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Air Force Institute of Technology

Research Report 2015

Period of Report: 1 Oct 2014 to 30 Sep 2015

Graduate School of Engineering and Management

GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT
AIR FORCE INSTITUTE OF TECHNOLOGY
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

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AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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This report was edited and produced by the Office of Research and Sponsored Programs, Graduate School of Engineering and Management, Air Force Institute of Technology. The Department of Defense, other federal government, and non-government agencies supported the work reported herein but have not reviewed or endorsed the contents of this report.

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or visit the AFIT website: www.afit.edu

Air Force Institute of Technology Research Report 2015 Foreword

Research programs at the Air Force Institute of Technology (AFIT) are aligned with national defense priorities and provide valuable technical and management experiences that enhance our graduates' performance throughout their careers. To maximize value, AFIT's research efforts address strategic priorities identified in guidance such as *America's Air Force: A Call to the Future* (2014), the United States Air Force Chief Scientist's report *Technology Horizons, A Vision for Air Force Science and Technology During 2010-2030*, and the *Air Force Science & Technology Strategy 2014*.

AFIT's Autonomy and Navigation Technology Center, Center for Cyberspace Research, Center for Directed Energy, Center for Operational Analysis, Center for Technical Intelligence Studies and Research, Center for Space Research and Assurance and other research groups serve as focal points for many of our research initiatives. Emerging research groups are addressing game-changing technologies including hypersonics and human-machine systems, exploring energy security strategies, and developing defense-related additive manufacturing applications.

AFIT has strategic partnerships with the Air Force Research Laboratory, the National Air and Space Intelligence Center, the Air Force Life Cycle Management Center, the United States Transportation Command, and many other organizations and operational communities to maximize the contributions of our research programs to national defense needs. Our faculty and students also engage in collaborations with researchers at universities throughout the nation to advance the state-of-the-art in a variety of disciplines. AFIT cooperates with commercial enterprises to ensure timely transfer of new technology to US industry through Cooperative Research and Development Agreements (CRADAs) whenever appropriate.

This Research Report is prepared annually to summarize the significant contributions of AFIT; to solicit continued involvement and support from our Air Force, DOD, and other federal partners; and to encourage new sponsors to participate in AFIT's research programs. AFIT welcomes new opportunities to engage in research projects that are of mutual interest to our customers, faculty, and students. Additional information is available at <http://www.afit.edu/ENR/>.

Heidi R. Ries, Ph.D.
Dean for Research
Graduate School of Engineering
and Management



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1. INTRODUCTION

1.1. OVERVIEW

This Research Report presents the FY15 research statistics and contributions of the Graduate School of Engineering and Management (EN) at AFIT. AFIT research interests and faculty expertise cover a broad spectrum of technical areas related to USAF needs, as reflected by the range of topics addressed in the faculty and student publications listed in this report. In most cases, the research work reported herein is directly sponsored by one or more USAF or DOD agencies.

AFIT welcomes the opportunity to conduct research on additional topics of interest to the USAF, DOD, and other federal organizations when adequate manpower and financial resources are available and/or provided by a sponsor. In addition, AFIT provides research collaboration and technology transfer benefits to the public through Cooperative Research and Development Agreements (CRADAs). Interested individuals may discuss ideas for new research collaborations, potential CRADAs, or research proposals with individual faculty using the contact information in this document or via the AFIT Directory at http://www.afit.edu/directory_search.cfm.

Additional information on the research programs at AFIT may also be found on the research web home page at <http://www.afit.edu/ENR/>. The Office of Research and Sponsored Programs, Graduate School of Engineering and Management can be reached at 937-255-3633, (DSN 785-3633) or by email: research@afit.edu. The primary points of contact are Dr. Michael J. Caylor, Director of Sponsored Programs, 937-255-3636 x7104, DSN 785-3636 x7104 and Dr. Heidi R. Ries, Dean for Research, 937-255-3636 x4544, DSN 785-3636 x4544.

1.2. THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT RESEARCH COLLABORATION

As detailed in the 2015-2017 catalog at <http://www.afit.edu/docs/20152017AFITcatalog.pdf>, AFIT offers Master's and Doctoral programs in a variety of disciplines through six departments: the Department of Aeronautics and Astronautics (ENY), the Department of Electrical and Computer Engineering (ENG), the Department of Engineering Physics (ENP), the Department of Mathematics and Statistics (ENC), the Department of Operational Sciences (ENS), and the Department of Systems Engineering and Management (ENV). In all of these disciplines, research is an integral component of graduate education, developing an individual student's skills and providing new knowledge of interest to many.

A brief listing of each department's research areas of emphasis appears below. Please contact the faculty or relevant departmental office for further information, or visit the Graduate School of Engineering and Management departmental websites at <http://www.afit.edu/en/>.

The [Department of Aeronautics and Astronautics](#) invites research topic proposals and collaborative suggestions for the Aeronautical Engineering, Astronautical Engineering, Materials Science, and Space Systems programs. The following list highlights the Department's research specialties:

Aeroelasticity and Design Optimization
Aerospace Structures and Materials
Autonomous Control of UAVs
Compact Combustor Development
Computational Fluid Dynamics
Control of High Performance Aircraft
Dynamic Flight Simulation
Experimental Fluid Dynamics
High Velocity Impact
Impact Dynamics
Inflatable Space Structures
Materials and Structural Analysis

Mechanics of Materials and Structures
Micro Air Vehicles
Non-Linear Dynamics
Re-entry Dynamics
Rocket & Space Propulsion
Rotorcraft Aeromechanics
Satellite Cluster Dynamics, Navigation, & Control
Spacecraft Dynamics & Control
Turbine Aerodynamics
Weapon Aerodynamics

The [Department of Electrical and Computer Engineering](#) invites research topic proposals and collaborative suggestions for the Electrical Engineering, Computer Engineering, Computer Science, Cyber Operations, and Cyber Warfare programs, as well as the **Autonomy and Navigation Technology Center** and the **Center for Cyberspace Research**. The following list highlights the Department's research specialties:

Advanced Security-Focused Computing Architectures
Artificial Intelligence
Automatic Target Recognition
Communications/Radar
Computer Communication Networks
Cryptography
Cyber Operations and Security
Electromagnetics/Low Observables
Electro-Optics

Evolutionary Algorithms
Guidance, Navigation, and Control
Hardware Assurance
Information Visualization
Micro- and Nanosystems
Parallel and Distributed Processing
Signal and Image Processing
Software Protection
Wireless Networks
Wireless Sensor Networks

The [Department of Engineering Physics](#) invites research topic proposals and collaborative suggestions for the Applied Physics, Nuclear Engineering, Optical Sciences and Engineering, Materials Science (jointly operated with the Department of Aeronautics and Astronautics), and Combating Weapons of Mass Destruction programs, as well as the **Center for Directed Energy** and **Center for Technical Intelligence Studies and Research**. The following list highlights the Department's research specialties within these programs:

Adaptive Optics, Aero-Optics and Beam Control
Atmospheric Characterization and Compensation
Atmospheric Effects on Weapons Systems
Atmospheric Electricity
Aviation Weather Forecasting
Biological and Chemical Weapon Technologies
Computational Physics
Defects in Crystalline Solids
Directed Energy Weapons Effectiveness
High Energy Density Physics
Imaging Science
Lasers and Electro-Optics
Muon Detection
Materials – Bio, Nuclear and Sensor
Microscopic Imaging of Surfaces
Modeling and Simulation of Atmospheric Effects

Molecular Reaction Dynamics
Nanomaterials
Nanomechanics
Nuclear Forensics
Nuclear Survivability
Nuclear Weapons Effects
Numerical Weather Prediction
Physics-Based Scene Modeling
Positron Spectrometry
Radiation and Particle Detection
Radiation Effects on Materials and Electronics
Radiation Transport
Remote Sensing and Signature Analysis
Satellite Meteorology
Semiconductors
Space Physics
Tropical Cyclone Analysis and Forecasting
Weather Radar

The [Department of Mathematics and Statistics](#) invites research topic proposals and collaborative suggestions for the following research specialties:

Acoustic Wave Scattering
Bayesian Analysis
Biostatistics
Categorical Data Analysis
Design of Experiments
Electromagnetics
Functional Analysis
Information Fusion

Nonlinear Waves
Numerical Analysis
Optimization
Partial Differential Equations
Rarefield Gas Dynamics
Regression Modeling
Stochastic Processes
Wavelets

The [Department of Operational Sciences](#), as well as its resident **Center for Operational Analysis**, invites research topic proposals and collaborative suggestions within the areas of Operations Research, Logistics, and Supply Chain Management programs. The following list highlights the Department's research specialties:

Agile Combat Support Prioritization
Automatic Target Recognition
Enterprise Level Depot Sustainment
Evaluation of Autonomous Systems
Facility Location Optimization
Force Structure Analysis Tool Development
Irregular Warfare Model Development
Materials Research Test Planning
Modeling and Simulation

Network Analysis
Repair Network Integration
Robust Decision Making
Robust Mobility Modeling
Social Network Modeling and Analysis
Supply Chain Management and Resource Optimization
Test and Evaluation

The [Department of Systems Engineering and Management](#) is a multidisciplinary department offering graduate degrees in seven different majors and conducting research in collaboration with the wide spectrum of programs throughout AFIT. The mission of the department is to provide defense-focused graduate education and engage in interdisciplinary research to achieve integrated solutions to current and future Air Force challenges and enhance the interface between technology and human resources by focusing on systems, processes, and management. The following list highlights the Department's research specialties:

Applied Environmental Sciences
Computer and Network Security
Construction Management
Cost Analysis
Design and Analysis of Experiments
Ecological Engineering
Emergency Management
Facility and Infrastructure Management
Fuels Microbiology
Geographical Information Science
Human Systems Integration
Human-Agent Interaction
Image and Display Science
Information Assurance and Security
Infrastructure Asset Management
Knowledge Management

Model-Based Systems Engineering
Occupational/Environmental Exposures
Operations Research
Organizational Change
Product Design and Development
Project Management
Reliability Engineering
Strategic Decision Support
Structural Health Monitoring
Surface Science
Sustainability and Life Cycle Assessment
Systems Engineering
Unmanned Air System Design and Test
Vigilance

Another avenue for educational and research collaboration with the Graduate School of Engineering and Management is through association with one or more of **AFIT's Research Centers**. A brief listing of each Center's research or educational areas of emphasis appears below. Please contact the Centers directly (see Chapter 6) or visit <http://www.afit.edu/ENR/page.cfm> for further information.

The [Autonomy and Navigation Technology \(ANT\) Center](#) is a forward-looking research center seeking to identify and solve tomorrow's most challenging navigation and autonomous and cooperative control problems by focusing on three research thrusts: autonomous and cooperative systems, non-GPS precision navigation, and robust GPS navigation/NAVWAR.

The [Center for Cyberspace Research \(CCR\)](#) conducts cutting-edge research in all aspects of cyberspace operations, including offense/exploitation, network defense, vulnerability analysis, critical infrastructure protection, human factors, and reverse engineering. Under CCR's leadership, AFIT has been designated by the National Security Agency as a Center of Academic Excellence in Cyber Operations and in Information Assurance Research. CCR also plays a prominent role in developing the Air Force's cyberspace operations workforce through execution of the Cyber 200 and Cyber 300 professional continuing education courses. Through these programs, CCR helps produce a cadre of technically educated leaders for the DOD and Federal government. Finally, as the Air Force's Cyberspace

Technical Center of Excellence, CCR faculty and staff advise Air Force and DOD leaders on issues related to force development, cyberspace education, and research activities.

The [Center for Directed Energy \(CDE\)](#) is dedicated to Air Force and DOD research in high energy lasers (HELs), high power microwaves (HPMs), and their enabling technologies. The Center is an advocate for transitioning these systems to the battlefield through vigorous scientific and engineering research, graduate education programs and diverse consulting activities.

The [Center for Operational Analysis \(COA\)](#) conducts defense-focused research and provides timely technology transfer to DOD sponsors. The center provides solutions to current and future operational challenges while developing critical and forward thinking analysts, managers, and leaders.

The [Center for Space Research and Assurance \(CSRA\)](#) is focused on delivering highly-valued resilient, responsive and reliable space capabilities to the DOD and Intelligence Community through executing cutting-edge space technology development, science and space experiments in collaboration with government organizations to meet the challenges of tomorrow and by developing the technical space cadre through world-class research and immersive hands-on graduate education.

The [Center for Technical Intelligence Studies and Research \(CTISR\)](#) is focused on Air Force, DOD and the U.S. Intelligence Community (IC)'s scientific, technical and operational activities through graduate research programs. Activities are directed on improving technical intelligence gathering via remote sensing. Current research is focused on signature measurement, phenomenological understanding, and algorithm development for target detection & tracking, event classification, and material identification.

The **Center of Excellence (COE) for Scientific Test and Analysis Techniques (STAT) in Test & Evaluation (T&E)** is a reach-back T&E capability that provides advice and assistance in the application of scientific test and analysis techniques in the development of Test & Evaluation Master Plans (TEMP). The COE provides value to the PEOs/PMs across the DOD through assistance provided to the Chief Developmental Tester (T&E Program Leads) during the T&E planning, execution and assessment. The COE provides an additional resource of subject matter expertise for the program managers and chief developmental testers of Major Defense Acquisition Programs (MDAP) and Major Automated Information Systems (MAIS) during the T&E planning, execution, and assessment process.

2. SPECIAL RECOGNITIONS

2.1 FACULTY FELLOWS

Badiru, Adedeji B., Dean, Graduate School of Engineering and Management, Fellow of the Institute of Industrial Engineers, Fellow of the Nigerian Academy of Engineering.

Bridgman, Charles J., Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, Fellow of the American Nuclear Society.

Deckro, Richard F., Professor of Operations Research, Department of Operational Sciences, Fellow of the Military Operations Research Society.

Elrod, William E., Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Society of Mechanical Engineers International.

Goltz, Mark N., Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, Fellow of the Society of American Military Engineers.

Grimaila, Michael R., Professor and Head, Department of Systems Engineering and Management, Fellow of the Information System Security Association.

Hengehold, Robert L., Professor Emeritus of Physics, Department of Engineering Physics, Fellow of the American Physical Society.

Houpis, Constantine H., Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

Franke, Milton E., Professor Emeritus of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers.

Mall, Shankar, Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

Maybeck, Peter S., Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

Pachter, Meir, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Electrical and Electronic Engineers.

Palazotto, Anthony N., Distinguished Professor, Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of American Institute of Aeronautics and Astronautics, Fellow of the American Academy of Mechanics, Fellow of the American Society of Civil Engineers, Fellow of the Engineering Mechanics Institute.

Perram, Glen P., Professor of Physics, Department of Engineering Physics, Fellow of the Directed Energy Professional Society.

Pignatiello, Joseph J., Professor of Operations Research; Head, Department of Operational Sciences, Fellow of the Institute of Industrial Engineers, Fellow of the American Society for Quality.

Polanka, Marc D., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

Raquet, John F., Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Institute of Navigation.

Ruggles-Wrenn, Marina B., Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, Fellow of the American Society of Mechanical Engineers International.

Terzuoli, Andrew J., Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, Fellow of the Electromagnetics Academy.

Torvik, Peter J., Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and Astronautics, Fellow of the American Institute of Aeronautics and Astronautics, Life Fellow of American Society of Mechanical Engineers International, Fellow of the Ohio Academy of Science.

2.2 PROFESSIONAL CERTIFICATIONS

Ahner, Darryl K., Professional Engineer (Commonwealth of Virginia)

Badiru, Adedeji B., Certified Project Management Professional (PMP), Leadership Certificate (University of Tennessee Leadership Institute), Professional Engineer (State of Oklahoma)

Cain, Stephen C., Professional Engineer (State of Ohio)

Coutu, Ronald A., Jr., Professional Engineer (State of California)

Cunningham, William A., Certified in Transportation and Logistics (CTL)

Eninger, Robert M., Lt Col, Certified Industrial Hygienist

Fass, Robert D., Certified Cost Estimator/Analyst (International Cost Estimating and Analysis Association)

Freels, Jason K., Maj, Systems Planning, Research, Development and Engineering (SPRDE) Certification, Level III

Golden, Eric M., Maj, APDP Level II Certification – SPRDE Science and Technology Manager, APDP Level II Certification – SPRDE Systems Engineer, APDP Level I Certification – Program Management

Goltz, Mark N., Board Certified Environmental Engineer (American Academy of Environmental Engineers), Professional Engineer (State of Minnesota)

Greendyke, Robert B., Professional Engineer (State of Texas)

Grimaila, Michael R., Certified Information Security Manager (CISM); Information Systems Audit and Control Association (ISACA); Certified Information System Security Professional (CISSP); International Information Systems Security Certification Consortium, Inc. (ISC)2; National Security Agency INFOSEC Assessment Methodology (IAM) Certification; National Security Agency INFOSEC Evaluation Methodology (IEM) Certification; National Security Agency 4011/4012/4013 Certification

Hammond, Gregory D., Maj, Professional Engineer (State of North Carolina)

Harper, Willie F., Jr., Professional Engineer (State of Arizona)

***Houpis, Constantine H.**, Professional Engineer (State of Ohio)

Kunz, Donald L., Professional Engineer (Commonwealth of Virginia)

Loper, Robert D., APDP Level II Certification – SPRDE, APDP Level II Certification – S&T Management, APDP Level I Certification – Program Management

Marciniak, Michael A., APDP Level II Certification – SPRDE, APDP Level II Certification – Program Management, APDP Level I Certification – Test and Evaluation, Certified Laser Safety Officer (Board of Laser Safety, Orlando, FL)

Mullins, Barry E., Program, Certified Supervisory Control and Data Acquisition (SCADA) Security Architect (CSSA), Information Assurance Certification Review Board, National Security Agency INFOSEC Assessment Methodology (IAM) Certification, National Security Agency INFOSEC Evaluation Methodology (IEM) Certification, Professional Engineer (State of Colorado)

Overstreet, Robert E., Lt Col, Certified in Transportation & Logistics (CTL)

Palazotto, Anthony N., Professional Engineer (State of Ohio)

Perram, Glen P., Professional Engineer (State of Ohio)

Peterson, Gilbert L., ISC2 Certified Cyber Forensics Professional (CCFP)

Racz, LeeAnn, Maj, Professional Engineer (State of Colorado), Board Certified Industrial Hygienist, Board Certified Environmental Engineer

Reeder, Mark F., Professional Engineer (State of Ohio)

Ritschel, Jonathan, Lt Col, APDP Business-Cost Estimation Certification, Level II

Rutledge, James L., Maj, Professional Engineer (State of Texas)

Ryan, Erin T., Lt Col, APDP Program Management Certification, Level III, APDP Systems Planning, Research, Development and Engineering Certification, Level III

Shelley, Michael L., Certified Air Force Hearing Conservationist

Stone, Brian B., Maj, Six Sigma Black Belt Certification (Arizona State University), Certificate in Statistics (Arizona State University)

Tuttle, Ronald F., APDP Level III Certification – Program Management, APDP Level III Certification – SPRDE

Valencia, Vhance V., Maj, Professional Engineer (State of North Carolina)

Yamamoto, Dirk, P., Lt Col, Certified Safety Professional (CSP)

*Emeritus faculty

2.3 RESEARCH AND TEACHING AWARDS

2.3.1 FACULTY

AHNER, DARRYL K.

Council of Supply Chain Management Professionals Global Conference, 2014 E Grosvenor Plowman Award for Best Paper

AKERS, BENJAMIN F.

ENC Instructor of the Quarter, 2015 Spring Quarter

BORGHETTI, BRETT J.

2015 AETC Winner & Nominee to AF level Competition, AF STEM Outstanding Science and Educator Award for 2014

COLLINS, PETER J.

2014 AMTA Outstanding Service Award

CROWE, DARRELL S., Maj

2015 Southwest Ohio Council for Higher Education (SOCHE) Excellence in Teaching Award

DECKRO, RICHARD F.,

2015 Distinguished Professor, Air Force Institute of Technology

DOUGLAS, MATTHEW A., Lt Col

2014-2015 Instructor of the Year, AFIT/ASAM

FICKUS, MATTHEW C.

ENC Instructor of the Quarter, 2015 Winter Quarter

HAMMOND, GREGORY D., Maj

2014 Department Journal Publication of the Year

HODSON, DOUGLAS D.

2015 Harold Brown Award (AETC level)

2014 AFIT's 4th Quarter Civilian Category III Award

HOPKINSON, KENNETH M.

2014 AFIT Winner and Air Education and Training Command (AETC) Runner-Up for the Educator of the Year Award

JACKSON, JULIE A.

ENG nominee for the 2014 BOV Gage H. Crocker Professor Award

KELLY, TONY D.

2015 Junior Civilian Career Engineering Award— Air Force Institute of Technology (AFIT) and Air Education and Training Command (AETC)

2015 Lt Col Charles P. Brothers, Jr. Outstanding Volunteer Service Award

LIU, DAVID, Maj

2015 Outstanding Military Faculty Member, Military Officer Association of America

LUNDAY, BRIAN J., LTC

ISERC, Best Paper Award for the IE in the Military Track, 2015

MARTIN, RICHARD K.

AFIT quarterly award, 2015 Q1, Team category, National Engineers Week Team

Presidential Volunteer Service Award (silver level), AFIT Engineers Week Team

MCHALE, STEPHEN, LTC

2014 Southwest Ohio Council for Higher Education (SOCHE) Excellence in Teaching Award

MILLS, ROBERT

General Bernard A. Schriever Award

MIXON, DUSTIN, Maj

Air Force Office of Scientific Research (AFOSR) Young Investigator Award

MULLINS, BARRY E.

2014 Southwest Ohio Council for Higher Education (SOCHE) Excellence in Teaching Award

OYAMA, KYLE, Lt Col

2014 AFIT/ENV Publication of the Year for AFIT/ENV

Best of Session Award: Awarded by the Society of Flight Test Engineers – This award recognized the paper “Analyzing DT&E Flight Test Missions” by Sutherlin, J., J. Colombi, J. Wirthlin, K. Oyama, and J. Vandewiel for the *Proceedings of the 45th Annual International Symposium of the Society of Flight Test Engineers*

PETERSON, JESSE D., Capt

ENC Instructor of the Quarter, 2015 Summer Quarter

PIGNATIELLO, JOSEPH J., Jr.,

Award of Appreciation, Quality Control and reliability Engineering Division (QCRE) of the Institute of Industrial Engineers, 2015

POLANKA, MARC D.

2015 Southwestern Ohio Council for Higher Education Leadership Fellow

RANDALL, CHRISTIAN E., Maj

AETC 2014 Outstanding Air Force Logistics Readiness Field Grade Officer of the Year

RITSCHER, JONATHAN, D., Lt Col

2014 Southwest Ohio Council for Higher Education (SOCHE) Excellence in Teaching Award

2014 Faculty Scholar of the Year, Department of Systems Engineering and Management

ROBBINS, MATTHEW J., Lt Col

HQ AFMC/A2/5 2014 Annual Award Winner: recognized with the Cost Capability Analysis Team

RUGGLES-WRENN, MARINA B.

2015 Stinson Trophy, presented by the National Aeronautical Association for outstanding and enduring contribution to the role of women in the field of aviation, aeronautics, space or related sciences

RUSNOCK, CHRISTINA, Maj

Engineering Economy Track Best Paper Award: Awarded by the Institute of Industrial Engineers - This award recognized the paper "Predicting Cost Growth for Military and Civil Space Systems" by Christina F. Rusnock and Edward D. White III for the *Proceedings of the 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference*

RYAN, ERIN T., Lt Col

2014 Department Outstanding Educator Award

SCHUBERT KABBAN, CHRISTINE M.

ENC Instructor of the Quarter, 2014 Fall Quarter

SEAL, MICHAEL D., Maj

2014 AETC winner for AF Science & Engineering Award – Exploratory Technology Development (ETD)

THAL, ALFRED E.,

2014 SIE Management Instructor of the Year

Best Application Paper Award: Awarded by the Western Decision Sciences Institute - This award recognized the paper "Strategic Sourcing: Don't Lose Sight of the Forest" by A.R. Meyers and A.E. Thal, Jr. for the *Western Decision Sciences Institute Annual Meeting*

2.3.2 STUDENTS

ALBA, CHRISTOPHER R.

Best Technical Presentation – CFD, 40th AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2015

ALTENHOFEN, JASON A.

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Systems Engineering and Management. Thesis title: "A Methodology to Determine the Influence of Requirements Change to Support System Design."

2014-2015 Louis Polk Award that recognizes a graduating student who has made an advanced contribution to his/her professional field in direct furtherance of the objectives of the National Defense Industrial Association.

AUSSERER, JOSEPH K.

Best Technical Presentation – Combustion, 40th AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2015

HORN, KEVIN P.

2nd Place, Graduate Student Category, AIAA Regional Student Conference at Wright State University, OH, Apr 2015

JODEH, NIDAL M.

Best Paper in Design and Optimization, ASME Dayton Engineering Sciences Symposium, May 2015

LAFLEUR, ROBERT S.

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Electrical and Computer Engineering. Thesis title: "Development of A Novel Hybrid Multi-Junction Architecture for Silicon Solar Cells."

Best Paper in Renewable and Clean Energy, ASME Dayton Engineering Sciences Symposium, May 2015

LEWIS, MEGAN E.

2015 Chancellor's Award for the most exceptional master's thesis by a graduating student. Thesis title: "Recent Advances in Compressed Sensing: Discrete Uncertainty Principles and Fast Hyperspectral Imaging."

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Mathematics and Statistics. Thesis title: "Recent Advances in Compressed Sensing: Discrete Uncertainty Principles and Fast Hyperspectral Imaging."

LINGENFELTER, ANDREW J.

Lockheed Martin Best Student Paper in Structures – 2015 AIAA SciTech, Jan 2015

1st Place, Art-in-Science Competition – 2015 Dayton Cincinnati Aerospace Science Symposium, Mar 2015

LYNCH, ANDREW J.

Best Technical Presentation – Heat Transfer, 40th AIAA Dayton Cincinnati Aerospace Science Symposium, Mar 2015

MATTERS, DAVID A.

2015 Melvin E. Gross Award that recognizes a graduating master's student who has demonstrated the most exceptional academic achievement and high qualities of character, initiative and leadership.

SINGLETON, JACOB W.

Best Paper in Sensors, ASME Dayton Engineering Sciences Symposium, May 2015

SLAUGHTER, ROBERT A.

2014 Best Student Paper, IEEE Applied Imagery and Pattern Recognition Workshop

STEENMAN, MATTHEW B.

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Aeronautics and Astronautics. Thesis title: "Reverse Radio Frequency Fingerprinting for Remote Indoor Localization."

VAN ZANDT, NOAH R.

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Engineering Physics. Thesis title: "Modeled and Measured Partially Coherent Illumination Speckle Effects from Sloped Surfaces for Tactical Tracking."

WIDRICK, REBECCA S.

2015 Dean's Award for the most exceptional master's thesis by a graduating student in the Department of Operational Sciences. Thesis title: "Optimal Policies for the Management of a Plug-In Hybrid Electric Vehicle Swap Station."

3. RESEARCH STATISTICS

3.1 RESEARCH AND CONSULTING OUTPUT MEASURES

There are measurable indicators of AFIT's contribution to the engineering and scientific community and AFIT's success in staying well informed of technical possibilities and scientific opportunities. These indicators include the number and quality of technical publications accepted by the editors of journals; the number of presentations accepted for regional, national and international conferences; the number of sponsor funded research projects conducted; and finally, the number of student Graduate Research Papers, MS theses, and PhD dissertations completed and submitted to the Defense Technical Information Center. For FY15, these output measures are shown in Tables 3.1a and 3.1b for the Departments and Centers, respectively.

Table 3.1a Faculty Research and Sponsored Programs Output, by Department

	Graduate School, by Department						
	Graduate School (EN) Total	Math & Stats (ENC)	Electrical & Comp Eng (ENG)	Engineering Physics (ENP)	Operational Sciences (ENS)	Sys Eng & Management (ENV)	Aeronautics & Astro (ENY)
Number of Faculty (FTE)*	142	17	36	23	23	23	20
Refereed Publication Authorships**	268	37	54	46	20	56	55
Refereed Conferences on the Basis of Full Paper Review**	181	5	80	23	23	24	26
Refereed Conferences on the Basis of Abstract Review**	154	3	47	30	29	9	36
Sponsor Funded Projects***	193	8	66	45	14	12	47
Books & Chapters in Books**	18	1	7	1	1	6	2
Patents****	6	-	3	1	-	-	2
Doctoral Dissertations Advised	41	2	8	9	8	4	10
Master's Theses Advised	249	5	69	37	41	51	46
Graduate Research Papers Advised	15	-	-	-	15	-	-

*FTE: Full-time equivalent

**Publications/Presentations are counted by faculty authorships.

***One project associated with the Office of Research and Sponsored Programs (ENR) is reflected in Graduate School (EN) Total.

****Includes: Patents awarded, patent applications, and invention disclosures.

Table 3.1b Faculty Research and Sponsored Programs Output, by Center

	Center Total	Graduate School, by Center					
		ANT	CCR	CDE	COA	CSRA	CTISR
Number of Affiliated Faculty*	121	28	23	14	19	23	14
Refereed Publication Authorships**	70	6	29	19	2	6	8
Refereed Conferences on the Basis of Full Paper Review**	66	21	20	16	2	7	-
Refereed Conferences on the Basis of Abstract Review**	43	14	4	12	2	5	6
Sponsor Funded Projects***	101	25	17	21	10	15	13
Books & Chapters in Books**	5	3	2	-	-	-	-
Patents	3	1	1	1	-	-	-
Doctoral Dissertations Advised	18	3	6	4	2	2	1
Master's Theses Advised	85	34	26	5	3	16	1
Graduate Research Papers Advised	15	-	-	-	15	-	-

*Some faculty are affiliated with multiple centers.

**Publications/Presentations are counted by faculty authorships.

***Four projects are shared by two centers, not reflected in the Center Total but credit given to both Centers.

3.2 RESEARCH AND CONSULTING SPONSORSHIP

As part of an Air Force institution, the faculty members of the Air Force Institute of Technology focus their research on current problems as well as future systems of the Air Force and other DOD organizations. Evidence of this focus is that 85% of all theses, dissertations, and graduate research papers listed in Table 3.1a are externally sponsored by Air Force, DOD and government agencies. In addition, most of the research projects and consultations are carried out for Air Force and DOD units. The data are summarized in Figure 3.1 and Table 3.2.

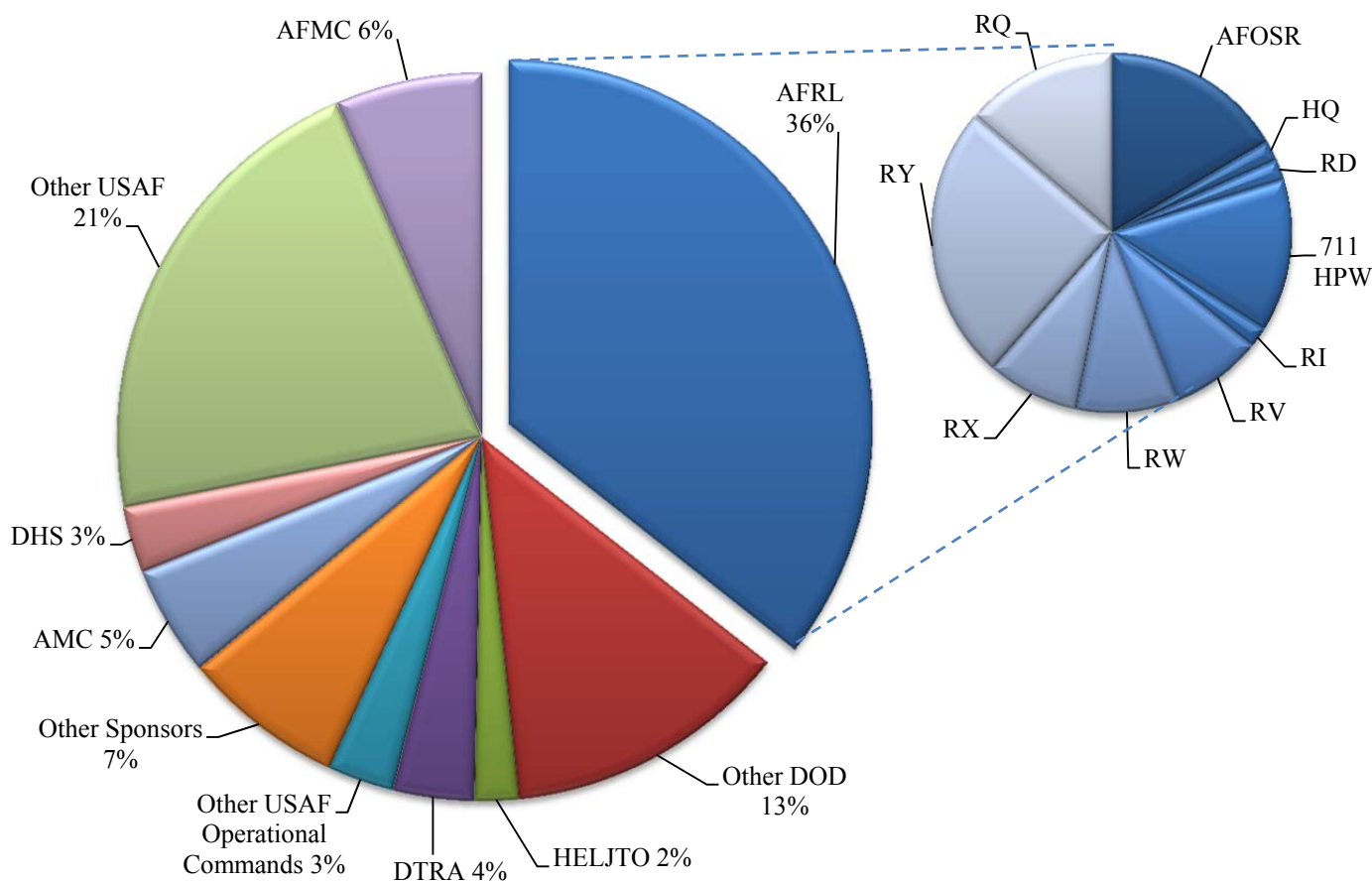


Figure 3.1 Sponsors of AFIT Theses, Dissertations, and Graduate Research Papers

Table 3.2 AFIT External Sponsorship by Organization

SPONSOR ORGANIZATION	PhD Dissertations	Master's Theses	Graduate Research Papers	Funded Projects
OFFICE OF THE SECRETARY OF THE AIR FORCE		3		
HQ UNITED STATES AIR FORCE	1	3	1	
AIR COMBAT COMMAND		2		
AIR EDUCATION AND TRAINING COMMAND		1		
AIR FORCE MATERIEL COMMAND	2	3		4
96 th Test Group		2		
746 th Test Squadron		1		1
Air Force Life Cycle Management Center		4		4
Air Force Nuclear Weapons Center	1	4		1
Air Force Research Laboratory (AFRL)		1		1
711 Human Performance Wing (RH)	1	14		2
Air Force Office of Scientific Research (AFOSR)	3	15		30
Aerospace Systems Directorate (RQ)	3	12		19
Directed Energy Directorate (RD)	1	1		4
Information Directorate (RI)	1	1		1
Materials & Manufacturing Directorate (RX)	1	8		4
Munitions Directorate (RW)	2	8		6
Sensors Directorate (RY)	4	23		21
Space Vehicles Directorate (RV)	2	8		1
Air Force Seek Eagle Office		1		
Air Force Sustainment Center	1			
Air Force Test Pilot School		1		
AIR MOBILITY COMMAND		3	12	
AIR FORCE SPACE COMMAND		6		1
USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS				
Air Force Civil Engineer Center		5		1
Air Force Cost Analysis Agency		1		
Air Force Medical Operations Agency		1		
Air Force Petroleum Agency		1		
Air Force Technical Application Center		1		
Air Force Weather Agency		1		
National Air and Space Intelligence Center		4		9
US Air Force Academy		1		
OTHER DEPARTMENT OF DEFENSE	3	11		30
Defense Advanced Research Projects Agency		3		2
Defense Information Systems Agency				1
Defense Threat Reduction Agency	3	8		5
High Energy Laser Joint Technology Office	1	5		5
Joint Aircraft Survivability Program Office		2		
Joint Chiefs of Staff			1	
Joint Warfare Analysis Center				2
Laboratory for Telecommunications Sciences	1	2		
Missile Defense Agency	1			4
National Geospatial-Intelligence Agency				2
National Security Agency				5
Office of the Secretary of Defense	1	4		3
United States Army		4		10
United States Marine Corps				2
United States Navy		2		1
US European Command		1		
US Special Operations Command		2		
US Strategic Command		1		
US Transportation Command			1	1

OTHER FEDERAL AGENCIES				1
Department of Energy	1	2		
Department of Homeland Security	1	8		2
Environmental Protection Agency		7		
National Aeronautics and Space Administration				1
National Science Foundation		1		2
NON-FEDERAL AGENCIES				3
Argentine Air Force Materiel General Directorate		1		
Brazilian Armed Forces		1		
Dayton Area Graduate Studies Institute		1		
Dayton LEADER Consortium		1		
Lincoln Laboratory - MIT		2		
Lockheed Martin		2		1
Spectral Energies		1		
Turkish Air Force		1		
*TOTALS	35	213	15	193

*NOTE: Some student publications have multiple sponsors; See App B for Selected Acronym List

3.3 EXTERNAL SPONSOR FUNDING FOR THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT

Many of the Graduate School of Engineering and Management's theses and research projects completed under faculty supervision (sponsored or unsponsored) are funded in part by other Air Force, DOD and government units and agencies. Often, this funding results from collaboration between faculty and thesis sponsors and occurs when the research project can be leveraged by the purchase of equipment or services not otherwise available. Figure 3.2 summarizes the past ten fiscal years of sponsored funding. Tables 3.3 and 3.4, and Figure 3.3, summarize external funding for FY15.

Figure 3.2 New Award History FY06-FY15

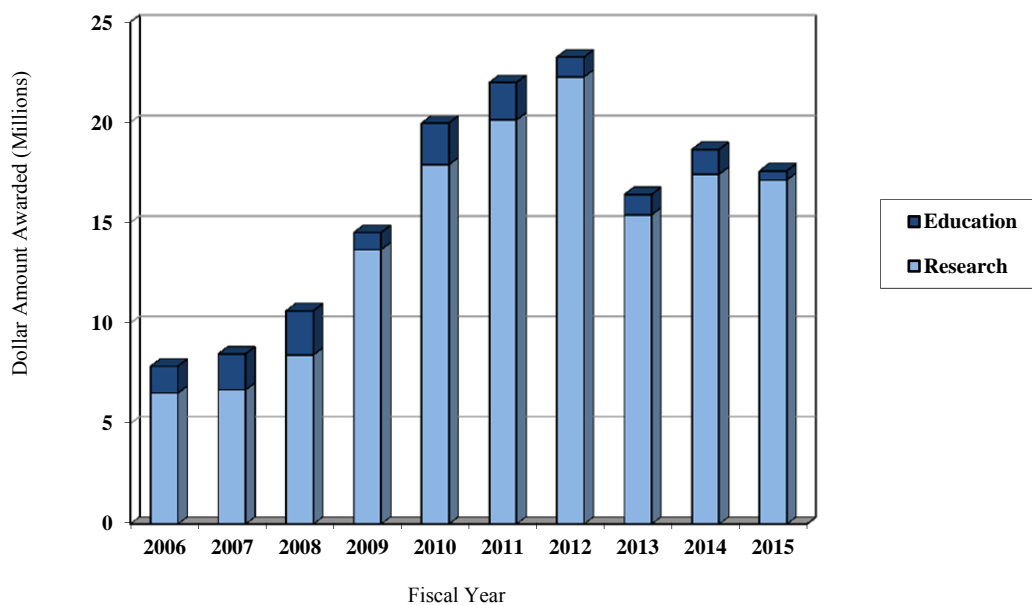


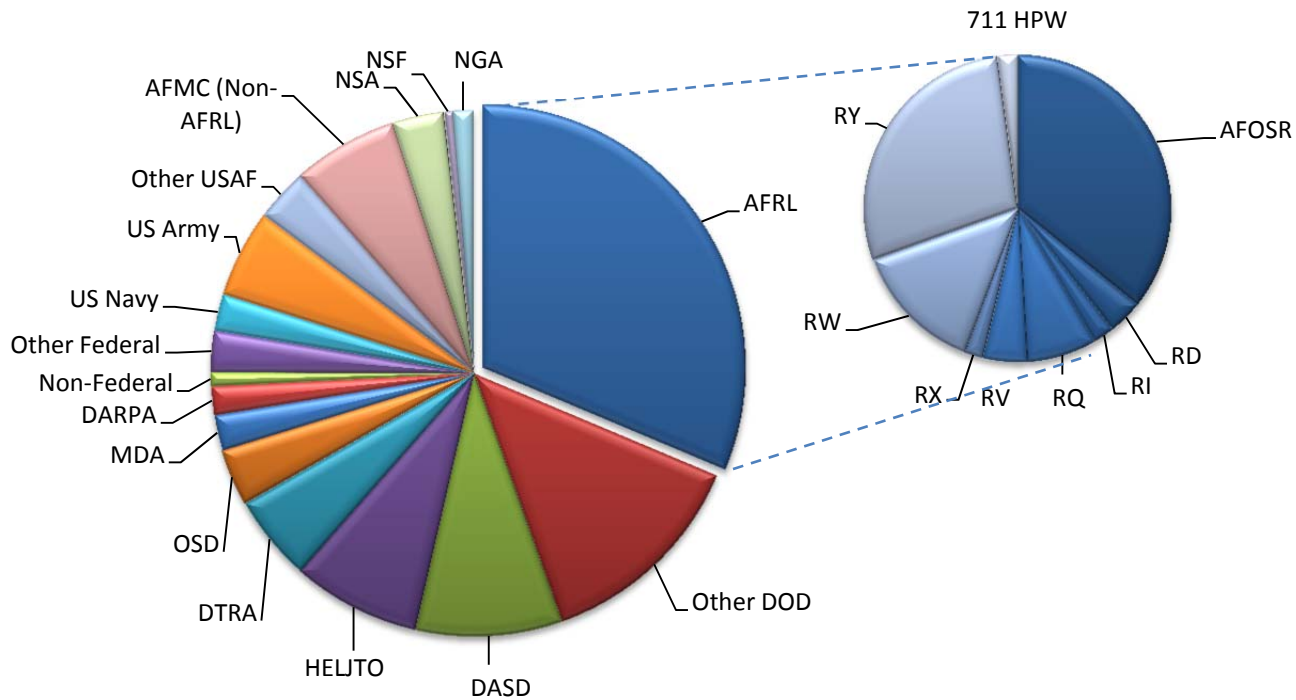
Table 3.3 FY15 External Funding & Research Expenditures for Academic Departments & Research Centers (\$1,000's)

Department	Newly Awarded Research Projects		Newly Awarded Education Projects		Total FY15 Newly Awarded Projects		Total FY15 Research Expenditures
	#	\$k	#	\$k	#	\$k	\$k
Mathematics & Statistics (ENC)	7	422	1	30	8	452	355
Electrical & Computer Eng (ENG)	64	4,828	2	204	66	5,032	5,153
Engineering Physics (ENP)	44	4,982	1	50	45	5,032	4,470
Research & Sponsored Programs (ENR)	1	377	-	-	1	377	-
Operational Sciences (ENS)	11	3,182	3	115	14	3,297	3,571
Systems Eng & Management (ENV)	11	717	1	8	12	725	837
Aeronautical & Astronautical Eng (ENY)	44	2,622	3	49	47	2,671	2,552
TOTAL	182	17,130	11	456	193	17,586	16,938

Center							
Autonomy and Navigation Technology (ANT)	25	2,174	-	-	25	2,174	2,599
Center for Cyberspace Research (CCR)	15	1,226	2	204	17	1,430	1,021
Center for Directed Energy (CDE)	21	2,657	-	-	21	2,657	2,244
Center for Operational Analysis (COA)*	9	1,521	1	90	10	1,611	1,990
Center for Space Research and Assurance (CSRA)	15	1,310	-	-	15	1,310	1,287
Center for Tech Intel Studies & Research (CTISR)	12	1,445	1	50	13	1,495	1,200
TOTAL	97	10,333	4	344	101	10,677	10,341

Notes: Total research expenditures reported include institutional cost sharing, which is not included in newly awarded projects. Numbers reported to the ASEE and NSF research expenditure surveys vary somewhat due to differences in definitions. All Center funds are also included in departmental funding.

Figure 3.3 New FY15 Awards by Sponsor



*Pie Chart on the right shows breakdown by AFRL Technology Directorates

Table 3.4 New FY15 Awards to Academic Departments & Research Centers by Sponsor

Dept.	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ENC	244	-	-	100	94	14	452
ENG	2,551		263	1,973	225	20	5,032
ENP	1,045	217	100	3,457	213		5,032
ENR	377	-	-	-	-	-	377
ENS	175	715		2,407			3,297
ENV	86	133	78	420	8		725
ENY	1,033	78	134	1,306	5	115	2,671
TOTAL	5,511	1,143	575	9,663	545	149	17,586

Note: "Other DOD" in this table includes the DTRA, HELJTO, NGA, NSA, OSD, DASD, and MDA pie slices from Figure 3.3, plus funding from other DOD organizations.

Center	AFRL \$k	AFMC (Non-AFRL) \$k	Other USAF \$k	Other DOD \$k	Other Federal \$k	Non- Federal \$k	Total \$k
ANT	1,414	-	35	705	-	20	2,174
CCR	240	-	-	965	225	-	1,430
CDE	767	17	12	1,798	63	-	2,657
COA	100	715	-	796	-	-	1,611
CSRA	374	103	-	833	-	-	1,310
CTISR	50	-	87	1,358	-	-	1,495
TOTAL	2,945	835	134	6,457	288	20	10,677

Note: All Center funds are also included in departmental funding

4. SPONSORSHIP OF STUDENT RESEARCH

4.1. OFFICE OF THE SECRETARY OF THE AIR FORCE

MASTER'S THESES

GARDNER, NICHOLAS R., *Forecasting Foreign Currency Exchange Rates for Air Force Budgeting*. AFIT/ENV/MS/15M-178. Faculty Advisor: Lt Col Jonathan D. Ritschel. Sponsor: SAF.

HERON, REY A., *Forecasting DOD Mid-Acquisition Space Program Final Costs Using WBS Level 2 and 3 Data*. AFIT/ENC/MS/15M-179. Faculty Advisor: Dr. Edward D. White. Sponsor: SAF/AFCAA.

TEKE, CHRISTOPHER L., *Impacts of Severe Weather, Climate Zone, and Energy Factors on Base Realignment and Closure (BRAC)*. AFIT/ENV/MS/15M-186. Faculty Advisor: Dr. John J. Elshaw. Sponsor: SAF/IE.

4.2. HEADQUARTERS UNITED STATES AIR FORCE

DOCTORAL DISSERTATIONS

BOEHMKE, BRADLEY C., *Grabbing the Air Force by the Tail: Applying Strategic Cost Analytics to Understand and Manage Indirect Cost Behavior*. AFIT/ENS/DS/15S-076. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC & HQ USAF/A4. [COA]

MASTER'S THESES

COOPER, ANDREW L., *Antecedents to Organizational Performance: Theoretical and Practical Implications for Aircraft Maintenance Officer Force Development*. AFIT/ENS/MS/15M-129. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: HQ USAF/A4.

HOECHERL, JOSEPH C., *Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment*. AFIT/ENS/MS/15M-126. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: HQ USAF/A1.

SCHOFIELD, JILL A., *Non-Rated Air Force Line Officer Attrition Rates Using Survival Analysis*. AFIT/ENS/MS/15M-128. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

GRADUATE RESEARCH PAPERS

POSEY, FAITH K., *Enterprise Sustainment Metrics*. AFIT/ENS/GRP/15J-018. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4. [COA]

4.3. AIR COMBAT COMMAND

MASTER'S THESES

HANSEN, JOEL N., *The Impact of United States Investment for Civil Infrastructure in Developing Countries*. AFIT/ENV/MS/15M-175. Faculty Advisor: Lt Col Peter P. Feng. Sponsor: ACC/12 AF.

LOGAN, SAMUEL W., *Predicting Citizen Satisfaction with Government Services in Belize*. AFIT/ENV/MS/15M-190. Faculty Advisor: Lt Col Peter P. Feng. Sponsor: ACC/12 AF.

4.4. AIR EDUCATION AND TRAINING COMMAND

MASTER'S THESES

RICH, MICHAEL D., *Evaluating Machine Learning Classifiers for Hybrid Network Intrusion Detection Systems*. AFIT/ENG/MS/15M-046. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RV & AF CyTCoE. [CCR]

AIR FORCE INSTITUTE OF TECHNOLOGY

DOCTORAL DISSERTATIONS

BENSON, MICHAEL R., *Identifying the Experimental and Theoretical Effective Characteristics of Nonaligned Anisotropic Metamaterials*. AFIT/ENP/DS/15J-008. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A. [CDE]

CHALYVIDIS, CHRISTOS E., *Supply Chain Interoperability Measurement*. AFIT/ENS/DS/15J-001. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

GOFF, GARY M., *Orbit Estimation of Non-Cooperative Maneuvering Spacecraft*. AFIT/ENY/DS/15J-051. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

KALLEMYN, BENJAMIN S., *Modeling Network Interdiction Tasks*. AFIT/ENS/DS/15S-032. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

LAKE, ROBERT A., *Novel Applications of a Thermally Tunable Bistable Buckling Silicon-on-Insulator (SOI) Microfabricated Membrane*. AFIT/ENG/DS/15S-013. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: N/A.

LIN, ALAN C., *Network Analysis with Stochastic Grammars*. AFIT/ENG/DS/15S-014. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]

SEYMOUR, RICHARD S., *Testing the Adequacy of a Semi-Markov Process*. AFIT/ENC/DS/15S-003. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

SMALENBERGER, DAVID M., *On Pecuniary Resiliency, Early Warning, and Market Imitation under Unrestricted Warfare*. AFIT/ENS/DS/15S-034. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

STEWART, KYLE E., *Novel Techniques for Secure Use of Public Cloud Computing Resources*. AFIT/ENG/DS/15S-018. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

THOMPSON, ROBERT E., *A Methodology for the Optimization of Disaggregated Space System Conceptual Designs*. AFIT/ENV/DS/15J-062. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

MASTER'S THESES

AL GHOFAILY, MOHAMMED, *Finite Element Analysis and Experimentation of an Icosahedron Frame under Compression*. AFIT/ENY/MS/15S-051. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: N/A.

ALLEN, COURTNEY, *Evaluation of Control Inputs on the Spin Recovery of the 8KCAB Super Decathlon*. AFIT/ENV/MS/15S-035. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

BABBIE, CURTIS A., *Effect of Mixture Pressure and Equivalence Ratio on Detonation Cell Size for Hydrogen-Air Mixtures*. AFIT/ENY/MS/15J-045. Faculty Advisor: Dr. Paul I. King. Sponsor: N/A.

BROWN, ADAM B., *A Case Study of Requirements Development in a Satellite Adjunct Payload*. AFIT/ENV/MS/14D-040. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

CATARIUS, ADRAIAN M., *Static Scene Statistical Non-Uniformity Correction*. AFIT/ENG/MS/15M-062. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

COLYER, PATRICK, *Infrared Signature Modeling of the UH-60L for Increased Mission Success of Future Vertical Lift Aircraft*. AFIT/ENY/MS/15S-056. Faculty Advisor: Maj David Liu. Sponsor: N/A.

DANSEREAU, MATTHEW R., *A Decision Analysis Framework for Evaluation of Helmet Mounted Display Alternatives for Fighter Aircraft*. AFIT/ENV/MS/14D-045. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

DINIZ, HEATHER C., *Navigation Constellation Design Using a Multi-Objective Genetic Algorithm*. AFIT/ENY/MS/15M-245. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A. [CSRA]

EKEN, MELIH, *Modular Heat Dissipation Technique for a CubeSat*. AFIT/ENY/MS/15S-073. Faculty Advisor: Maj James L. Rutledge. Sponsor: N/A. [CSRA]

FORBES, JACOB A., *Restoration and Humanitarian Aid Delivery on Interdependent Transportation and Communication Networks after an Extreme Event*. AFIT/ENS/MS/15M-142. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: N/A.

GALDEEN, MATTHEW T., *Modeling and Simulation of an Impedance Loaded Bow Tie Antenna*. AFIT/ENG/MS/15M-036. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A. [ANT]

GILLESPIE, MITCHELL N., *Modeling Attitude Variance in Small Unmanned Aerial Systems for Acoustic Signature Simplification Using Experimental Design in a Hardware-in-the-Loop Simulation*. AFIT/ENS/MS/15M-110. Faculty Advisor: Maj Brian B. Stone. Sponsor: N/A.

GRATSCH, JOSHUA M., *Analytical Development of the Availability KPP as Applied to Air Force Acquisition Programs*. AFIT/ENS/MS/15S-077. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A.

GRUBER, DONALD A., *Tactical AI in Real Time Strategy Games*. AFIT/ENG/MS/15M-021. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A.

HAN, CHAN Y., *A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense System Assets*. AFIT/ENS/MS/15M-123. Faculty Advisor: Lt Col Matthew J. D. Robbins. Sponsor: N/A.

HERGENRETER, CHRISTOPHER A., *Determining the Most Vital Arcs within a Multi-Mode Communication Network Using Set-Based Measures*. AFIT/ENS/MS/15M-131. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: N/A.

HILL, RAYMOND J., *Multivariate Indicators of Terrorism Vulnerability in Africa*. AFIT/ENS/MS/15M-125. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: N/A.

HOWARD, SAMANTHA R., *Automated Sunspot Detection and Classification Using SOHO/MDI Imagery*. AFIT/ENP/MS/15M-078. Faculty Advisor: Dr. William F. Bailey. Sponsor: N/A.

JEWELL, BENJAMIN A., *Applying Model-Based Systems Engineering to CubeSats: A Tailored Approach for a Reusable State Analysis Tool*. AFIT/ENV/MS/15M-194. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

JONES, DAVID W., *Theoretical Limits of Lunar Vision Aided Navigation with Inertial Navigation System*. AFIT/ENG/MS/15M-020. Faculty Advisor: Dr. Kyle J. Kauffman. Sponsor: N/A. [ANT]

JONES, TREVOR G., *A Method to Predict Compressor Stall in the TF34-100 Turbofan Engine Utilizing Real-Time Performance Data*. AFIT/ENV/MS/15J-036. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A. [ANT]

KANIA, MATTHEW A., *Analysis of Hypersonic Vehicle Wakes*. AFIT/ENV/MS/15S-063. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

LASARGE, JACOB A., *A CubeSat Mission for Mapping Spot Beams of Geostationary Communications Satellites*. AFIT/ENV/MS/15M-247. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

LEIGHNER, ANDREW C., *FPGA Accelerated Discrete-SURF for Real-Time Homography Estimation*. AFIT/ENG/MS/15M-042. Faculty Advisor: Maj John M. Pecarina. Sponsor: N/A.

LESKO, JAMES E., *Characterizing the Effects of Unknown Error on Space Object Surveillance and Identification Network Performance*. AFIT/ENV/MS/15M-249. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

LI, SHUXIANG A., *A Method To Predict Compressor Stall in the TF34-100 Turbofan Engine Utilizing Real-Time Performance Data*. AFIT/ENV/MS/15J-036. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A.

LOGUE, JONATHAN E., *Mission Architecture Development for Geosynchronous Space Situational Awareness*. AFIT/ENV/MS/14D-028. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

LOPEZ, CHARLES A., *Assessing Development Test Utilizing Data Links*. AFIT/ENV/MS/15J-038. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A.

MARONEY, MICHAEL J., *An Assessment of the Effectiveness of Air Force Risk Management Practices in Program Acquisition Using Survey Instrument Analysis*. AFIT/ENV/MS/15J-041. Faculty Advisor: Lt Col Erin T. Ryan. Sponsor: N/A.

MCCLUNG, BRANDON T., *Investigating GAIM-GM's Capability to Sense Ionospheric Irregularities via Walker Satellite Constellations*. AFIT/ENP/MS/15M-076. Faculty Advisor: Dr. William F. Bailey. Sponsor: N/A.

MENNE, JEFFREY, *An Aerothermal Analysis of a Hypersonic Vehicle*. AFIT/ENV/MS/15M-237. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

NAGY, JOHN E., *Entity Recognition via Multimodal Sensor Fusion with Smart Phones*. AFIT/ENG/MS/15M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

OLSEN, CHRISTOPHER C., *Characterizing and Managing Intrusion Detection System (IDS) Alerts with Multi-Server/Multi-Priority Queuing Theory*. AFIT/ENV/MS/14D-024. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

PAINTER, JEFFREY T., *Cascading Effects of Fuel Network Interdiction*. AFIT/ENS/MS/15M-145. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

PALUCH, SARAJO, *Ethical Behavior and Ajzen's Theory of Planned Behavior Applied to the Decision to Obtain Professional Credentials*. AFIT/ENV/MS/15M-191. Faculty Advisor: Dr. John J. Elshaw. Sponsor: N/A.

PAUL, NICHOLAS R., *Optimizing the Domestic Chemical, Biological, Radiological, and Nuclear Response Enterprise*. AFIT/ENS/MS/15M-143. Faculty Advisor: LTC Brian L. Lunday. Sponsor: N/A.

POSTON, HOWARD E., *Generation of Strategies for Environmental Deception in Two-Player Normal-Form Games*. AFIT/ENG/MS/15J-004. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A. [ANT & CCR]

RETTKE, AARON J., *An Approximate Dynamic Programming Mode for Optimal MEDEVAC Dispatching*. AFIT/ENS/MS/15M-115. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: N/A.

ROBERSON, DANIEL M., *The Unified Behavior Framework for the Simulation of Autonomous Agents*. AFIT/ENG/MS/15M-014. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

SCANLAND, DAVID S., *Value Focused Thinking Applications to Supervised Pattern Classification with Extensions to Hyperspectral Anomaly Detection Algorithms*. AFIT/ENS/MS/15M-121. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: N/A.

SCHMIDT, NICHOLAS S., *Evaluation of the Military Utility of Employing an Angle of Arrival Payload Hosted on a CubeSat as an Augmentation to Existing Geolocation Systems*. AFIT/ENY/MS/15M-213. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

SHIREY, RUSSELL G., *Git as an Encrypted Distributed Version Control System*. AFIT/ENG/MS/15M-022. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

SPRANG, JOSHUA S., *Non-Linear Optimization Applied to Angle-of-Arrival Satellite-Based Geolocation with Correlated Measurements*. AFIT/ENG/MS/15M-044. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

SULLIVAN, NICHOLAS P., *Energy Harvesting & Recapture from Human Subjects: Dual-Stage MEMS Cantilever Energy Harvester*. AFIT/ENG/MS/15M-068. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

SWANSON, BRANDY A., *Investigating the Impacts of Particle Size and Wind Speed on Brownout*. AFIT/ENP/MS/15M-097. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: N/A.

UDELL, HEATHER M., *A CubeSat Mission Modeling Tool*. AFIT/ENY/MS/15M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

WILLIAMS, ANTHONY S., *Expected Position Error for an Onboard Satellite GPS Receiver*. AFIT/ENG/MS/15M-029. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A. [ANT]

WOLFE, TIMOTHY S., *Pulsed Radio Frequencies via Photoconductive Semiconductor Switch Driven Sources*. AFIT/ENG/MS/15M-039. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

YAXLEY, KATE J., *Communication and Jamming BDA of OFDMA Communication Systems Using the Software Defined Radio Platform WARP*. AFIT/ENG/MS/15M-073. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [CCR]

ZEITLIN, ZACHARY J., *Fingerprinting Software Defined Networks and Controllers*. AFIT/ENG/MS/15M-067. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

4.5. AIR FORCE MATERIEL COMMAND

DOCTORAL DISSERTATIONS

BOEHMKE, BRADLEY C., *Grabbing the Air Force by the Tail: Applying Strategic Cost Analytics to Understand and Manage Indirect Cost Behavior*. AFIT/ENS/DS/15S-076. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC & HQ USAF/A4. [COA]

KRESTER, MICHAEL P., *Building Enterprise Transition Plans through the Development of Collapsing Design Structure Matrices*. AFIT/ENS/DS/15S-033. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFMC.

MASTER'S THESES

ISOM, JOSHUA M., *Overcoming Hurdles Implementing Multi-Skilling Policies*. AFIT/ENS/MS/15M-124. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC/A4.

KAZI, KIPTA, *Addressing Enterprise-Level Information System Deficiencies*. AFIT/ENS/MS/15M-111. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC/A4. [COA]

KRIEVS, DANIEL A., *Integrating Agile Combat Support within Title 10 Wargames*. AFIT/ENS/MS/15M-127. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4.

96TH TEST GROUP

MASTER'S THESES

ALBEE, TRAVIS A., *Unique Two-Way Field Probe Concept Utilizing a Geodesic Sphere and Quad-Roto*. AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG/NRTF. [ANT]

FILLMORE, CASEY E., *Computational Electromagnetic Studies for Low-Frequency Compensation of the Reflector Impulse-Radiating Antenna*. AFIT/ENG/MS/15M-011. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG/NRTF. [ANT]

746TH TEST SQUADRON

MASTER'S THESES

KAWECKI, JAMES E.C., *Initial Implementation and Testing of a Tightly-Coupled IMU/Pseudolite System*. AFIT/ENG/MS/15M-025. Faculty Advisor: Dr. John F. Raquet. Sponsor: 746 TS. [ANT]

AIR FORCE LIFE CYCLE MANAGEMENT CENTER

MASTER'S THESES

ALSHEHRI, ALI A., *Evaluating Opportunities for Improved Processes and Flow Rates in Royal Saudi Air Force F-15 Reparable Items Supply Chain*. AFIT/ENS/MS/15S-031. Faculty Advisors: Dr. Kenneth L. Schultz. Sponsor: AFLCMC.

BROWN, GREGORY E., *Accuracy of Time Phasing Aircraft Development Using the Continuous Distribution Function*. AFIT/ENC/MS/15M-173. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

MOORE, JUSTIN R., *A Comparative Study of Learning Curve Models in Defense Airframe Cost Estimating*. AFIT/ENV/MS/15M-182. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFLCMC.

MORRIS, JESSICA P., *An Application of Multi-Criteria Shortest Path to a Customizable Hex-Map Environment*. AFIT/ENS/MS/15M-118. Faculty Advisor: Dr. James W. Chrissis. Sponsor: AFLCMC.

AIR FORCE NUCLEAR WEAPONS CENTER

DOCTORAL DISSERTATIONS

FEE, JAMES R., *Modeling Electromagnetic Pulse at Air Burst Altitudes*. AFIT/ENP/DS/15S-023. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

MASTER'S THESES

BARNETT, BRIAN L., *Ionizing and Non-ionizing Radiation Effects in Thin Layer Hexagonal Boron Nitride*. AFIT/ENP/MS/15M-099. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

DEAN, CHRISTOPHER P., *Aircraft Paint Damage by Thermal Pulse and Characterization of the Wind Tunnel-Enhanced AFIT Thermal Irradiation Test System*. AFIT/ENP/MS/15M-083. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

HARRIS, CAMERON N., *The Efficiency of Methionine as a Radioprotectant of Bacillus Anthracis for Cell Viability and Outgrowth Time after UVC and Gamma Irradiation*. AFIT/ENP/MS/15M-105. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFNWC.

PAXTON, JAMES C., *Convective Considerations during Thermal Flash: Wind Tunnel-Enhanced AFIT Experimental Thermal Irradiation Test System*. AFIT/ENY/MS/15M-232. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFNWC.

AIR FORCE RESEARCH LABORATORY

MASTER'S THESES

ALIX, DANIEL C., *Error Characterization of Flight Trajectories Reconstructed Using Structure from Motion*. AFIT/ENY/MS/15M-214. Faculty Advisor: Col Karl C. Walli. Sponsor: AFRL. [ANT]

AFRL: 711th HUMAN PERFORMANCE WING

DOCTORAL DISSERTATIONS

PACIENCIA, TODD J., *Improving Non-Linear Approaches to Anomaly Detection, Class Separation, and Visualization*. AFIT/ENS/DS/14D-015. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: 711 HPW/RH.

MASTER'S THESES

AMADDIO, KELLY M., *The Cognition of Multi-Aircraft Control (MAC): Cognitive Ability Predictors, Working Memory, Interference, and Attention Control in Radio Communication*. AFIT/ENV/MS/15M-205. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]

ARNEAL, JAMES A., *Spectral Textile Detection in the VNIR/SWIR Band*. AFIT/ENG/MS/15M-049. Faculty Advisor: Lt Col Jeffrey D. Clark. Sponsor: 711 HPW/RH.

- BOEKE, DANIELLE K., *Exploring Individual Differences in Workload Assessment*. AFIT/ENV/MS/14D-031. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]
- CORPUZ, MICHAEL Q., *A Process Improvement Study on a Military System of Clinics to Manage Patient Demand and Resource Utilization Using Discrete-Event Simulation, Sensitivity Analysis, and Cost-Benefit Analysis*. AFIT/ENV/MS/15M-199. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH.
- DROSTE, DANIEL J., *A System Dynamics Approach to the Efficacy of Oxime Therapy in Sub Lethal Exposure to Sarin Gas*. AFIT/ENV/MS/15J-053. Faculty Advisor: Dr. Michael L. Shelley. Sponsor: 711 HPW/RH.
- DYE, GREGORY W., *Using IMPRINT to Guide Experimental Design with Simulated Task Environments*. AFIT/ENG/MS/15J-052. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [CCR]
- GASKI, PAUL T., *Characterizing and Classifying Acoustical Ambient Sound Profiles*. AFIT/ENS/MS/15M-122. Faculty Advisor: Dr. Raymond R. Hill. Sponsors: 711 HPW/RH.
- KATREIN, STEPHEN P., *The Effect of Stages and Levels of Automation and Reliability on Workload and Performance for Remotely Piloted Aircraft Operations*. AFIT/ENV/MS/15M-201. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH. [ANT]
- OCAMPO, SABRINA, *Does Training and Official Roles and Responsibilities of USAF Remotely Piloted Aircraft (RPA) Sensor Operators Match Their Day-to-Day Tasks?* AFIT/ENV/MS/14D-042. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH.
- RICKS, DONOVAN L., *A Novel Analysis of Performance Classification and Workload Prediction Using Electroencephalography (EEG) Frequency Data*. AFIT/ENG/MS/15M-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [ANT]
- SMITH, ANDREW M., *Robust Models for Operator Workload Estimation*. AFIT/ENG/MS/15M-064. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [ANT]
- TANG, KHOA A., *Hyperspectral Based Skin Detection for Person of Interest Identification*. AFIT/ENG/MS/15M-031. Faculty Advisor: Lt Col Jeffrey D. Clark. Sponsor: 711 HPW/RH.
- WADE, DAVID F., *Using Data Mining to Determine the Impact Continuity of Care Has on the Air Force's Healthcare System*. AFIT/ENV/MS/14D-044. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH.
- WILLIAMS, KELLEY J., *Evidence for the Inhibition of Dengue Virus Binding in the Presence of Silver Nanoparticles*. AFIT/ENP/MS/15M-089. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/RH. [ANT]

AFRL: AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

DOCTORAL DISSERTATIONS

- ALBA, CHRISTOPHER R., *A Nonequilibrium Finite-Rate Carbon Ablation Model for Radiating Earth Re-entry Flows*. AFIT/ENY/DS/15S-053. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR.
- BINDEWALD, JASON M., *Adaptive Automation Design and Implementation*. AFIT/ENG/DS/15S-007. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFOSR. [ANT & CCR]

WINDER, SHEENA L., *Mechanical Testing of Ultra-High Temperature Ceramics at 1500° C in Air - Development of an Experimental Facility and Test Method*. AFIT/ENY/DS/15M-259. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

MASTER'S THESES

ARQUETTE, DAVID M., *Symmetry Groups for Linear Programming Relaxations of Orthogonal Array Problems*. AFIT/ENC/MS/15M-003. Faculty Advisor: Dr. Dursun A. Bulutoglu. Sponsor: AFOSR.

BRANDT, LOGAN J., *Analysis of Muon Induced Neutrons in Detecting High Z Nuclear Materials*. AFIT/ENP/MS/15M-109. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFOSR.

GRIDLEY, MATTHEW J., *Experimental Method of Generating Electromagnetic Gaussian Schell-Model Beams*. AFIT/ENG/MS/15M-058. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFOSR.

GWIN, ALEXANDER H., *Implementation of Metal-Insulator Transition Materials and Phase Change Materials*. AFIT/ENG/MS/15M-016. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

HAEFNER, JOSEPH W., *Characterization and Analysis of Integrated Silicon Photonic Detectors for High-Speed Communications*. AFIT/ENG/MS/15M-071. Faculty Advisor: Maj Derrick Langley. Sponsor: AFOSR.

JUST, LUCAS W., *Dynamic Response Analysis of an Icosahedron Shaped Lighter than Air Vehicle*. AFIT/ENY/MS/15M-216. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

LAFLEUR, ROBERT S., *Development of A Novel Hybrid Multi-Junction Architecture for Silicon Solar Cells*. AFIT/ENG/MS/15M-026. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

MCCAULEY, AARON K., *Analysis of Features for Synthetic Aperture Radar Target Classification*. AFIT/ENG/MS/15M-032. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFOSR.

NISHIDA, JEFFREY K., *Estimating Single and Multiple Target Locations Using K-Means Clustering with Radio Tomographic Imaging in Wireless Sensor Networks*. AFIT/ENG/MS/15M-038. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR. [ANT]

PALTZER, NICHOLAS J., *Network Routing Using the Network Tasking Order, a Chron Approach*. AFIT/ENG/MS/15M-059. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFOSR. [CCR]

PAUL, BRADLY S., *Airborne Network Optimization with Dynamic Network Update*. AFIT/ENG/MS/15M-030. Faculty Advisor: Maj Thomas E. Dube. Sponsor: AFOSR. [CCR]

REXFORD, ANDREW C., *Credible Set Estimation, Analysis, and Applications in Synthetic Aperture Radar Canonical Feature Extraction*. AFIT/ENG/MS/15M-033. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFOSR.

ROADRUCK, BRIAN J., *Counter Weapon Control*. AFIT/ENG/MS/15M-056. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR. [ANT]

VAN DYNE, DYLAN M., *Simulation of Locking Space Truss Deployments for a Large Deployable Sparse Aperture Reflector*. AFIT/ENY/MS/15M-250. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFOSR. [CSRA]

VAN, TAN, *Characterizing Multiple Wireless Sensor Networks for Large-Scale Radio Tomography*. AFIT/ENG/MS/15M-057. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR. [ANT & CCR]

AFRL: AEROSPACE SYSTEMS DIRECTORATE

DOCTORAL DISSERTATIONS

MASTERNAK, TADEUSZ J., *Multi-Objective Trajectory Optimization of a Hypersonic Reconnaissance Vehicle with Temperature Constraints*. AFIT/ENV/DS/14D-021. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ.

SMITH, NATHAN E., *Optimal Collision Avoidance Trajectories for Unmanned/Remotely Piloted Aircraft*. AFIT/ENY/DS/14D-034. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

SUPPLISSON, ANGELA W., *Optimal Recovery Trajectories for Automatic Ground Collision Avoidance Systems (Auto GCAS)*. AFIT/ENY/DS/15M-002. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

MASTER'S THESES

AL NATIFAT, SALEH A., *Tension-Compression Fatigue Behavior of 2D and 3D Polymer Matrix Composites at Elevated Temperature*. AFIT/ENY/MS/15S-052. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.

BOWDEN, JAMES R., *Influences of Display Design and Task Management Strategy on Situation Awareness, Performance, and Workload in Process Control Environments*. AFIT/ENV/MS/14D-029. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: AFRL/RQ.

HODKIN, RANDALL J., *Modal Characterization of a Piezoelectric Shaker Table*. AFIT/ENY/MS/15J-001. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

HORN, KEVIN P., *Exhaust Composition in a Small Internal Combustion Engine Using FTIR Spectroscopy*. AFIT/ENY/MS/15J-042. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

KAMRUD, ALEXANDER J., *Unified Behavior Framework for Discrete Event Simulation Systems*. AFIT/ENG/MS/15M-017. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/RQ. [CCR]

KELLY, SCOTT J., *A Monocular SLAM Method to Estimate Relative Pose during Satellite Proximity Operations*. AFIT/ENY/MS/15M-219. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: AFRL/RQ.

KIM, NAMKYU, *Optimized Flight Path for Localization Using Line of Bearing*. AFIT/ENY/MS/15M-246. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

SHAH, NIHAR, *Computer Modeling of a Rotating Detonation Engine in a Rocket Configuration*. AFIT/ENY/MS/15M-230. Faculty Advisor: Dr. Paul I. King. Sponsor: AFRL/RQ.

TEOPE, KAZ I., *Experimental Magnetohydrodynamic Energy Extraction from a Pulsed Detonation*. AFIT/ENY/MS/15M-224. Faculty Advisor: Dr. Paul I. King. Sponsor: AFRL/RQ.

WERNER, KYLE P., *Precision Relative Positioning for Automated Aerial Refueling from a Stereo Imaging System*. AFIT/ENG/MS/15M-048. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

YOUNG, JONATHAN D., *Development of a Finite State Machine for a Small Unmanned Aircraft System Using Experimental Design*. AFIT/ENS/MS/15M-146. Faculty Advisor: Maj Brian B. Stone. Sponsor: AFRL/RQ.

ZIMMER, VICTOR J., *Transient Air Throttle Characterization for Scramjet Ignition*. AFIT/ENY/MS/15M-231. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.

AFRL: DIRECTED ENERGY DIRECTORATE

DOCTORAL DISSERTATIONS

STEINBOCK, MICHAEL J., *Adaptive Optics for Strong Turbulence Compensation*. AFIT/ENG/DS/15S-017. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD. [CDE]

MASTER'S THESES

LEMIEUX, JAMES A., *Experimental Verification of the Enhanced Interferometric Phased Array Laser System*. AFIT/ENG/MS/15M-010. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD. [CDE]

AFRL: INFORMATION DIRECTORATE

DOCTORAL DISSERTATIONS

CLARK, MICHAEL R., *The Theory and Application of Privacy-Preserving Computation*. AFIT/ENG/DS/15M-013. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]

MASTER'S THESES

BOYTER, DEVLIN T., *Identifying Image Manipulation Software from Image Features*. AFIT/ENG/MS/15M-051. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RI. [CCR]

AFRL: MATERIALS AND MANUFACTURING DIRECTORATE

DOCTORAL DISSERTATIONS

KRISAK, MATTHEW B., *Environmental Degradation of Nickel-Based Superalloys due to Gypsiferous Desert Dusts*. AFIT/ENY/DS/15S-066. Faculty Advisor: Capt Brook I. Bentley. Sponsor: AFRL/RX.

MASTER'S THESES

ADORNO, WILLIAM, III, *Autonomous Experimentation of Carbon Nanotubes Using Response Surface Methods*. AFIT/ENS/MS/15M-113. Faculty Advisor: Maj Brian B. Stone. Sponsor: AFRL/RX.

HULL, CHRISTOPHER J., *Effect of Prior Exposure at Elevated Temperatures on Tensile Properties and Stress-Strain Behavior of Three Oxide/Oxide Ceramic Matrix Composites*. AFIT/ENY/MS/15M-228. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

LANSER, RICHARD L., *Tension-Compression Fatigue of an Oxide/Oxide Ceramic Matrix Composite at Elevated Temperature in Air and Steam Environments*. AFIT/ENY/MS/15M-222. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

SPRINKLE, KEVIN B., *Creep of Sylramic-iBN Fiber Tows at Elevated Temperature in Air and in Silicic Acid-Saturated Steam*. AFIT/ENY/MS/15J-046. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

TIPTON, JAMES T., *Fatigue Behavior of IM7/BMI 5250-4 Composite at Room and Elevated Temperatures*. AFIT/ENY/MS/15M-241. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

VANHOOSE, TAMARA B., *X-ray Shielding Effectiveness of Multifunctional Composite Materials*. AFIT/ENP/MS/15M-081. Faculty Advisor: Dr. John W. McClory. Sponsor: AFRL/RX.

WALLENTINE, SARAH M., *Effect of Prior Exposure at Elevated Temperatures on Tensile Properties and Stress-Strain Behavior of Four Non-Oxide Ceramic Matrix Composites*. AFIT/ENY/MS/15J-048. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

WILSON, KODY A., *Non-Destructive Techniques for Classifying Aircraft Coating Degradation*. AFIT/ENP/MS/15M-088. Faculty Advisor: Dr. Michael R. Hawks. Sponsor: AFRL/RX.

AFRL: MUNITIONS DIRECTORATE

DOCTORAL DISSERTATIONS

KAPLAN, SERGEY M., *Piezoelectric Response of Ferroelectric Ceramics under Mechanical Stress*. AFIT/ENY/DS/15S-064. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

PARSON, CARL R., *Approximate Dynamic Programming for Military Resource Allocation*. AFIT/ENS/DS/14D-016. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AFRL/RW. [COA]

MASTER'S THESES

ALTENHOFEN, JASON A., *A Methodology to Determine the Influence of Requirements Change to Support System Design*. AFIT/ENV/MS/15M-172. Faculty Advisor: Lt Col Kyle F. Oyama. Sponsor: AFRL/RW.

BENNETT, MICHAEL L., *Using Reactive Flow Models to Characterize Sustained and Short-Pulse Ignition Behavior*. AFIT/ENY/MS/15M-220. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

HARDY, STEFAN L., *Implementing Cooperative Behavior & Control Using Open Source Technology across Heterogeneous Vehicles*. AFIT/ENV/MS/15M-180. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RW.

LAGRANGE, BRIAN K., *Reflections of a Wave: An Analysis of Photonic Doppler Velocimetry Systems*. AFIT/ENY/MS/15M-242. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

LANCASTER, JAMES C., *Characterization of a Robotic Manipulator for Dynamic Wind Tunnel Applications*. AFIT/ENY/MS/15M-227. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

THOMAS, CHRISTOPHER M., *Flexible Architecture and Its Impact on the Life Cycle Cost of Air to Surface Munitions*. AFIT/ENV/MS/15M-171. Faculty Advisor: Lt Col Erin T. Ryan. Sponsor: AFRL/RW.

NIETO, EDUARDO, *Simulation of Metal Particulates in High Energetic Materials*. AFIT/ENY/MS/15J-043. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

RICHARDS, HAYDEN K., *Topology Optimization of Additively Manufactured Penetrating Warheads: Design Methodologies and Test Results*. AFIT/ENY/MS/15M-234. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RW.

AFRL: SENSORS DIRECTORATE

DOCTORAL DISSERTATIONS

BUTLER, SAMUEL D., *Experimental and Theoretical Basis for a Closed-Form Spectral BRDF Model*. AFIT/ENP/DS/15S-021. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RY. [CDE & CTISR]

CARBINO, TIMOTHY J., *Exploitation of Unintentional Ethernet Cable Emissions Using Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprints to Enhance Network Security*. AFIT/ENG/DS/15S-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RY. [CCR]

CROSBY, JASON G., *Multi-Mode Analysis of Dual Ridged Waveguide Systems for Material Characterization*. AFIT/ENG/DS/15S-011. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RY.

CROWE, DARRELL S., *Hot Streak Characterization in Serpentine Exhaust Nozzles*. AFIT/ENY/DS/14D-032. Faculty Advisor: Dr. Christopher L. Martin, Jr. Sponsor: AFRL/RY.

MASTER'S THESES

ABEITA, TRAVIS P., *Superconducting Quantum Interference Devices for the Detection of Magnetic Flux and Application to Airborne High Frequency Direction Finding*. AFIT/ENG/MS/15M-052. Faculty Advisor: Lt Col Jeremy Stringer. Sponsor: AFRL/RY.

AUNG, RONALD M., *Operational Implementation Impact on RF-DNA Fingerprinting Performance*. AFIT/ENG/MS/15M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RY. [CCR]

CALVER, TIMOTHY, *Fe:ZnSe Solid-State Power Amplifier for an Optical Parametric Master Oscillator*. AFIT/ENP/MS/15M-075. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFRL/RY.

DONIGAN, THOMAS M., *Subtractive Plasma-Assisted-Etch Process for Developing High Performance Nanocrystalline Zinc-Oxide Thin-Film-Transistors*. AFIT/ENG/MS/15M-027. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/RY.

GABERT, SCOTT G., *Statistical Analysis of Heterogeneous Resolution Cells in Bistatic SAR Clutter*. AFIT/ENG/MS/15M-053. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/RY.

GONZALES, RAMIRO N., Jr., *Application of Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting to Power Substation Emissions*. AFIT/ENG/MS/15M-034. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RY. [CCR]

GUTIERREZ, ALYSSA N., *Cloud-Induced Uncertainty for Visual Navigation*. AFIT/ENG/MS/14D-043. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/RY. [ANT]

HERUSKA, BENJAMIN N., *Design and Characterization of a Secure Automatic Dependent Surveillance-Broadcast Prototype*. AFIT/ENG/MS/15M-041. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/RY. [CCR]

HSIA, LELEIA A., *Gate-Level Commercial Microelectronics Verification with Standard Cell Recognition*. AFIT/ENG/MS/15M-069. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/RY.

HUTCHINSON, SCOTT A., *Distributed Kernelized Locality-Sensitive Hashing for Faster Image Based Navigation*. AFIT/ENG/MS/15M-070. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/R.Y. [ANT & CCR]

KNISELY, ALAEXANDER G., *Biaxial Anisotropic Material Development and Characterization Using Rectangular to Square Waveguide*. AFIT/ENG/MS/15M-055. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/R.Y.

LEINES, MATTHEW T., *Terrain Referenced Navigation Using SIFT Features in LiDAR Range-Based Data*. AFIT/ENG/MS/14D-047. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y. [ANT]

LOWDER, WILLIAM M., *Real-Time RF-DNA Fingerprinting of ZigBee Devices Using a Software-Defined Radio with FPGA Processing*. AFIT/ENG/MS/15M-054. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y. [CCR]

MIRABILE, ANTHONY T., *Pilot Assisted Inertial Navigation System Aiding Using Bearings-Only Measurements Taken Over Time*. AFIT/ENG/MS/15M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/R.Y. [ANT]

NINE, JULIANA J., *(U) Detection, Classification, and Mitigation of Inauthentic GPS Signals Using Radio Frequency Distinct Native Attributes and Direction of Arrival Estimation*. AFIT/ENG/MS/15M-065. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: AFRL/R.Y. [ANT & CCR]

RICH, MICHAEL D., *Evaluating Machine Learning Classifiers for Hybrid Network Intrusion Detection Systems*. AFIT/ENG/MS/15M-046. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/R.Y. & AF CyTCoE. [CCR]

ROHDE, JOHNATHAN L., *Urban Environment Navigation with Real-Time Data Utilizing Computer Vision, Inertial, and GPS Sensors*. AFIT/ENG/MS/15M-037. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y. [ANT]

STOYANOV, DIMITAR, *Investigating of Field-Collected Data Using Diffuse and Specular, Forward and Reverse Radiative Transfer Models*. AFIT/ENP/MS/15M-100. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/R.Y. [CDE]

TAO, ALBERT B., *Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting Applied to SatCom Short Burst Data Modems Using a Software-Defined Radio*. AFIT/ENG/MS/15M-043. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y. [CCR]

TATUM, RALPH K., *Exploration of Digital Circuits and Transistor-Level Testing In the DARPA TRUST Program*. AFIT/ENG/MS/15M-040. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/R.Y.

THARP, JUSTIN S., *On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation*. AFIT/ENG/MS/15M-063. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/R.Y. [ANT]

WALTON, JOHN P., *Electrostatically Driven Large Aperture Micro-Mirror Actuator Assemblies for High Fill-Factor, Agile Optical Phase Arrays*. AFIT/ENG/MS/15J-003. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFRL/R.Y.

WARNER, KRISTIAN E., *Electrical and Physical Property Characterization of Single Walled Carbon Nanotube Ink for Flexible Printed Electronics*. AFIT/ENG/MS/15M-066. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/R.Y.

AFRL: SPACE VEHICLES DIRECTORATE

DOCTORAL DISSERTATIONS

BELLOWS, CHARLIE T., *Leveraging External Sensor Data for Enhanced Space Situational Awareness*. AFIT/ENY/DS/15S-054. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: AFRL/RV.

WRIGHT, JONATHAN W., *Advancements of In-Flight Mass Moment of Inertia and Structural Deflection Algorithms for Satellite Attitude Simulators*. AFIT/ENY/DS/15M-261. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

MASTER'S THESES

BAILEY, ERIC J., *Single Platform Geolocation of Radio Frequency Emitters*. AFIT/ENG/MS/15M-028. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [ANT & CCR]

HEPPE, JUSTIN T., *Methods of Measuring Stress Relaxation in Composite Tape Springs*. AFIT/ENY/MS/15M-221. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/RV. [CSRA]

JENSON, DANIEL N., *Space Object Self-Tracker Experiment Design and Analysis*. AFIT/ENY/MS/15M-223. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

MOOMEY, DANIEL, *Aiding Geostationary Space Situational Awareness Using Small Aperture Commercial Telescopes*. AFIT/ENY/MS/15M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

KRANICH, SHANNON N., *Correlation of Solar X-ray Flux and SID Modified VLF Signal Strength*. AFIT/ENP/MS/15M-077. Faculty Advisor: Dr. William F. Bailey. Sponsor: AFRL/RV.

PENN, DYLAN R., *Characterization and Modeling of a Control Moment Gyroscope*. AFIT/ENY/MS/15M-235. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

SALVADOR, VICTOR A., *Low Earth Orbit Satellite Tracking Telescope Network: Collaborative Optical Tracking for Enhanced Space Situational Awareness*. AFIT/ENV/MS/15M-200. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

TIBBS, MICHAEL L., *Design and Test of an Attitude Determination and Control System for a 6U CubeSat Using AFIT's CubeSat Testbed*. AFIT/ENY/MS/15M-240. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

AIR FORCE SEEK EAGLE OFFICE

MASTER'S THESES

TAUER, THOMAS M., *Identifying Nonlinear Aerodynamic Phenomena Contributing to F-16 Limit Cycle Oscillation*. AFIT/ENY/MS/15M-226. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFSEO.

AIR FORCE SUSTAINMENT CENTER

DOCTORAL DISSERTATIONS

GEHRET, GREGORY H., *Advancing Cost-Effective Readiness by Improving the Supply Chain Management of Sparse, Intermittently-Demanded Parts*. AFIT/ENS/DS/15M-256. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFSC.

AIR FORCE TEST PILOT SCHOOL

MASTER'S THESES

STEENMAN, MATTHEW B., *Reverse Radio Frequency Fingerprinting for Remote Indoor Localization*. AFIT/ENY/MS/15M-225. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFTPS. [ANT]

4.6. AIR MOBILITY COMMAND

MASTER'S THESES

MARIOTTI, MICHAEL P., *C-5M Fuel Efficiency through MFOQA Data Analysis*. AFIT/ENS/MS/15M-116. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A9.

NATION, ANDREW P., *Pragmatic Divestment of KC-135 Navigators in the Special Operations Air Refueling Mission*. AFIT/ENV/MS/15M-255. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AMC.

SCHUMACHER, MICHAEL J., *Active Duty C-17 Aircraft Commander Fuel Efficiency Metrics and Goal Evaluation*. AFIT/ENS/MS/15M-119. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: AMC/A3.

GRADUATE RESEARCH PAPERS

BEAL, JOSEPH D., *Quantifying C-17 Aircrew Training Priorities*. AFIT/ENS/GRP/15J-021. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AMC. [COA]

BOWYER, BRAD P., *Consolidating AMC's Contingency Response Capabilities: A Delphi Study*. AFIT/ENS/GRP/15J-026. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: USAF EC. [COA]

CLINTON, KYLE M., *Rethinking C-17 Training Requirements: Air Refueling*. AFIT/ENS/GRP/15J-025. Faculty Advisor: Dr. Alan L. Johnson. Sponsor: 62 OG. [COA]

EHMEN, JOSHUA W., *Altering Flight Schedules for Increased Fuel Efficiency*. AFIT/ENS/GRP/15J-016. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: AMC. [COA]

FREEMAN, RAHSUL J., *Mitigating the Erratic Behavior of the Transportation Working Capital Fund through Accurate Forecasting*. AFIT/ENS/GRP/15J-028. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC. [COA]

KELLER, CHRISTOPHER J., *Analysis of Pacific Enroute Structure in Support of C-5M "Super Galaxy."* AFIT/ENS/GRP/15J-011. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: 60 AMW/OG. [COA]

LAMOTHE, KRISTINA L., *Measuring the Effectiveness of Active Associate TFI Units*. AFIT/ENS/GRP/15J-022. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AMC. [COA]

MACDONALD, CHRISTOPHER R., *Next Generation Tanker: Optimizing Air Refueling Capabilities with a Divested KC-10 Fleet*. AFIT/ENS/GRP/15J-019. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC. [COA]

MOLLISON, ANTHONY R., *Fighting Through a Logistics Cyber Attack*. AFIT/ENS/GRP/15J-027. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AMC. [COA]

PARSONS, KEVIN L., *Leveraging Global Communications Capabilities in the 618 AOC*. AFIT/ENS/GRP/15J-013. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: 618 AOC. [COA]

UHLAND, CHRISTOPHER D., *Optimizing the Weapons Officer in the Mobility Air Forces*. AFIT/ENS/GRP/15J-023. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: 618 AOC. [COA]

WYFFELS, REBECCA A., *C-21 Fleet: Base Optimization*. AFIT/ENS/GRP/15J-024. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: 375 AMW/OG. [COA]

4.7. AIR FORCE SPACE COMMAND

MASTER'S THESES

MOLLE, DEREK P., *Parametric Estimation of Load for Air Force Datacenters*. AFIT/ENV/MS/15M-170. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFSPC/38ES.

SPACE AND MISSILE SYSTEMS CENTER

MASTER'S THESES

BUCKLE, LYNDSEY D., *Binary Integer Assignment Program to Determine the Optimal Launch Manifest for Heterogeneous Disaggregated Satellite Constellations*. AFIT/ENV/MS/15J-059. Faculty Advisor: Dr. John M. Colombi. Sponsor: SMC.

BURNS, AARON J., *Assessing GPS Constellation Resiliency in an Urban Canyon Environment*. AFIT/ENS/MS/15M-138. Faculty Advisor: Dr. John O. Miller. Sponsor: SMC.

DEIFEL, JUSTIN H., & PENA, ALBERT J., *An Analysis of CONUS Based Deployment of Pseudolites for Positioning, Navigation and Timing (PNT) Systems*. AFIT/ENV/MS/15S-037. Faculty Advisor: Dr. David R. Jacques. Sponsor: SMC.

PENA, ALBERTJ., See DEIFEL, JUSTIN H.

THOMAS, MATTHEW G., *Statistical Observations of Positioning, Navigation, and Timing in a Combat Simulation*. AFIT/ENS/MS/15M-114. Faculty Advisor: Dr. John O. Miller. Sponsor: SMC.

4.8. USAF FIELD OPERATING AGENCIES/DIRECT REPORTING UNITS

AIR FORCE CIVIL ENGINEERING CENTER

MASTER'S THESES

GARTLAND, DANIEL H., *Test and Evaluation of Ultrasonic Additive Manufacturing (UAM) for a Large Aircraft Maintenance Shelter (LAMS) Baseplate*. AFIT/ENV/MS/15M-158. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

GRANDSAERT, PATRICK J., *Integrating Pavement Crack Detection and Analysis Using Autonomous Unmanned Aerial Vehicle Imagery*. AFIT/ENV/MS/15M-195. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

HOFF, RYAN M., *Analysis of Air Force Wartime Contracted Construction Project Performance*. AFIT/ENV/MS/15M-174. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.

NICHOLS, MATTHEW J., *A Delphi Study Using Value-Focused Thinking for United States Air Force Mission Dependency Index Values*. AFIT/ENV/MS/15M-192. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

POULSEN, SETH N., *A Delphi Study of Additive Manufacturing Applicability for United States Air Force Civil Engineer Contingency Operations*. AFIT/ENV/MS/15M-161. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

AIR FORCE COST ANALYSIS AGENCY

MASTER'S THESES

BRIDGEFORTH, SHEDRICK M., *Using Earned Value Data to Forecast the Duration of Department of Defense (DOD) Space Acquisition Programs*. AFIT/ENV/MS/15M-177. Faculty Advisor: Lt Col Jonathan D. Ritschel. Sponsor: AFCAA.

AIR FORCE MEDICAL OPERATIONS AGENCY

MASTER'S THESES

SMITH, BLAKE, *An Inventory and Safety Stock Analysis of Air Force Medical Service Pharmaceuticals*. AFIT/ENS/MS/15M-133. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFMOA. [ANT]

AIR FORCE PETROLEUM AGENCY

MASTER'S THESES

D'AGOSTINO, JUSTIN P., *Forecasting Fuels Support Equipment Requisitions*. AFIT/ENS/MS/15M-134. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AFPA.

AIR FORCE TECHNICAL APPLICATION CENTER

MASTER'S THESES

MCINTEE, NICHOLAS J., *The Effect of Anisotropic Scatter on Atmospheric Neutron Transport*. AFIT/ENP/MS/15M-085. Faculty Advisor: Dr. Kirk A. Mathews. Sponsor: AFTAC.

AIR FORCE WEATHER AGENCY

MASTER'S THESES

TRAVIS, ANDREW J., *Utilizing Four Dimensional Lightning and Dual-Polarization Radar to Develop Lightning Initiation Forecast Guidance*. AFIT/ENP/MS/15M-092. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: AFWA/45 WS.

NATIONAL AIR AND SPACE INTELLIGENCE CENTER

MASTER'S THESES

CARPENTER, STEVEN P., *A Computational Investigation of the Dynamics of a Hypersonic Glide Vehicle*. AFIT/ENY/MS/15M-233. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

HATHAWAY, KYLE A., *Hypersonic Air Radiation Modeling for a Conical Reentry Vehicle*. AFIT/ENY/MS/15M-238. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

HAUKE, ROBERT, *Aerothermodynamic CFD Analysis of a Hypersonic Reentry Vehicle*. AFIT/ENY/MS/15M-229. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

JOHNSTONE, CHANCELLOR A.J., *A Risk Based Approach to Node Insertion within Social Networks*. AFIT/ENS/MS/15M-136. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: NASIC.

UNITED STATES AIR FORCE ACADEMY

MASTER'S THESES

TULIP, CHRISTOPHER M., *Bandwidth Broadening by Reduction of Chromatic Aberration Effects Using Second-Stage Diffractive Optics*. AFIT/ENP/MS/15M-086. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: USAFA/DFP.

4.9. DEPARTMENT OF DEFENSE

MASTER'S THESES

REKEDAL, KEVIN D., *Investigation of the High-Cycle Fatigue Life of Selective Laser Melted and Hot Isostatically Pressed Ti-6Al-4v*. AFIT/ENY/MS/15M-212. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

WALKER, DAVID L., *Topology Optimization of an Aircraft Wing*. AFIT/ENY/MS/15J-044. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY

MASTER'S THESES

DINH, DAVID H., *Ground Station and Mission Operations Validation for the FalconSAT-7 CubeSat*. AFIT/ENY/MS/15M-239. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: DARPA. [CSRA]

JEON, JAE H., *Improving the Performance of the Space Surveillance Telescope as a Function of Seeing Parameter*. AFIT/ENG/MS/15M-050. Faculty Advisor: Dr. Kyle J. Kauffman. Sponsor: DARPA.

SLIGAR, ANTHONY J., *Measuring Angular Rate of Celestial Objects Using the Space Surveillance Telescope*. AFIT/ENG/MS/15M-019. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: DARPA.

DEFENSE THREAT REDUCTION AGENCY

DOCTORAL DISSERTATIONS

DEXTER, MICHAEL L., *Investigation and Development of Atmospheric Nuclear Detonation Optical Forensics Techniques*. AFIT/ENP/DS/15S-022. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]

HOLSTON, MAURIO S., *Characterization of Point Defects in Lithium Aluminate (LiAlO₂) Single Crystals*. AFIT/ENP/DS/15S-025. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

KNIGHT, EMILY A., *Modeling Radiation Effectiveness for Inactivation of Bacillus Spores*. AFIT/ENC/DS/15S-001. Faculty Advisor: Dr. William P. Baker. Sponsor: DTRA.

MASTER'S THESES

ERWIN, WILLIAM J., *Verification and Validation of Monte Carlo N-Particle 6 for Computing Gamma Protection Factors*. AFIT/ENP/MS/15M-090. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA. [CTISR]

FERGUSON, IAN P., *Photoluminescence and Optically Stimulated Luminescence Studies of LiAlO₂ and LiGaO₂ Crystals*. AFIT/ENP/MS/15M-106. Faculty Advisor: Dr. Nancy C. Giles. Sponsor: DTRA.

FISH, MICHAEL C., *Comparison of Streak and Frame Film Light Intensity Curves*. AFIT/ENP/MS/15M-080. Faculty Advisor: LTC Stephen R. McHale. Sponsor: DTRA.

JACKSON, PETER T., *Determination of Dimensions and Yield of Nuclear Fireballs from Test Films*. AFIT/ENP/MS/15M-103. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]

MCKINNEY, JOSEPH L., *Nuclear Cloud Rise Film Analysis and Yield Determination*. AFIT/ENP/MS/14D-012. Faculty Advisor: Lt Col Stephen R. McHale. Sponsor: DTRA.

MORRISON, MICHAEL, *Multiple Detector Optimization for Hidden Radiation Source Detection*. AFIT/ENP/MS/15M-082. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA.

PARDO, CHRISTIAN C., *Optimizing Biological Agent Detection for Military Bases Utilizing a Statistical Model of Innate Filter Systems*. AFIT/ENP/MS/15M-084. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: DTRA.

REINECKE, CHRISTOPHER D., *Methodology for Nuclear Cloud Analysis from Atmospheric Test Films*. AFIT/ENP/MS/15M-107. Faculty Advisor: LTC Stephen R. McHale. Sponsor: DTRA.

HIGH ENERGY LASER JOINT TECHNOLOGY OFFICE

DOCTORAL DISSERTATIONS

BLANK, LARRY A., *Potential Energy Curves and Associated Line Shape of Alkali-Metal and Noble-Gas Interactions*. AFIT/ENP/DS/14D-051. Faculty Advisor: Dr. David E. Weeks. Sponsor: HELJTO.

MASTER'S THESES

ANDERSON, GREGORY M., *Development of a Standard Maritime C₂N Profile Using Satellite Measurements*. AFIT/ENP/MS/15M-141. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

CARDOZA, JOSEPH A., *A Simple Model for Fine Structure Transitions in Alkali-Metal Noble-Gas Collisions*. AFIT/ENP/MS/15M-079. Faculty Advisor: Dr. David E. Weeks. Sponsor: HELJTO.

MORAN, PAUL J., *Scaling of an Optically Pumped Mid-Infrared Rubidium Laser*. AFIT/ENP/MS/15M-104. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

ROSENTHAL, JAMES M., *Absorption Spectroscopy of Rubidium in an Alkali Metal Dispenser Cell and Bleached Wave Analysis*. AFIT/ENP/MS/15M-102. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO. [CDE]

VAN ZANDT, NOAH R., *Modeled and Measured Partially Coherent Illumination Speckle Effects from Sloped Surfaces for Tactical Tracking*. AFIT/ENP/MS/15M-257. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

JOINT CHIEFS OF STAFF

GRADUATE RESEARCH PAPERS

HUSTED, ALLEN D., *Identifying Knowledge, Skill, and Ability Requirements for Contracting Officer Representatives in Deployed Environments*. AFIT/ENS/GRP/15J-012. Faculty Advisor: Lt Col Christian E. Randall. Sponsor: JCS/J4.

LABORATORY FOR TELECOMMUNICATIONS SCIENCES

DOCTORAL DISSERTATIONS

MAILLOUX, LOGAN O., *A Performance and Security Analysis of Decoy Enabled Quantum Key Distribution Systems*. AFIT/ENV/DS/15S-041. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS. [CCR]

MASTER'S THESES

CERNERA, ROBERT C., *A System-Level Throughput Model for Quantum Key Distribution*. AFIT/ENG/MS/15S-069. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: LTS. [CCR]

ENGLE, RYAN D., *Modeling, Simulation, and Analysis of a Decoy State Enabled Quantum Key Distribution System*. AFIT/ENV/MS/15M-181. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS. [CCR]

MISSILE DEFENSE AGENCY

DOCTORAL DISSERTATIONS

MILLER, WOODY S., *Temperature Dependent Rubidium-Helium Line Shapes and Fine Structure Mixing Rates*. AFIT/ENP/DS/15S-027. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA. [CDE]

OFFICE OF THE SECRETARY OF DEFENSE

DOCTORAL DISSERTATIONS

CLARK, JASON B., *Functionality, Complexity, and Approaches to Assessment of Resilience under Constrained Energy and Information*. AFIT/ENV/DS/15M-159. Faculty Advisor: Dr. David R. Jacques. Sponsor: ODASD.

MASTER'S THESES

KHAWAGI, ALI, *Corrosion Fatigue Crack Growth Behavior at Notched Hole in 7075-T6 under Biaxial and Uniaxial Fatigue with Different Phases*. AFIT/ENY/MS/15/S-065. Faculty Advisor: Dr. Shankar Mall. Sponsor: OSD.

MAYO, BENJAMIN R., *Suitability Analysis of Continuous-Use Reliability Growth Projection Models*. AFIT/ENS/MS/15M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: DASD(DT&E). [COA]

SMITH, NATHAN C., *Examining the Return on Investment of Test and Evaluation*. AFIT/ENC/MS/15M-183. Faculty Advisor: Dr. Edward D. White. Sponsor: OSD. [ANT]

WILLIAMS, JEFFREY, *Acoustic Model Evaluation and Improvement*. AFIT/ENS/MS/15M-139. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [ANT]

UNITED STATES ARMY

MASTER'S THESES

BOEKESTEIN, BENJAMIN C., *A Predictive Logistic Regression Model of World Conflict Using Open Source Data*. AFIT/ENS/MS/15M-112. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

CRAIG, ROBERT R., *The Military Theater Distribution Network Design Problem*. AFIT/ENS/MS/15M-137. Faculty Advisor: LTC Brian J. Lunday. Sponsor: TRADOC.

MCKENNA, REBEKAH S., *Using Approximate Dynamic Programming to Solve the Military Inventory Routing Problem with Direct Delivery*. AFIT/ENS/MS/15M-140. Faculty Advisor: Dr. Matthew J.D. Robbins. Sponsor: TRADOC.

VUKCEVIC, ALEXANDER M., *Army Information Technology Procurement: A Business Process Analysis*. AFIT/ENV/MS/15M-207. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: CIO. [CCR]

UNITED STATES NAVY

MASTER'S THESES

MORENO, DAVID C., *Tropical Cyclone Intensity and Position Analysis Using Passive Microwave Imager and Sounder Data*. AFIT/ENP/MS/15M-093. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: JTWC.

PIERCE, SCOTT J., *Modeling Navigation System Performance of a Satellite-Observing Star Tracker Tightly Integrated with an Inertial Measurement Unit*. AFIT/ENG/DS/15M-260. Faculty Advisor: Dr. John F. Raquet. Sponsor: USNO. [ANT]

UNITED STATES EUROPEAN COMMAND

MASTER'S THESES

VASQUEZ, ELLIOT B., *Analysis of the Effectiveness of the F-15E Risk Management during Peacetime Operations*. AFIT/ENV/MS/15J-060. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: USAFE/494FS.

UNITED STATES SPECIAL OPERATIONS COMMAND

MASTER'S THESES

FURMAN, THOMAS S., *An Application of Social Network Analysis on Military Strategy, System Networks and the Phases of War*. AFIT/ENS/MS/15M-117. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: USSOCOM.

NYSTROM, JARED K., *A Dynamic Game on Network Topology for Counterinsurgency Applications*. AFIT/ENS/MS/15M-144. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: USSOCOM.

UNITED STATES STRATEGIC COMMAND

MASTER'S THESES

HUGHES, HENRY W., *A Cost-Benefit Analysis of Intercontinental Ballistic Missile Spare Parts Inventory Management*. AFIT/ENS/MS/15M-130. Faculty Advisor: Dr. William A. Cunningham. Sponsor: USSTRATCOM/91 MXG.

UNITED STATES TRANSPORTATION COMMAND

GRADUATE RESEARCH PAPERS

BOWMAN, TRACI L., *Global Container Management Process Improvements*. AFIT/ENS/GRP/15J-020.
Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SDDC. [COA]

4.10. OTHER FEDERAL AGENCIES

DEPARTMENT OF ENERGY

DOCTORAL DISSERTATIONS

SLAUGHTER, ROBERT C., *Multidimensional Analysis of Nuclear Detonations*. AFIT/ENP/DS/15S-029.
Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA. [CSRA]

MASTER'S THESES

GREEN, ASHLEY E., *Comparison of Varying Mass-to-Yield Ratio Nuclear Detonations Using DIRSIG*.
AFIT/ENP/MS/15M-094. Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA. [CSRA]

WIDRICK, REBECCA S., *Optimal Policies for the Management of a Plug-In Hybrid Electric Vehicle Swap Station*. AFIT/ENS/MS/15M-135. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: DOE/LANL.

DEPARTMENT OF HOMELAND SECURITY

DOCTORAL DISSERTATIONS

ENGLERT, JOHN W., *Estimating Peak Magnetic Fields within the Source Region Using Remanent Magnetization: An Application to Nuclear Forensics*. AFIT/ENP/DS/14D-037. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DHS.

MASTER'S THESES

CORVIN, CHARITO M., *A Feasibility Study on the Application of the ScriptGenE Framework as an Anomaly Detection System in Industrial Control Systems*. AFIT/ENG/MS/15S-010. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

HALL, JOSHUA D., *Modeling of Muon Chemistry in the Presence of Electric Fields Using COMSOL*. AFIT/ENP/MS/15M-108. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DHS.

KEY, SCOTT W., *Surface Geometry and Chemistry of Hydrothermally Synthesized Single Crystal Thorium Dioxide*. AFIT/ENP/MS/15M-087. Faculty Advisor: Dr. Tony D. Kelly. Sponsor: DHS.

MATTERS, DAVID A., *Analysis of the Nuclear Structure of Rhenium-186 Using Neutron-Induced Reactions*. AFIT/ENP/MS/15M-098. Faculty Advisor: Dr. John W. McClory. Sponsor: DHS.

PARKER, MICHAEL J., *Coupling Nuclear Induced Phonon Propagation with Conversion Electron Mössbauer Spectroscopy*. AFIT/ENP/MS/15J-054. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DHS.

PETERSON, GLENN, *Photoemission Characterization of Novel Uranium Materials*. AFIT/ENP/MS/15M-101. Faculty Advisor: Dr. Tony D. Kelly. Sponsor: DHS.

WARNER, PHILLIP C., *Automatic Configuration of Programmable Logic Controller Emulators*. AFIT/ENG/MS/15M-024. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

WINN, MICHAEL M., *Constructing Cost-Effective and Targetable ICS Honeypots Suited for Production Networks*. AFIT/ENG/MS/15M-045. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS. [CCR]

ENVIRONMENTAL PROTECTION AGENCY

MASTER'S THESES

BASELEY, DANIEL R., *Hyperspectral Imagery for Large Area Survey of Organophosphate Pesticides*. AFIT/ENV/MS/15M-203. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

FLEMINGS, WILLIAM D., *Detection and Characterization of Malathion Adherence to Piping Materials Used in Water Distribution Systems*. AFIT/ENV/MS/15M-096. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

LEE, WALTER R., *The Fate of Malathion on Copper and Iron Piping within a Water Distribution System*. AFIT/ENV/MS/15M-164. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

MARTIN, SETH K., *Effect of Malathion on the Microbial Ecology of Activated Sludge*. AFIT/ENV/MS/15M-095. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

MUDIMBI, PATRICK M., *Pulsed Ultraviolet Light Emitting Diodes for Advanced Oxidation of Tartrazine*. AFIT/ENV/MS/15M-202. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

RAUGLAS, ERIK G., *The Effect of Malathion on the Activity and Performance of Activated Sludge*. AFIT/ENV/MS/15M-197. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

SCOTT, ROBERT W., *The Use of Ultra-Violet (UV) Light Emitting Diodes (LEDs) in an Advanced Oxidation Process (AOP) with Brilliant Blue FCF as an Indicator*. AFIT/ENV/MS/15M-198. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA/NHSRC.

NATIONAL SCIENCE FOUNDATION

MASTER'S THESES

LEWIS, MEGAN E., *Recent Advances in Compressed Sensing: Discrete Uncertainty Principles and Fast Hyperspectral Imaging*. AFIT/ENC/MS/15M-002. Faculty Advisor: Maj Dustin G. Mixon. Sponsor: NSF.

4.11. NON-FEDERAL SPONSORS

ARGENTINE AIR FORCE MATERIEL GENERAL DIRECTORATE

MASTER'S THESES

HERNANDEZ, SANTIAGO, *An Optimization of the Maintenance Assets Distribution Network in the Argentine Air Force*. AFIT/ENS/MS/15M-152. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Materiel General Directorate.

BRAZILIAN ARMED FORCES

MASTER'S THESES

DOS SANTOS, LUCIANO A., *The Brazilian Air Force Uniform Distribution Process: Using Lean Thinking, Statistical Process Control and Theory of Constraints to Address Improvement Opportunities*. AFIT/ENS/MS/15M-151. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: Brazilian Armed Forces.

DAYTON AREA GRADUATE STUDIES INSTITUTE

MASTER'S THESES

DODD, MARK T., *Coherent Thermal Emission from Photonic Nanostructures Composed of TA, W, GE, and HFO2 Thin Films*. AFIT/ENP/MS/15M-006. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: DAGSI.

DAYTON LEADER CONSORTIUM

MASTER'S THESES

FOLZ, ANDREW S., *The Role of Social Support on the Relationship between Gender and Career Progression in STEM Academia*. AFIT/ENV/MS/15M-204. Faculty Advisor: Dr. John J. Elshaw. Sponsor: Dayton LEADER Consortium.

LINCOLN LABORATORY – MIT

MASTER'S THESES

CHRISTMAN, JOSHUA R., *Leveraging Human Insights by Combining Multi-Objective Optimization with Interactive Evolution*. AFIT/ENG/MS/15M-060. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

WILLINGER, COREY T., *Effects of Data Replication on Data Exfiltration in Mobile Ad Hoc Networks Utilizing Reactive Protocols*. AFIT/ENG/MS/15M-035. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

LOCKHEED MARTIN

MASTER'S THESES

HAND, JUSTIN W., *Low Speed Experimental Study of Missile Concept in Store Separation Environment*. AFIT/ENY/MS/15M-211. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

CONNORS, CASEY D., *Agent-Based Modeling Methodology for Analyzing Weapons Systems*. AFIT/ENS/MS/15M-132. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

SPECTRAL ENERGIES

MASTER'S THESES

LYNCH, ANDREW J., *Overall Effectiveness Measurement at Engine Temperatures with Reactive Film Cooling and Surface Curvature*. AFIT/ENY/MS/15M-244. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: Spectral Energies.

TURKISH AIR FORCE

MASTER'S THESES

ACAR, MUSTAFA, *Optimization of Turkish Air Force SAR Units' Forward Deployment Points for a Central Based SAR Force Structure*. AFIT/ENS/MS/15M-148. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: TuAF.

5. ACADEMIC DEPARTMENT PUBLICATIONS AND FUNDING INFORMATION

5.1. DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS

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5.1.1. DOCTORAL DISSERTATIONS

ALBA, CHRISTOPHER R., *A Nonequilibrium Finite-Rate Carbon Ablation Model for Radiating Earth Re-entry Flows*. AFIT/ENY/DS/15S-053. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFOSR.

BELLOWS, CHARLIE T., *Leveraging External Sensor Data for Enhanced Space Situational Awareness*. AFIT/ENY/DS/15S-054. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: AFRL/RV.

CROWE, DARRELL S., *Hot Streak Characterization in Serpentine Exhaust Nozzles*. AFIT/ENY/DS/14D-032. Faculty Advisor: Dr. Christopher L. Martin, Jr. Sponsor: AFRL/RV.

GOFF, GARY M., *Orbit Estimation of Non-Cooperative Maneuvering Spacecraft*. AFIT/ENY/DS/15J-051. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

KAPLAN, SERGEY M., *Piezoelectric Response of Ferroelectric Ceramics under Mechanical Stress*. AFIT/ENY/DS/15S-064. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

KRISAK, MATTHEW B., *Environmental Degradation of Nickel-Based Superalloys due to Gypsiferous Desert Dusts*. AFIT/ENY/DS/15S-066. Faculty Advisor: Capt Brook I. Bentley. Sponsor: AFRL/RX.

SMITH, NATHAN E., *Optimal Collision Avoidance Trajectories for Unmanned/Remotely Piloted Aircraft*. AFIT/ENY/DS/14D-034. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

SUPPLISSON, ANGELA W., *Optimal Recovery Trajectories for Automatic Ground Collision Avoidance Systems (Auto GCAS)*. AFIT/ENY/DS/15M-002. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

WINDER, SHEENA L., *Mechanical Testing of Ultra-High Temperature Ceramics at 1500° C in Air - Development of an Experimental Facility and Test Method*. AFIT/ENY/DS/15M-259. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFOSR.

WRIGHT, JONATHAN W., *Advancements of In-Flight Mass Moment of Inertia and Structural Deflection Algorithms for Satellite Attitude Simulators*. AFIT/ENY/DS/15M-261. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

5.1.2. MASTER'S THESES

AL GHOFAILY, MOHAMMED, *Finite Element Analysis and Experimentation of an Icosahedron Frame under Compression*. AFIT/ENY/MS/15S-051. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: N/A.

AL NATIFAT, SALEH A., *Tension-Compression Fatigue Behavior of 2D and 3D Polymer Matrix Composites at Elevated Temperature*. AFIT/ENY/MS/15S-052. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RQ.

ALIX, DANIEL C., *Error Characterization of Flight Trajectories Reconstructed Using Structure from Motion*. AFIT/ENY/MS/15M-214. Faculty Advisor: Col Karl C. Walli. Sponsor: AFRL. [ANT]

BABBIE, CURTIS A., *Effect of Mixture Pressure and Equivalence Ratio on Detonation Cell Size for Hydrogen-Air Mixtures*. AFIT/ENY/MS/15J-045. Faculty Advisor: Dr. Paul I. King. Sponsor: N/A.

BENNETT, MICHAEL L., *Using Reactive Flow Models to Characterize Sustained and Short-Pulse Ignition Behavior*. AFIT/ENY/MS/15M-220. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

CARPENTER, STEVEN P., *A Computational Investigation of the Dynamics of a Hypersonic Glide Vehicle*. AFIT/ENY/MS/15M-233. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

COLYER, PATRICK, *Infrared Signature Modeling of the UH-60L for Increased Mission Success of Future Vertical Lift Aircraft*. AFIT/ENY/MS/15S-056. Faculty Advisor: Maj David Liu. Sponsor: N/A.

DINH, DAVID H., *Ground Station and Mission Operations Validation for the FalconSAT-7 CubeSat*. AFIT/ENY/MS/15M-239. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: DARPA. [CSRA]

DINIZ, HEATHER C., *Navigation Constellation Design Using a Multi-Objective Genetic Algorithm*. AFIT/ENY/MS/15M-245. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A. [CSRA]

EKEN, MELIH, *Modular Heat Dissipation Technique for a CubeSat*. AFIT/ENY/MS/15S-073. Faculty Advisor: Maj James L. Rutledge. Sponsor: N/A. [CSRA]

HAND, JUSTIN W., *Low Speed Experimental Study of Missile Concept in Store Separation Environment*. AFIT/ENY/MS/15M-211. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: Lockheed Martin.

HATHAWAY, KYLE A., *Hypersonic Air Radiation Modeling for a Conical Reentry Vehicle*. AFIT/ENY/MS/15M-238. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

HAUKE, ROBERT, *Aerothermodynamic CFD Analysis of a Hypersonic Reentry Vehicle*. AFIT/ENY/MS/15M-229. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: NASIC.

HEPPE, JUSTIN T., *Methods of Measuring Stress Relaxation in Composite Tape Springs*. AFIT/ENY/MS/15M-221. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/RV. [CSRA]

HODKIN, RANDALL J., *Modal Characterization of a Piezoelectric Shaker Table*. AFIT/ENY/MS/15J-001. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFRL/RQ.

HORN, KEVIN P., *Exhaust Composition in a Small Internal Combustion Engine Using FTIR Spectroscopy*. AFIT/ENY/MS/15J-042. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: AFRL/RQ.

HULL, CHRISTOPHER J., *Effect of Prior Exposure at Elevated Temperatures on Tensile Properties and Stress-Strain Behavior of Three Oxide/Oxide Ceramic Matrix Composites*. AFIT/ENY/MS/15M-228. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

JENSON, DANIEL N., *Space Object Self-Tracker Experiment Design and Analysis*. AFIT/ENY/MS/15M-223. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

JUST, LUCAS W., *Dynamic Response Analysis of an Icosahedron Shaped Lighter than Air Vehicle*. AFIT/ENY/MS/15M-216. Faculty Advisor: Dr. Anthony N. Palazotto. Sponsor: AFOSR.

KANIA, MATTHEW A., *Analysis of Hypersonic Vehicle Wakes*. AFIT/ENY/MS/15S-063. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

KELLY, SCOTT J., *A Monocular SLAM Method to Estimate Relative Pose during Satellite Proximity Operations*. AFIT/ENY/MS/15M-219. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: AFRL/RQ.

KHAWAGI, ALI, *Corrosion Fatigue Crack Growth Behavior at Notched Hole in 7075-T6 under Biaxial and Uniaxial Fatigue with Different Phases*. AFIT/ENY/MS/15S-065. Faculty Advisor: Dr. Shankar Mall. Sponsor: OSD.

KIM, NAMKYU, *Optimized Flight Path for Localization Using Line of Bearing*. AFIT/ENY/MS/15M-246. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ. [ANT]

LAGRANGE, BRIAN K., *Reflections of a Wave: An Analysis of Photonic Doppler Velocimetry Systems*. AFIT/ENY/MS/15M-242. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

LANCASTER, JAMES C., *Characterization of a Robotic Manipulator for Dynamic Wind Tunnel Applications*. AFIT/ENY/MS/15M-227. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFRL/RW.

LANSER, RICHARD L., *Tension-Compression Fatigue of an Oxide/Oxide Ceramic Matrix Composite at Elevated Temperature in Air and Steam Environments*. AFIT/ENY/MS/15M-222. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

LASARGE, JACOB A., *A CubeSat Mission for Mapping Spot Beams of Geostationary Communications Satellites*. AFIT/ENY/MS/15M-247. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

LESKO, JAMES E., *Characterizing the Effects of Unknown Error on Space Object Surveillance and Identification Network Performance*. AFIT/ENY/MS/15M-249. Faculty Advisor: Dr. Jonathan T. Black. Sponsor: N/A.

LYNCH, ANDREW J., *Overall Effectiveness Measurement at Engine Temperatures with Reactive Film Cooling and Surface Curvature*. AFIT/ENY/MS/15M-244. Faculty Advisor: Dr. Marc D. Polanka. Sponsor: Spectral Energies.

MENNE, JEFFREY, *An Aerothermal Analysis of a Hypersonic Vehicle*. AFIT/ENY/MS/15M-237. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: N/A.

MOOMEY, DANIEL, *Aiding Geostationary Space Situational Awareness Using Small Aperture Commercial Telescopes*. AFIT/ENY/MS/15M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

NIETO, EDUARDO, *Simulation of Metal Particulates in High Energetic Materials*. AFIT/ENY/MS/15J-043. Faculty Advisor: Dr. Robert B. Greendyke. Sponsor: AFRL/RW.

PAXTON, JAMES C., *Convective Considerations during Thermal Flash: Wind Tunnel-Enhanced AFIT Experimental Thermal Irradiation Test System*. AFIT/ENY/MS/15M-232. Faculty Advisor: Dr. Mark F. Reeder. Sponsor: AFNWC.

PENN, DYLAN R., *Characterization and Modeling of a Control Moment Gyroscope*. AFIT/ENY/MS/15M-235. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

REKEDAL, KEVIN D., *Investigation of the High-Cycle Fatigue Life of Selective Laser Melted and Hot Isostatically Pressed Ti-6Al-4v*. AFIT/ENY/MS/15M-212. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

RICHARDS, HAYDEN K., *Topology Optimization of Additively Manufactured Penetrating Warheads: Design Methodologies and Test Results*. AFIT/ENY/MS/15M-234. Faculty Advisor: Maj David Liu. Sponsor: AFRL/RW.

SCHMIDT, NICHOLAS S., *Evaluation of the Military Utility of Employing an Angle of Arrival Payload Hosted on a CubeSat as an Augmentation to Existing Geolocation Systems*. AFIT/ENY/MS/15M-213. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

SHAH, NIHAR, *Computer Modeling of a Rotating Detonation Engine in a Rocket Configuration*. AFIT/ENY/MS/15M-230. Faculty Advisor: Dr. Paul I. King. Sponsor: AFRL/RQ.

SPRINKLE, KEVIN B., *Creep of Sylramic-iBN Fiber Tows at Elevated Temperature in Air and in Silicic Acid-Saturated Steam*. AFIT/ENY/MS/15J-046. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

STEENMAN, MATTHEW B., *Reverse Radio Frequency Fingerprinting for Remote Indoor Localization*. AFIT/ENY/MS/15M-225. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFTPS. [ANT]

TAUER, THOMAS M., *Identifying Nonlinear Aerodynamic Phenomena Contributing to F-16 Limit Cycle Oscillation*. AFIT/ENY/MS/15M-226. Faculty Advisor: Dr. Donald L. Kunz. Sponsor: AFSEO.

TEOPE, KAZ I., *Experimental Magnetohydrodynamic Energy Extraction from a Pulsed Detonation*. AFIT/ENY/MS/15M-224. Faculty Advisor: Dr. Paul I. King. Sponsor: AFRL/RQ.

TIBBS, MICHAEL L., *Design and Test of an Attitude Determination and Control System for a 6U CubeSat Using AFIT's CubeSat Testbed*. AFIT/ENY/MS/15M-240. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV. [CSRA]

TIPTON, JAMES T., *Fatigue Behavior of IM7/BMI 5250-4 Composite at Room and Elevated Temperatures*. AFIT/ENY/MS/15M-241. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

UDELL, HEATHER M., *A CubeSat Mission Modeling Tool*. AFIT/ENY/MS/15M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]

VAN DYNE, DYLAN M., *Simulation of Locking Space Truss Deployments for a Large Deployable Sparse Aperture Reflector*. AFIT/ENY/MS/15M-250. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFOSR. [CSRA]

WALKER, DAVID L., *Topology Optimization of an Aircraft Wing*. AFIT/ENY/MS/15J-044. Faculty Advisor: Maj David Liu. Sponsor: JASPO.

WALLENTINE, SARAH M., *Effect of Prior Exposure at Elevated Temperatures on Tensile Properties and Stress-Strain Behavior of Four Non-Oxide Ceramic Matrix Composites*. AFIT/ENY/MS/15J-048. Faculty Advisor: Dr. Marina B. Ruggles-Wrenn. Sponsor: AFRL/RX.

ZIMMER, VICTOR J., *Transient Air Throttle Characterization for Scramjet Ignition*. AFIT/ENY/MS/15M-231. Faculty Advisor: Maj James L. Rutledge. Sponsor: AFRL/RQ.

5.1.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AGTE, JEREMY S., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2011 (AFIT/ENY); BS, Aeronautical Engineering, United States Air Force Academy, 1997; MS, Mechanical Engineering, The George Washington University, 1999; PhD, Aeronautical and Astronautical Engineering, Massachusetts Institute of Technology, 2011. Lt Col Agte has significant experience in aircraft design, systems optimization, and computational analysis of aerospace systems. Additionally, he is a flight test engineering graduate of the U.S. Air Force Test Pilot School (01A). His research focus areas include aerospace systems design, multidisciplinary design optimization, multistate design for robustness, and optimal control.

REFEREED JOURNAL PUBLICATIONS

Bettinger, R.A., Black, J.T., and Agte, J.S., “Design of Experiment Approach to Atmospheric Skip Entry Maneuver Optimization,” *Journal of Spacecraft and Rockets*, Vol. 53, No. 3, pp. 813-826, 2015.
DOI: 10.2514/1.A33032.

AYRES, BRADLEY J.,

Visiting Assistant Professor of Systems Engineering (Aerospace Corp.), Department of Aeronautics and Astronautics, AFIT Appointment Date: 2012 (AFIT/ENY); BS, Chemical Engineering, University of Missouri, Columbia, 1982; M.A., Procurement and Acquisition Management, Webster University, St. Louis, 1991; M.S., Software Systems Management, Air Force Institute of Technology, 1992; PhD, Business Administration specializing in MIS, Florida State University, 2003. Dr. Ayres' research interests include development of complex systems. He is a member of AIAA, the Project Management Institute, and the International Council on Systems Engineering. Tel. 255-3355 x3422, email: Bradley.Ayres.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Thompson, R.E., Colombi, J.M., Black, J.T., and Ayres, B.J., “Model-Based Conceptual Design Optimization Methods: Disaggregated Weather System Follow-On,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 4, pp. 1021-1037, Jul 2015. DOI: 10.2514/1.A33135. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Kaslow, D., Anderson, L., Asundi, S., Ayres, B.J., Iwata, C., Shiotani, B., and Thompson, R., “Developing a CubeSat Model-Based System Engineering (MBSE) Reference Model – Interim Status,” 2015 IEEE Aerospace Conference, Big Sky, MT, Mar 2015.

Thompson, R.E., Colombi, J., Black, J.T., and Ayres, B.J., “Disaggregated Space System Conceptual Design Optimization – Stochastic Analysis Methods,” 2015 IEEE Aerospace Conference, Big Sky, MT, Mar 2015. DOI: 10.1109/AERO.2015.7119027. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kaslow, D., Anderson, L., Asundi, S., Ayres, B.J., Iwata, C., Shiotani, B., and Thompson, R., “Developing and Distributing a CubeSat Model-Based System Engineering (MBSE) Reference Model,” 31st Space Symposium, Colorado Springs, CO, Apr 2015.

BENTLEY, BROOK I., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2013 (AFIT/ENY); BS Mechanical Engineering, Brigham Young University, 2005; MS Aeronautical Engineering, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2013. Capt Bentley's research interests include hypersonics, scramjets, fluids, and surface phenomena such

as ablation and sublimation. He is a member of AIAA, Phi Kappa Phi, Tau Beta Pi, and Sigma Gamma Tau. Tel. 937-255-3636 x7478, email: Brook.Bentley@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #5: Aerothermoelastic Analysis Methodologies for Aircraft Design).” Sponsor: AFRL/RQ. Funding: \$10,000.

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #6: Plasma-Based Control of Transitional Flows Using High-Fidelity Simulations).” Sponsor: AFRL/RQ. Funding: \$10,000.

BLACK, JONATHAN T.,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2007 (AFIT/ENY); BS Industrial Engineering, University of Illinois at Urbana-Champaign, 2001; MS Mechanical and Aerospace Engineering, Joint Institute for Advancement of Flight Sciences (joint NASA Langley Research Center and George Washington University program), 2003; PhD, Mechanical Engineering, University of Kentucky, 2006. Dr. Black has worked on several successful space experiments and AFIT's Space Vehicle Design sequence. His current research interests include structures, structural dynamics, advanced sensing technologies, space systems engineering, and novel orbit analysis for a wide variety of military and intelligence applications including large lightweight space structures, micro UAV development, and taskable satellites. He is the first AFIT recipient of an AFOSR Young Investigator Award and is an AIAA Associate Fellow.

REFEREED JOURNAL PUBLICATIONS

Bettinger, R.A. and Black, J.T., “Comparative Study of Phasing, Atmospheric Skip Entry, and Simple Plane Change Maneuvers,” *Journal of Spacecraft and Rockets*, Vol. 51, No. 6, pp. 1965-1975, Nov 2014. DOI: 10.2514/1.A32872.

Bettinger, R.A., Black, J.T. and Agte, J.S., “Design of Experiment Approach to Atmospheric Skip Entry Maneuver Optimization,” *Journal of Spacecraft and Rockets*, Vol. 53, No. 3, pp. 813-826, 2015. DOI: 10.2514/1.A33032.

Goff, G.M., Black, J.T. and Beck, J.A., “Orbit Estimation of a Continuously Thrusting Spacecraft Using Variable Dimension Filters,” *Journal of Guidance, Control, and Dynamics*, Jan 2015. DOI: 10.2514/1.G001091.

Goff, G.M., Black, J.T., and Beck, J.A., “Short Arc Radar Observation Considerations in Covariance Intersection,” *International Journal of Space Science and Engineering*, Vol. 3, No. 1, pp. 50-67, May 2015. DOI: 10.1504/ijspacese.2015.069358.

Goff, G.M., Black, J.T., and Beck, J.A., “Tracking Maneuvering Spacecraft with Filter-Through Approaches Using Interacting Multiple Models,” *Acta Astronautica*, Vol. 114, pp. 152-163, Sep 2015. DOI: 10.1016/j.actaastro.2015.05.009.

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Jennings, A., Mayhew, M., and Black, J., “Video Measurements of Instantaneous Forces of Flapping Wing Vehicles,” *Mechanical Systems and Signal Processing*, Vol. 64-65, pp. 325-336, Dec 2015, DOI: 10.1016/j.ymssp.2015.04.020.

Leigh, A.M. and Black, J.T., “Navigation Solution to Maneuver a Spacecraft Relative to Multiple Satellites and Ground Locations,” *Acta Astronautica*, Vol. 109, No. 1, pp. 1-13, Apr 2015. DOI: 10.1016/j.actaastro.2014.08.005.

- Leigh, A.M. and Black, J.T., “Navigation Solution to Maneuver a Spacecraft Relative to a Sphere Centered on a Cooperative Satellite,” *Acta Astronautica*, Vol. 105, No. 1, pp. 230-241, Dec 2014. DOI: 10.1016/j.actaastro.2014.09.005.
- Leigh, A.M. and Black, J.T., “Navigation Solution to Maneuver a Spacecraft Relative to Spheres Centered on Multiple Cooperative Satellites,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 3, pp. 754-765, May-Jun 2015. DOI: 10.2514/1.A32910.
- Leigh, A.M., Black, J.T., and McLaughlin, C., “Navigation Solution to Maneuver Spacecraft Relative to Spheres Centered on Cooperative Satellites,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 3, pp. 754-765, 2015.
- Niederhauser, J.D., Hartsfield, C.R., and Black, J.T., “Design and Characterization of a Space-Based Imaging Experiment Computer Unit,” *Journal of Aerospace Engineering*, Vol. 28, No. 3, pp. 04014081-1-04014081-13, May 2015. DOI: 10.1061/(ASCE)AS.1943-5525.0000362
- Showalter, D.J. and Black, J.T., “Near-Optimal Geostationary Transfer Maneuvers with Cooperative En-Route Inspection using Hybrid Optimal Control,” *Acta Astronautica*, Vol. 105, No. 2, pp. 395-406, Dec 2014. DOI: 10.1016/j.actaastro.2014.09.013.
- Showalter, D.J. and Black, J.T., “Optimal Continuous-Thrust Responsive Theater Maneuvers,” *Journal of Spacecraft and Rockets*, Apr 2015. DOI: 10.2514/1.A33108.
- Showalter, D.J. and Black, J.T., “Responsive Theater Maneuvers via Particle Swarm Optimization,” *Journal of Spacecraft and Rockets*, Vol. 51, No. 6, pp. 1976-1985, Nov-Dec 2014. DOI: 10.2514/1.A32989.
- Thompson, R.E., Colombi, J.M., Black, J.T. and Ayres, B.J., “Model-Based Conceptual Design Optimization Methods: Disaggregated Weather System Follow-On,” *Journal of Spacecraft and Rockets*, Vol. 52, No. 4, pp. 1021-1037, Jul 2015. DOI: 10.2514/1.A33135.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Thompson, R.E., Colombi, J., Black, J.T., and Ayres, B.J., “Disaggregated Space System Conceptual Design Optimization – Stochastic Analysis Methods,” 2015 IEEE Aerospace Conference, Big Sky, MT, Mar 2015. DOI: 10.1109/AERO.2015.7119027.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Bellows, C.T., Black, J.T., Cobb, R.G. and Jennings, A.L., “Updating Track Data from Partial Serendipitous Satellite Streaks,” 25th AAS/AIAA Space Flight Mechanics Meeting, Williamsburg, VA, AAS 15-268, Jan 2015.
- Goff, G.M., Black, J.T., and Beck, J.A., “Orbit Estimation of a Continuously Thrusting Satellite Using Variable Dimension Filters,” AIAA Guidance, Navigation, and Control Conference, Orlando, FL, Jan 2015. DOI: 10.2514/6.2015-0093.
- LaSarge, J.A. and Black, J.T., “A CubeSat Mission and Configuration Analysis for Locating and Mapping Spot Beams of Geostationary Comm-Satellites,” AIAA SciTech Conference, Orlando, FL, Jan 2015. DOI: 10.2514/6.2015-2044.
- Van Dyne, D., Jennings, A.L. and Black, J.T., “Simulation of Locking Space Truss Deployments,” 2nd AIAA Spacecraft Structures Conference, Orlando, FL, Jan 2015. DOI: 10.2514/6.2015-0227.

COBB, RICHARD G.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2001 (AFIT/ENY); BS, Pennsylvania State University, 1988; MS, Air Force Institute of Technology, 1992; PhD, Air Force Institute of Technology, 1996. Dr. Cobb teaches courses on control theory, optimization and

satellite design. His research focuses on dynamics and control of space structures for space-based remote sensing, and optimization and control for aerospace applications. Recent research includes developing optimal trajectory plans for Global Strike missions, maneuver planning for satellite proximity operations, and dynamics and control techniques for lightweight space optics and sensor systems for Space Situational Awareness. While on active duty, Dr. Cobb served as the technical advisor for AFRL's Space Vehicles Technology Branch, and led several space flight experiment programs, including the Vibration Isolation and Suppression System sponsored by BMDO and the Satellite Ultra-quiet Isolation Technology Experiment. Dr. Cobb also served as a launch operations officer at Cape Canaveral AFS on the Global Positioning System program, responsible for the integration and launch of the GPS Block II satellite constellation. Dr. Cobb is an Associate Fellow of AIAA. Tel. 937-255-3636 x4559, email: Richard.Cobb@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Automatic Ground Collision Avoidance System Trajectory Optimization - Flight Tests." Sponsor: AFRL/RQ. Funding: \$12,000. [ANT]

"Trajectory Optimization Applications for Loyal Wingman and Missile Avoidance." Sponsor: AFRL/RQ. Funding: \$30,000. [ANT]

REFEREED JOURNAL PUBLICATIONS

Ross, S.M., Cobb, R.G., Baker, W.P., and Harmon, F., "Implementation lessons and pitfalls for real-time optimal control with stochastic systems," *Journal of Optimal Control Applications and Methods*, Vol. 36, No. 2, pp. 198-217, Mar 2015. DOI: 10.1002/oca.2110.

Smith, N., Cobb, R., Pierce, S., and Raska, V., "Uncertainty Corridors for Three-Dimensional Collision Avoidance," *Journal of Guidance, Control, and Dynamics*, Vol. 38, No. 6, pp. 1156-1162, Jun 2015. DOI:10.2514/1.G000459.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Jodeh, N. and Cobb, R., "Autonomous Flight Path Planning for Traffic Monitoring in Wireless Sensor Networks," AIAA Guidance, Navigation, and Control Conference, Orlando, FL, AIAA Paper 2015-0190, Jan 2015.

Jodeh, N. and Cobb, R., "Optimal Airborne Trajectories for Data Collection from Wireless Sensor Networks by Direct Collocation Methods," AIAA Guidance, Navigation, and Control Conference, Orlando, FL, AIAA Paper 2015-0072, Jan 2015.

Livermore, R. and Cobb, R., "Optimal UAS Path Planning for Convoy Overwatch," AIAA Guidance, Navigation, and Control Conference, Orlando, FL, AIAA Paper 2015-0487, Jan 2015.

Suplisson, A., Cobb, R., Baker, W., and Jacques, D., "An Optimal Control Approach to Aircraft Automatic Ground Collision Avoidance," AIAA Guidance, Navigation, and Control Conference, Orlando, FL, AIAA Paper 2015-1316, Jan 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bellows, C.T., Black, J.T., Cobb, R.G., and Jennings, A.L., "Updating Track Data from Partial Serendipitous Satellite Streaks," 25th AAS/AIAA Space Flight Mechanics Meeting, Williamsburg, VA, AAS 15-268, Jan 2015. [CSRA]

Gross, K.H., Clark, M.A., Hoffman, J.A., Swenson, E.D., Cobb, R., Whalen, M.W., and Wagner, L., "Application and Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System," Space Forum, Pasadena, CA, Sep 2015. [CSRA]

Humphreys, C., Cobb, R., Jacques, D., and Reeger, J., "Optimal Mission Path for the Uninhabited Loyal Wingman," AIAA Aviation 2015, Dallas, TX, Jun 2015.

Lancaster, J., Reeder, M.F., Cobb, R.G., Sytsma, M., and Rowe, P., "Experiments with the Model Test Apparatus Installed in the AFIT Low-Speed Tunnel," AIAA Aviation 2015, Dallas, TX, AIAA Paper 2015-3017, Jun 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Bellows, C., Schumaker, P., Black, J., Cobb, R., and Jennings, J., "Updating Track Data from Serendipitous Satellite Streaks," AIAA 40th Dayton-Cincinnati Aerospace Science Symposium, Mar 2015.

Carr, R. and Cobb, R., "Progress on Stochastic Optimal Control as Applied to Aircraft Missile Avoidance," AIAA 40th Dayton-Cincinnati Aerospace Science Symposium, Mar 2015.

Carr, R., Jorris, T., and Cobb, R., "Propagation of Uncertainty in Optimal Control Using the Unscented Transform," ASME 10th Dayton Engineering Sciences Symposium, Oct 2014.

Humphreys, C. and Cobb, R., "Optimal Path for Unmanned Loyal Wingman Using Direct Orthogonal Collocation and Stochastic Estimation in Pop-up Threat Environment," ASME 10th Dayton Engineering Sciences Symposium, Oct 2014.

Humphreys, C., Cobb, R., Reeger, J., and Jennings, A., "Particle Swarm Optimization as Initial Guess in Nonlinear Programming Solver," AIAA 40th Dayton-Cincinnati Aerospace Science Symposium, Mar 2015.

Jodeh, N. and Cobb, R., "Optimal Airborne Trajectories for Data Collection from Wireless Sensor Networks by Direct Collocation Methods," ASME 10th Dayton Engineering Sciences Symposium, Oct 2014.

Jodeh, N., Livermore, R. and Cobb, R., "Optimal UAS Assignment and Trajectories for Data Collection from Wireless Sensor Networks," AIAA 40th Dayton-Cincinnati Aerospace Science Symposium, Mar 2015.

COMER, ADAM L., Capt,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2015 (AFIT/ENY); BS Mechanical Engineering, United States Air Force Academy, 2009; PhD Engineering, University of Cambridge, 2013. Capt Comer's research interests include fluid mechanics, combustion, and computational fluid dynamics-based design optimization with a focus on developing and applying practical and advanced computational models of turbulent combustion and multiphase flows for gas turbine propulsion applications. Specific research efforts include an automated, CFD-based optimization of a gas turbine fuel injector and computational modeling of bluff-body flame dynamics and instability. During his previous assignment as a deputy branch chief and combustion research engineer at AFRL, he gained exposure to a variety of applied and fundamental research efforts for current and future combustion systems for propulsion. Tel. 937-255-6565 x4745, email: Adam.Comer@afit.edu

CROWE, DARRELL S., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2015 (AFIT/ENY); BS Aerospace Engineering, Texas A&M, 2003; MS Aeronautical Engineering, Air Force Institute of Technology, 2008; PhD Aeronautical Engineering, Air Force Institute of Technology, 2014. Maj Crowe's research interests include computational fluid dynamics, weapon aerodynamics, propulsion systems integration, fuel film cooling, and grid generation methods. Maj Crowe teaches courses on computational fluid dynamics. He has experience in propulsion sustainment engineering and has worked as a computational fluid dynamics engineer in the area of aircraft/store compatibility. He is a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. Tel. 937-255-3636 x4204, email: Darrell.Crowe@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Computational Fluid Dynamics (CFD) Simulations of Serpentine Exhaust Nozzles.” Sponsor: AFRL/R.Y. Funding: \$18,047.

“Computational Fluid Dynamics (CFD) Simulations of Turbulent Flow Around an Aircraft Fairing.” Sponsor: NASIC. Funding: \$50,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Crowe, D. S. and Martin, C. L., “Effect of Geometry on Exit Temperature from Serpentine Exhaust Nozzles,” AIAA SciTech Conference, Orlando, FL, AIAA Paper 2015-1670, Jan 2015.

DELUCA, ANTHONY M., Lt Col,

Deputy Head and Assistant Professor of Aerospace Engineering, AFIT Appointment Date: 2013 (AFIT/ENY); BS Mechanical Engineering, US Military Academy at West Point, 1995; MBA Technology Management, University of Phoenix/ABQ, 1998; MS Aeronautical Engineering, Air Force Institute of Technology, 2004; PhD Aeronautical Engineering, Air Force Institute of Technology, 2013. Lt Col DeLuca's research interests include aerodynamics, fluid mechanics, and biomimetic flight systems. Lt Col DeLuca is a flight test engineer with extensive experience in air-to-air and air-to-ground weapons, and on national ISR systems, conducting flight test in a variety of aircraft. He is a commercial pilot with instrument and high-performance ratings, and a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA. Tel. 937-255-3636 x4537, email: Anthony.Deluca@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #7: Massively Unsteady Vortex-Dominated Flows).” Sponsor: AFRL/RQ. Funding: \$10,000.

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #8: Active Wing Twist and Camber Control Without Aircraft Control Surfaces).” Sponsor: AFRL/RQ. Funding: \$10,000.

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #9: Design and Life Prediction Tools for Aircraft Structural Components with Engineered Residual Stresses).” Sponsor: AFRL/RQ. Funding: \$10,000.

DILLSAVER, MATTHEW J., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2013 (AFIT/ENY); BS Mechanical Engineering, University of Oklahoma, 2002; MS Aeronautical Engineering, Air Force Institute of Technology, 2007; PhD, Aerospace Engineering, University of Michigan, 2013. Maj Dillsaver has experience as a Mechanical Systems and Aircraft Battle Damage Repair Engineer on the KC-135, F-15 Stability and Control Engineer, as well as Executive Officer and Assistant Director of Operations at the Air Force SEEK EAGLE Office. His research focus areas include control of very flexible aircraft, maneuver optimization for aircraft combat survivability and optimal control.

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #3: Effectiveness Based Design).” Sponsor: AFRL/RQ. Funding: \$10,000.

FREEMAN, JACOB A., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2015 (AFIT/ENY); BS Mechanical Engineering, Brigham Young University, 1997; MS Aeronautical Engineering, Air Force Institute of Technology, 2003; PhD Aeronautical Engineering, Virginia Tech, 2012. Lt Col Freeman's research interests include computational fluid dynamics, optimization under uncertainty, predictive computational uncertainty, and computational turbulence modeling. Lt Col Freeman has experience as the GPS deputy chief engineer at the Space & Missile Systems Center; computational

aircraft-store separation at the Air Force SEEK EAGLE Office; computational, experimental and flight testing of a micro air vehicle, and satellite payload testing, integration, launch and operations for the MightySat II.1 space vehicle for the Air Force Research Lab; and as assistant professor of aeronautical engineering at the Air Force Academy; he also deployed to Guantanamo Bay, Cuba, in support of Operation Enduring Freedom. He is a member of AIAA. Tel. 937-255-3636 x4901, email: Jacob.Freeman@afit.edu

PATENTS

Freeman, J. and Roy, C., “A Shape-Optimized Base Flap Geometry for Reducing Aerodynamic Drag of Tractor-Trailers,” Issued Oct 2014, US Provisional Patent No. 61/992,970.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Freeman, J., “Resilient Positioning, Navigation, and Timing: Global Positioning System,” key-note speaker and panelist presented to 150 government, military, industry and academic leaders and engineers; 7th Annual Autonomous Guidance, Navigation, and Control Symposium; Charles Stark Draper Laboratory, Cambridge, MA; May 2015.

GEISEL, CHRISTOPHER D., Maj,

Deputy Head and Assistant Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2014 (AFIT/ENY); BS Astronautical Engineering, United States Air Force Academy, 2001; MS Astronautical Engineering, Air Force Institute of Technology, 2008; PhD, Purdue University, 2013. Maj Geisel’s research interests include astrodynamics and dynamical systems theory. He has investigated spacecraft orbit design in a multi-body environment as well as navigation solutions for on-orbit inspection of satellites. Previously, he worked as an orbital analyst for the Advanced Payload Design Team at NASA’s Jet Propulsion Laboratory. At the Air Force Research Laboratory Sensors Directorate, he led the design of a sensor system for hypersonic vehicles. At the Space and Missile Systems Center / Missile Defense Systems Group, he supervised development, integration, testing, and operator training for two satellites designed to track ballistic missiles. He also mentored Iraqi and Afghan security forces during Operation Iraqi Freedom and Operation Enduring Freedom. Maj Geisel is a member of Sigma Gamma Tau, Tau Beta Pi, and AIAA. Tel. 937-255-3636 x4237, email: Christopher.Geisel@afit.edu

GREENDYKE, ROBERT B.,

Associate Professor of Aeronautics and Astronautics and Director, AFIT Scientist and Engineer Education Programs at Kirtland AFB; Appointment Date: 2005 (AFIT/ENY); BBA, Economics, Baylor University, 1979; BS, Aerospace Engineering, Texas A&M University, 1986; MS, Aerospace Engineering, Texas A&M University, 1988; PhD, Interdisciplinary Engineering, Texas A&M University, 1998. Dr. Greendyke’s research interests include computational fluid dynamics, Direct Simulation Monte Carlo methods, hypersonic and reacting flows, radiation simulation, thermophysics, and plasma simulation. Dr. Greendyke was a Research Scientist at NASA-Langley Research Center studying re-entry and aerobraking flows, and an Associate Professor in the University of Texas at Tyler establishing a start-up Mechanical Engineering Program from concept through accreditation. He has published over 30 journal articles, technical reports and conference publications in multiple fields. He is an Associate Fellow of the American Institute of Aeronautics and Astronautics. Tel. 937-255-3636 x4567, email: Robert.Greendyke@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Aerothermal Analysis of Hypersonic Bodies.” Sponsor: NASIC. Funding: \$80,000 – Greendyke 50% Bentley 25%, Lewis 25%.

“Computational and Experimental Investigation of Ablative-Radiative Hypersonic Flows.” Sponsor: AFOSR. Funding: \$25,750 – Greendyke 60%, Martin 40%.

“Computational Examination of the Behavior of Electronics Materials under Extreme Mechanical and Thermal Stresses.” Sponsor: AFRL/RW. Funding: \$34,560.

“The Use of Chemical Reaction Models in Hydrocode Simulation of Explosives.” Sponsor: AFOSR.
Funding: \$24,023.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Short Course in Hypersonic Aerothermodynamics for Intelligence Analysts.” Sponsor: NASIC. Funding: \$3,732.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Alba, C.R., Greendyke, R.B., and Marschall, J., “Influence of Carbon Nitridation in a Nonequilibrium Finite-Rate Ablation Model,” AIAA SciTech Conference, Orlando, FL, AIAA Paper 2015-1453, Jan 2015.

Lewis, S.W., Morgan, R.G., McIntyre, T.J., Alba, C.R., and Greendyke, R.B., “Comparison of Carbon Ablative Shock-Layer Radiation with High Surface Temperatures,” AIAA Aviation Conference, Dallas, TX, AIAA Paper 2015-2348, Jun 2015.

HALE, CHAD S., Lt Col,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2015 (AFIT/ENY); BS Mechanical Engineering, Brigham Young University, 1994; MS Aeronautical Engineering, Air Force Institute of Technology, 1995; PhD Aeronautical Engineering, Air Force Institute of Technology, 2010. Lt Col Hale is a graduate of the US Air Force Test Pilot School experimental flight test engineer course (Class 00B). Prior to his assignment to AFIT, Lt Col Hale served as the MQ-9 Chief of Test in the Medium Altitude UAS Division, Wright-Patterson AFB, OH. Lt Col Hale has extensive flight test experience as an F-16 developmental engineer, F-15 flight test technical director, and as Deputy Division Chief in HQ AFMC Test and Evaluation Division. His research interests include structural mechanics, weapons and munitions, and flight test. Lt Col Hale deployed to Baghdad, Iraq in support of the Office of Security Cooperation–Iraq. Lt Col Hale is a member of Tau Beta Pi, Sigma Gamma Tau, and ASME. Tel. 937-255-3636 x4628, email: Chad.Hale@afit.edu

HARTSFIELD, CARL R.,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2015 (AFIT/ENY); BS Aerospace Engineering, Georgia Institute of Technology, 1991; MS Aeronautical Engineering, Air Force Institute of Technology, 2001; PhD Astronautical Engineering, Naval Postgraduate School, 2006. Dr. Hartsfield is a former faculty member of The Ohio State University and former space sensor payload program manager. His research interests include space propulsion and optimal design of spacecraft, including integration and testing of spacecraft. Dr. Hartsfield’s research focuses on experimental evaluation and diagnostics for space propulsion and analytic evaluation of spacecraft design. He served as an invited space propulsion session co-chair at a 2011 NASA GRC HBCUOMI Outreach Symposium and as a session chair at the 2011 and 2012 Dayton/Cincinnati Aerospace Sciences Symposia. Dr. Hartsfield is a member of AIAA and the American Society for Engineering Education. Tel. 937-255-3636 x4667, email: Carl.Hartsfield@afit.edu

REFEREED JOURNAL PUBLICATIONS

Niederhauser, J.D., Hartsfield, C.R., and Black, J.T., “Design and Characterization of a Space-Based Imaging Experiment Computer Unit,” *Journal of Aerospace Engineering*, Vol. 28, No. 3, pp. 04014081-1-04014081-13, May 2015. DOI: 10.1061/(ASCE)AS.1943-5525.0000362.

JENNINGS, ALAN L.,

Research Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2012 (AFIT/ENY); BS Mechanical Engineering, University of Akron, 2006; MS Electrical Engineering, University of Dayton, 2007; PhD, Electrical Engineering, University of Dayton, 2012. Dr. Jennings has been involved in projects ranging from light-weight structural analysis to satellite constellation optimization.

SPONSOR FUNDED RESEARCH PROJECTS

“Advanced Nonlinear Attitude Control.” Sponsor: Undisclosed. Funding: \$50,000 – Jennings 70%, Swenson 30%. [CSRA]

“Imaging Chromatographic Spectrometer Experiment (CTEx).” Sponsor: Undisclosed. Funding: \$142,050. [CSRA & CTISR]

“JWAC AFIT Interaction (CSRA).” Sponsor: JWAC. Funding: \$75,000. – Deckro 40%, Ahner 40%, Sambora 10%, Jennings 10%. [CSRA]

“Statistical Metrics for Vision Features.” Sponsor: AFRL/RV. Funding: \$20,000. [CSRA]

“Structural Design Considerations for Very-Large Space Antenna.” Sponsor: AFOSR. Funding: \$48,276 – Jennings 75%, Black 25%. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bellows, C.T., Black, J.T., Cobb, R.G., and Jennings, A.L., “Updating Track Data from Partial Serendipitous Satellite Streaks,” 25th AAS/AIAA Space Flight Mechanics Meeting, Williamsburg, VA, AAS 15-268, Jan 2015.

Jennings, A.L. and Diniz, H., “Global Navigation Satellite System Design Exploration Using a Multi-Objective Genetic Algorithm,” AIAA Space 2015, Pasadena, CA, AIAA Paper No. 2015-4622, Sep 2015.

Van Dyne, D., Jennings, A.L., and Black, J.T., “Simulation of Locking Space Truss Deployments,” 2nd AIAA Spacecraft Structures Conference, Orlando, FL, Jan 2015. DOI: 10.2514/6.2015-0227.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor (2013-2016) for IEEE-ACCESS.

PATENTS

Jennings, A.L., “Real-Time Camera Tracking System Using Optical Flow Feature Points,” Application No. 14705922.

KING, PAUL I.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1991 (AFIT/ENY); BS, Arizona State University, 1971; MS, Air Force Institute of Technology, 1972; PhD, Oxford University, England, 1986. Dr. King is a former faculty member at the U.S. Air Force Academy and at the Cleveland State University. His research interests include internal and external aerodynamics and heat transfer (wings and bodies, turbomachinery and other applications). His research emphasizes experimentation and instrumentation. He has published over 100 articles and reports and chaired over 70 theses and dissertations.

REFEREED JOURNAL PUBLICATIONS

Lyall, M.E., King, P.I., Clark, J.P., and Sondergaard, R., “Endwall Loss Reduction of High Lift Low Pressure Turbine Airfoils Using Profile Contouring-Part I: Airfoil Design,” *Journal of Turbomachinery Transactions of the ASME*, Vol. 136, No. 8, Aug 2014.

Rouser, K.P., King, P.I., Schauer, F.R., Sondergaard, R., Hoke, J.L., et al., “Time-Resolved Flow Properties in a Turbine Driven by Pulsed Detonations,” *Journal of Propulsion and Power*, Vol. 30, No. 6, pp. 1528-1536, Nov 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Babbie, C.A., King, P.I., Stevens, C.A., Hoke, J.L., and Schauer, F.R., "Experimental Measurement of Hydrogen-Air Detonation Cell Size at Elevated Initial Pressures," AIAA SciTech Conference, Orlando, FL, AIAA Paper 2015-0634, Jan 2015.

Teope, K.I., King, P.I., Schauer, F.R., and Hoke, J.L., "Experimental Magnetohydrodynamic Energy Extraction from a Pulsed Detonation Tube," AIAA SciTech Conference, Orlando, FL, AIAA Paper 2015-1348, Jan 2015.

KUNZ, DONALD L.,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2003 (AFIT/ENY); BS, Syracuse University, 1971; MS, Georgia Institute of Technology, 1972; PhD, Georgia Institute of Technology, 1976; Dr. Kunz's research interests include rotorcraft dynamics, vibrations, and loads, structural dynamics, aeroelasticity, flying qualities of UAVs, multibody dynamics, and computational structural mechanics. He has published more than 100 journal articles, conference papers, and technical reports. Prior to coming to AFIT, Dr. Kunz worked at the US Army Aeroflightdynamics Directorate, McDonnell Douglas Helicopter Company, Old Dominion University, and the US Army Aviation and Missile Command. He is an Associate Fellow of AIAA, a member of AHS and ASME, and a licensed professional engineer in the Commonwealth of Virginia. Tel. 937-255-3636 x4548, email: Donald.Kunz@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Flying Qualities for Unmanned Vehicles." Sponsor: AFRL/RQ. Funding: \$20,000.

"Research Support for Joint AFIT/TPS Test Management Projects." Sponsor: USAF/TPS. Funding: \$30,000.

REFEREED JOURNAL PUBLICATIONS

Hanson, C.Q., Kunz, D.L., and Lindsley, N.J., "Investigation of Missile Control Surface Effects on F-16 Limit Cycle Oscillation," *Journal of Aircraft*, Vol. 52, No. 2, pp. 462-470, Mar-Apr 2015, DOI: 10.2514/1.C032741.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Greene, K.M. and Kunz, D.L., "Investigation of Large Unmanned Aircraft Non-Precision, Aggressive Quickness Criteria," SCI-269 Symposium on Flight Testing of Unmanned Aerial Systems, Ottawa, Canada, Paper No. 14, May 2015.

Greene, K.M. and Kunz, D.L., "Quickness Criteria for Large Unmanned Aircraft in Non-Precision, Aggressive and Non-Aggressive Maneuvers," AIAA Atmospheric Flight Mechanics Conference, Aviation Forum 2015, Dallas, TX, AIAA-2015-2393, Jun 2015, DOI: 10.2514/6.2015-2393.

LIEBST, BRADLEY S.,

Professor of Aerospace Engineering and Head, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 1989 (AFIT/ENY); BS, Wichita State University, 1978; MS, Massachusetts Institute of Technology, 1979; PhD, Massachusetts Institute of Technology, 1981. Dr. Liebst's research interests include eigenstructure assignment and control, stability and control of aerospace vehicles, passive and active control of large flexible structures, and aircraft handling qualities. He has published over 30 articles and reports and chaired over 40 theses and dissertations. Prior to teaching at AFIT, Dr. Liebst was Assistant Professor of Aerospace Engineering for six years at the University of Minnesota where he was voted the 1987 Best Institute of Technology (U of M) Professor. Tel. 937-255-3636 x4636, email: Bradley.Liebst@afit.edu

LIU, DAVID, Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2011 (AFIT/ENY); BS Aerospace Engineering, University of Texas at Austin, 2002; MS

Aerospace Engineering, University of Texas at Austin, 2004; PhD, Astronautical Engineering, Air Force Institute of Technology, 2011. Prior to his assignment to AFIT, Maj Liu was assigned to the AFRL, Space and Missile Directorate at Edwards AFB, CA as lead Experimental Test Engineer and later as Chief of Operations for the Experimental Demonstration Branch. Maj Liu was responsible for testing state-of-the-art rocket technology for the USAF and other government agencies. Maj Liu was also part of the Joint Combat Assessment Team deployed to Afghanistan to determine the effects of combat damage on Joint aviation assets for the advancement of aircraft survivability efforts. Maj Liu's interests include experimental research in plasma phenomenon in electric propulsion and other aerospace applications. In addition, Maj Liu's interests include the improvement of aircraft survivability, advances in weapons design, additive manufacturing, and topology optimization. Maj Liu is a member of Tau Beta Pi, Sigma Gamma Tau, and AIAA.

SPONSOR FUNDED RESEARCH PROJECTS

"3D Printed Warhead Research." Sponsor: AFRL/RW. Funding: \$40,000.

"Design Tools for Direct Digital Fabrication of Hypersonic Systems." Sponsor: AFOSR. Funding: \$27,760.

"Ultra-high Speed Plasma Diagnostics in an ExB Device for the Determination of Anomalous Transport Diffusion." Sponsor: AFOSR. Funding: \$30,710. [CSRA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Combat Aircraft Survivability Education." Sponsor: DOT&E. Funding: \$40,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lingenfelter, A. and Liu, D., "Development of Methods for Characterization of Hydrodynamic Ram Cavity Dynamics," 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, Jan 2015.

Mullins, C., Martinez, R., Williams, J., Farnell, C., Farnel, C., Liu, D., and Branam, R., "Non-Invasive Hall Current Distribution Measurement in a Hall Effect Thruster," 51st AIAA/SAE/ASEE Joint Propulsion Conference, Orlando, FL, Jul 2015.

Rekedal, K. and Liu, D., "Fatigue Life of Selective Laser Melted and Hot Isostatically Pressed Ti-6AL-4v Absent of Surface Machining," 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, Jan 2015.

Richards, H. and Liu, D., "Topology Optimization of Additively-Manufactured, Lattice-Reinforced Penetrative Warheads," 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, Jan 2015.

Trombetta, J., Bennet, M., Hand, J., Carpenter, S., and Liu, D., "Characterization of Spin Effects on Warhead Fragment Fly-out Distance," 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, Jan 2015.

Walker, D., Liu, D., and Jennings, A., "Topology Optimization of an Aircraft Wing," 56th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Orlando, FL, Jan 2015.

MALL, SHANKAR,

Distinguished Professor, Department of Aeronautics and Astronautics, AFIT Appointment Date: 1986 (AFIT/ENY); BS, Mechanical Engineering, Banaras Hindu University, India, 1964; MS, Mechanical Engineering, Banaras Hindu University, 1966; PhD, Mechanical Engineering, University of Washington, 1977. Dr. Mall's research centers on composite and smart materials, fatigue and fracture. Dr. Mall has authored over 300 papers and has been the co-editor of a book and five conference proceedings. He is a

Fellow of ASME and an Associate Fellow of AIAA. He was also the Principal Materials Research Engineer, Materials and Manufacturing Directorate, Air Force Research Laboratory. Tel. 937-255-3636 x4587, email: Shankar.Mall@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Characterization of Cryogenic Electromechanical Behavior of CNT Multi-Yarn (conductor).” Sponsor: AFOSR. Funding: \$35,090.

“Corrosion Fatigue Crack Initiation and Growth Behavior of ZnNi/Cadmium Plated High Strength Steel and Aluminum Alloys.” Sponsor: OSD. Funding: \$180,000.

“Electromechanical Characterization of Nanocomp’s Carbon Nanotube Products (Yarns, Sheets and Tapes).” Sponsor: Undisclosed. Funding: \$21,590.

“Improved Thermal Management for CubeSat via Carbon Nanotube (CNT) Fabric/Yarns.” Sponsor: Undisclosed. Funding: \$30,000 – Mall 50%, Swenson 50%.

“Modeling of Crack Growth Behavior under Biaxial Fatigue in Ambient and Salt-Water Environments.” Sponsor: USAERDC. Funding: \$68,670.

REFEREED JOURNAL PUBLICATIONS

Cesul, B.T., Mall, S., and Matson, L., “Photometric response of illite after simulated space exposure,” *Journal of Spacecraft and Rockets*, Vol. 51, No. 3, pp. 983-986, May-Jun 2014.

Misak, H.E., Asmatulu, R., O’Malley, M., Jurak, E., and Mall, S., “Functionalization of carbon nanotube yarn by acid treatment,” *International Journal of Smart and Nanomaterials*, pp. 33-43, Jan 2014.

Misak, H.E. and Mall, S., “Electrical conductivity, strength and microstructure of carbon nanotube multi-yarns,” *Materials and Design*, Vol. 75, pp. 76-84, Jun 2015.

Misak, H.E. and Mall, S., “Investigation into microstructure of carbon nanotube multi-yarn,” *Carbon*, Vol. 72, pp. 321-327, Jun 2014.

Misak, H.E., Perel, V.Y., Sabelkin, V., and Mall, S., “Biaxial tension-tension fatigue crack growth behavior of 2024-T3 under ambient air and salt water environments,” *Engineering Fracture Mechanics*, Vol. 118, pp. 83-97, Mar 2014.

Perel, V.Y., Misak, H.E., Mall, S., and Jain, V.K., “Biaxial Fatigue Crack Growth Behavior in Aluminum Alloy 5083-H116 Under Ambient Laboratory and Saltwater Environments,” *Journal of Materials Engineering and Performance*, Vol. 24, No. 4, pp. 1565-1572, 2015.

O’HARA, RYAN P., Maj,

Assistant Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2015 (AFIT/ENY); BS Mechanical Engineering, US Air Force Academy, 2000; MS Aeronautical Engineering, Wright State University, 2005; PhD Aeronautical Engineering, Air Force Institute of Technology, 2012. Maj O’Hara’s research focuses on the application of mechanical structures and structural dynamics. Areas of interest include turbine engines, laminate composites, small UAS, and additive manufacturing. Tel. 937-255-6565 x4542, email: Ryan.Ohara@afit.edu

REFEREED JOURNAL PUBLICATIONS

O’Hara, R., Deleon, N., and Palazotto, A., “Structural Identification and Simulation of a MAV Forewing,” *Journal of Composite Structures*, Vol. 119, pp. 315-321, Jan 2015.

PALAZOTTO, ANTHONY N.,

Distinguished Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT
Appointment Date: 1975 (AFIT/ENY); BS, New York University, 1955; MS, Brooklyn Polytechnic Institute, 1961; PhD, New York University, 1968. Dr. Palazotto's interests include nonlinear mechanics, shell analysis, finite elements, composite materials, viscoplasticity, and nonlinear dynamics. Dr. Palazotto is the co-author of a textbook, "The Nonlinear Analysis of Shell Structures," published in 1992 by the AIAA. In addition he has authored 230 archival technical publications and more than 500 technical presentations and manuscripts. Dr. Palazotto received the Hetenyi Award in 1982 from the Society of Experimental Mechanics, the Cleary Award in 1981 from the Air Force Materials Lab, the Structures and Materials Award from the ASCE in 1986, and the AIAA Sustained Service Award in 2004. Dr. Palazotto is a Fellow of the ASCE, a Fellow of the AIAA, a Fellow of the American Academy of Mechanics, and a Fellow of the Engineering Mechanics Institute. He is a registered Professional Engineer in the State of Ohio. Tel. 937-255-3636 x4599, email: Anthony.Palazotto@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Evaluation of Creep of Metals Used in a Supersonic Weapon." Sponsor: AFRL/RW. Funding: \$65,000.

"Evaluation of a Lighter Than Air Vehicles Using Unique Geometries." Sponsor: AFOSR. Funding: \$43,575.

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Abed, N., Abu-Al Rub, R., and Palazotto, A., "Computational Modeling of the Effect of Equiaxed Heterogeneous Microstructures on Strength and Ductility of Dual Phase Steels," *J. Computational Materials Science*, Vol. 103, pp. 20-37, Jun 2015.

Abu-Al Rub, R., Ettehad, M., and Palazotto, A., "Microstructural Modeling of Dual Phase Steel Using a Higher-Order Gradient Plasticity-Damage Model," *Intl. J. Solids and Structures*, Vol. 58, pp. 178-189, Apr 2015.

Adorno-Rodriguez, R., and Palazotto, A., "Nonlinear Structural Analysis of an Icosahedron under an Internal Vacuum," *AIAA J. Aircraft*, Vol. 52, No. 3, pp. 878-883, May 2015.

Buentello Hernandez, R., and Palazotto, A., "Development of a Model Considering High-Speed Sliding Wear," *Journal of Aerospace Engineering*, Vol. 28, No. 5, Sep 2015.

Cox, G., Palazotto, A., Brown, J., and George, T., "Traveling Wave Excitation: A Method to Produce Consistent Experimental Results," *Journal of Engineering for Gas Turbines and Power*, Vol. 136, No. 12, pp. 122502-1 to 122502-8, Dec 2014.

Cranston, B. and Palazotto, A., "Evaluation of the Thorax of Manduca Sexta for Flapping Wing Micro Air Vehicle Applications," *International Journal of Micro Air Vehicle*, Vol.6, No. 3, pp. 191-210, Sep 2014.

O'Hara, R., Deleon, N., and Palazotto, A., "Structural Identification and Simulation of a MAV Forewing," *Journal of Composite Structures*, Vol. 119, pp. 315-321, Jan 2015.

POLANKA, MARC D.,

Professor of Aerospace Engineering, AFIT Appointment Date: 2009 (AFIT/ENY); BS, Mechanical Engineering, University of Dayton, 1992; MS, Mechanical Engineering, Stanford University, 1993; PhD, Mechanical Engineering, University of Texas, 1999; Prior to accepting a position with AFIT, Dr. Polanka served 17 years in Turbine Engine Division of the Air Force Research Laboratory's Propulsion Directorate. Dr. Polanka's research interests include aspects of heat transfer, combustion, and fluid mechanics focusing on experimental applications involving turbine and combustor aerodynamics and cooling techniques. He has been published in a variety of journals including the Journal of Turbomachinery, the AIAA Journal of Propulsion and Power, and the Journal of Engineering for Gas Turbines and Power. He also has two patents to his credit. Dr. Polanka is an Associate Fellow of the AIAA, the past Section Chair of the Dayton-

Cincinnati Section of the AIAA, and the Honors and Awards Chair for the same section. Dr. Polanka serves as the Faculty representative for the AFIT Student Section branch of AIAA. He is also a Fellow of the ASME and serves on the Executive Board of the K-14 Committee of the International Gas Turbine Institute where he is also a past Point Contact for the annual Turbo Expo conference. Tel. 937-255-3636 x4714, email: Marc.Polanka@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT Combustion Laboratory Program Concerning UCC and Secondary Reaction Combustion Phenomena.” Sponsor: AFRL/RQ. Funding: \$30,000.

“Combustion Physics under High Centripetal Acceleration.” Sponsor: AFOSR. Funding: \$30,000 – Polanka 85%, Rutledge 15%.

“Film Cooling Effectiveness Measurements for Advanced Gas Turbine Engine Design Concepts.” Sponsor: AFLCMC. Funding: \$48,409.

“Unmanned Air Vehicle (UAV) and Payload Systems Technology (UPST).” Sponsor: Undisclosed. Funding: \$61,500. [ANT]

REFEREED JOURNAL PUBLICATIONS

Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T., “Scaling of Film Cooling Performance From Ambient to Engine Temperatures,” *Journal of Turbomachinery*, Vol. 137, No. 7, Jul 2015. DOI: 10.1115/1.4029197.

Husaboe, T.D., Polanka, M.D., Rittenhouse, J.A., Litke, P.J., and Hoke, J.L., “Dependence of Small Internal Combustion Engine’s Performance on Altitude,” *AIAA Journal of Propulsion and Power*, Vol. 30, No. 5, pp. 1328-1333, Sep-Oct 2014. DOI: 10.2514/1.B35133.

Rutledge, J.L. and Polanka, M.D., “Computational Fluid Dynamics Evaluations of Unconventional Film Cooling Scaling Parameters on a Simulated Turbine Blade Leading Edge,” *Journal of Turbomachinery*, Vol. 136, No. 10, Oct 2014.

Rutledge, J.L. and Polanka, M.D., “Efficiency of an Ideal Brayton Cycle with a Constant-Volume Interturbine Burner,” *Journal of Propulsion and Power*, Vol. 31, No. 3, pp. 970-975, May-Jun 2015. DOI:10.2514/1.B35446.

Rutledge, J.L. and Polanka, M.D., “Waveforms of Time-Resolved Film Cooling Parameters on a Leading Edge Model,” *Journal of Propulsion and Power*, Vol. 31, No. 1, pp. 253-264, Jan-Feb 2015. DOI: 10.2514/1.B35180.

Wilson, J.D., Damele, C.J., and Polanka, M.D., “Flame Structure Effects at High G-Loading,” *Journal of Engineering for Gas Turbines and Power*, Vol. 136, No. 10, Oct 2014. DOI: 10.1115/1.4027128.

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Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T., “Experimental Investigation of Net Heat Flux Reduction at Combustion Temperatures,” ASME Turbo Expo 2015, Montréal, Canada, Paper No. GT2015-42988, Jun 2015.

- Greiner, N.J., Polanka, M.D., and Rutledge, J.L., “Scaling of Adiabatic Effectiveness and Net Heat Flux Reduction from Near Ambient to Engine Temperatures,” ASME Turbo Expo 2015, Montréal, Canada, Paper No. GT2015-42986, Jun 2015.
- Horn, K.P. and Polanka, M.D., “Exhaust Composition in a Small Internal Combustion Engine Using FTIR,” AIAA Regional Student Competition, Dayton, OH, Apr 2015.
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- Rutledge, J.L., Rathsack, T.C., Van Voorhis, M., and Polanka, M.D., “Film Cooling Parameter Waveforms on a Turbine Blade Leading Edge With Oscillating Stagnation Line,” ASME Turbo Expo 2015, Montréal, Canada, Paper No. GT2015-43283, Jun 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Cottle, A.E. and Polanka, M.D., “Common Flow Source for a Full Annular Ultra Compact Combustor,” AIAA SciTech Conference, Orlando, FL, AIAA Paper No. 2015-0100, Jan 2015.
- Horn, K.P., Ausserer, J.K., Polanka, M.D., Litke, P.J., and Grinstead, K.D., “Dynamic Friction Measurements on a Small Engine Test Bench,” AIAA SciTech Conference, Orlando, FL, AIAA Paper No. 2015-1474, Jan 2015.
- Lynch, A., Shewhart, A., Polanka, M.D., and Rutledge, J.L., “Effects of Hole Configuration, Surface Curvature, and Mach Number on Film Cooling in Fuel Rich Environments,” AIAA SciTech Conference, Orlando, FL, AIAA Paper No. 2015-0350, Jan 2015.
- Mataczynski, M.R., Polanka, M.D., Nees, J.B., and Paxson, D.E., “Testing and Simulation of a Small-Scale Pressure Wave Supercharger,” AIAA SciTech Conference, Orlando, FL, AIAA Paper No. 2015-1345, Jan 2015.
- Wilson, J.D., Polanka, M.D., and Nees, J.B., “Inverted Gas Turbine Design and Analysis,” AIAA SciTech Conference, Orlando, FL, AIAA Paper No. 2015-0625, Jan 2015.

REEDER, MARK F.,

Professor of Aerospace Engineering, AFIT Appointment Date: 2002 (AFIT/ENY); BS, Mechanical Engineering, West Virginia University, 1989; MS, Mechanical Engineering, The Ohio State University, 1991; PhD, Mechanical Engineering, The Ohio State University, 1994; Prior to accepting a position with AFIT, Dr. Reeder served as an NRC Research Associate at NASA Glenn and subsequently as the manager of Research and Development for a manufacturer of industrial mixing equipment. Dr. Reeder’s research interests include all aspects of fluid mechanics with an emphasis on experimental applications involving external aerodynamics, mixing enhancement, and propulsion. Publications include characterizations of store separation from a cavity using pressure sensitive paint and measurements relating to several types of aircraft using 6-DOF balances, particle image velocimetry, filtered Rayleigh scattering, and other diagnostic tools. He has also recently published in the area of low temperature ablation in a supersonic flow as applied to thermal management systems for space access vehicles. Dr. Reeder has been published in a variety of journals including Experiments in Fluids, Journal of Fluid Mechanics, The AIAA Journal, The AIAA Journal of Propulsion and Power, AIAA Journal of Aircraft, the AIAA Journal of Spacecraft and Rockets, Physics of Fluids, NASA Tech Briefs, the AIChE Journal, and Chemical Engineering Progress. He also has four patents to his credit, is a licensed Professional Engineer in the State of Ohio, and is an elected member of the Academy of Distinguished Alumni, Department of Mechanical and Aerospace Engineering, West Virginia University. Dr. Reeder currently serves as the editor-in-chief of the International Journal of Micro Air

Vehicles. Dr. Reeder is an Associate Fellow of the AIAA and a member of ASME. Tel. 937-255-3636 x4530, email: Mark.Reeder@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENY and AFRL/RQV Coop Research Agreement (Task #1: Improving Optical Diagnostics in the Trisonic Gas Facility).” Sponsor: AFRL/RQ. Funding: \$29,000.

“‘Flight testing’ in the AFIT Low Speed Wind Tunnel.” Sponsor: AFRL/RW. Funding: \$61,330 – Reeder 50%, Cobb 50%. [ANT]

“‘Flip-Turn’ Missile Aerodynamic Characterization.” Sponsor: Lockheed. Funding: \$80,000 – Reeder 50%, Lofthouse 50%.

REFEREED JOURNAL PUBLICATIONS

Flora, T., Reeder, M., Lofthouse, A., and Kraft, N., “Dynamic Store Release of Ice Models from a Cavity into Mach 2.9 Flow,” *Journal of Aircraft*, Vol. 51, No. 6, pp. 1927-1941, Nov-Dec 2014.

Rutledge, J.L., Francis, S.A., Reeder, M.F., Petrosky, J.C., Babis, B.W., and Tryon, T.A., “Improved Method of Investigating Thermal Radiation Effects on Military Aircraft Skins,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 112-124, May 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lancaster, J., Reeder, M.F., Cobb, R.G., Sytsma, M., and Rowe, P., “Experiments with the Model Test Apparatus Installed in the AFIT Low-Speed Tunnel,” AIAA Aviation 2015, Dallas, TX, AIAA Paper 2015-3017, Jun 2015.

Merrick, J. and Reeder, M.F., “Cavity-Store Interactions under Supersonic Freestream Conditions,” AIAA Aviation 2015, Dallas, TX, AIAA Paper 2015-2863, Jun 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor-in-Chief, International Journal of Micro Air Vehicles, Multi-Science Publishing.

RUGGLES-WRENN, MARINA B.,

Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2003 (AFIT/ENY); BS, Polytechnic Institute of New York, 1981; MS, Rensselaer Polytechnic Institute, 1983; PhD, Rensselaer Polytechnic Institute, 1987. Dr. Ruggles-Wrenn’s interests center on mechanics of materials and structures, including experimental investigation of material behavior in extreme environments, , advanced structural materials, high-temperature structural design methods, and viscoplasticity. Dr. Ruggles-Wrenn has published 140 journal articles and technical reports, and has co-authored 10 books on composite materials and structures and on high-temperature structural design methods. Dr. Ruggles-Wrenn received several research and best paper awards; Stinson Trophy of the National Aeronautic Association, Col Gage H. Crocker Outstanding Professor Award, as well as the AFIT Instructor of the Quarter Award. Prior to joining AFIT, Dr. Ruggles-Wrenn was a research scientist at the Oak Ridge National Laboratory (1987-2003). Dr. Ruggles-Wrenn is a member of the Editorial Board of Applied Composite Materials and an Associate Technical Editor of the ASME Journal of Pressure Vessel Technology. Dr. Ruggles-Wrenn is a Fellow of the American Society of Mechanical Engineers (ASME) and a member of the American Ceramic Society. She is the Chair of the ASME Pressure Vessels and Piping Division. Tel. 937-255-3636 x4641, email: Marina.Ruggles-Wrenn@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Creep and Fatigue of Advanced SiC/SiC Composites at Elevated Temperature in Air and in Steam.” Sponsor: DAGSI. Funding: \$35,000.

“Creep of Advanced SiC/SiC Composites at Elevated Temperature in Air and in Steam.” Sponsor: AFRL/RX. Funding: \$12,500.

“Effects of Cure on Fatigue Performance of High-Temperature Polymer Matrix Composites.” Sponsor: AFRL/RX. Funding: \$12,500.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Launching Equity in the Academy across the Dayton Entrepreneurial Region (LEADER).” Sponsor: NSF. Funding: \$5,000.

REFEREED JOURNAL PUBLICATIONS

Ruggles-Wrenn, M.B. and Hilburn, S.R., “Creep in interlaminar shear of Nextel™720/ aluminosilicate composite at 1100 °C in air and in steam,” *International Journal of Applied Ceramic Technology*, Vol. 12, No. 2, pp. 473-480, 2015.

Winder, S.L., Ruggles-Wrenn, M.B., Parthasarathy, T.A., Key, T., and Carney, C.M., “Thermo-chemical compatibility of hafnium diboride with yttrium aluminum garnet at 1500°C in air,” *Journal of the European Ceramic Society*, Vol. 35, pp. 2437-2444, 2015.

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Hay, R., Ruggles-Wrenn, M.B., Armani, C., Steffens, B., Shillig, T., Tidball, T., Przybyla, C., and Zawada, L., “Environmental Effects on Ceramic Fiber Microstructures and Mechanical Properties,” International Workshop on Testing and Modeling Ceramic and Carbon Matrix Composites, Paris, France, 2014.

Hilburn, S.R., Ruggles-Wrenn, M.B., Ryther, C.E., and Zawada, L.P., “Mechanical Behavior of Nextel™720/ Aluminosilicate Composite under Combined Tension-Torsion Loading,” 39th International Conference on Advanced Ceramics & Composites, Daytona Beach, FL, Jan 2015.

Ruggles-Wrenn, M.B. and Hilburn, S.R., “Creep in Interlaminar Shear of an Oxide/Oxide Ceramic Matrix Composite at Elevated Temperature,” ASME Turbo Expo 2015, Montréal, Canada, GT2015-44034, Jun 2015.

Ruggles-Wrenn, M.B. and Lanser, R.L., “Tension-Compression Fatigue of Nextel™720/ Alumina Composite at 1200°C in Air and in Steam,” ICCST/10 Conference, Lisbon, Portugal, Sep 2015.

Ruggles-Wrenn, M.B., and Pope, M.T., “Creep in Interlaminar Shear of a Hi-Nicalon/SiC-B₄C Composite at 1200°C in Air and in Steam,” International Workshop on Testing and Modeling Ceramic and Carbon Matrix Composites, Paris, France, 2014.

Wilkinson, M.P. and Ruggles-Wrenn, M.B., “Mechanical Properties and Fatigue Behavior of 2-D and 3-D PMC Airframe Structures at Elevated Temperature,” AIAA SciTech 2015, Orlando, FL, Jan 2015.

Winder, S.L., Ruggles-Wrenn, M.B., Parthasarathy, T., Key, T., and Carney, C.M., “Thermo-Chemical Compatibility of Hafnium Diboride with Alumina and Yttrium Aluminum Garnet at 1500°C in Air,” 39th International Conference on Advanced Ceramics & Composites, Daytona Beach, FL, Jan 2015.

BOOKS & CHAPTERS IN BOOKS

Ruggles-Wrenn, M.B., “Ceramic Matrix Composites: Materials, Modeling, Technology and Applications.” *Environmental Effects on Oxide/Oxide Composites*. N. P. Bansal and J. Lamon, eds., John Wiley & Sons, Inc., pp. 295-333, 2015.

Ruggles-Wrenn, M.B., “Structural Integrity and Durability of Advanced Composites.” *Effects of Environment on Creep Behavior of Three Oxide-Oxide Ceramic Matrix Composites at 1200°C*. P. W. R. Beaumont, C. Soutis, A. Hodzic, eds., Elsevier, pp. 315-340, 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, Applied Composite Materials – International Journal for the Science and Application of Composite Materials.

Associate Technical Editor, ASME Journal of Pressure Vessel Technology.

RUTLEDGE, JAMES L., Maj,

Assistant Professor of Aerospace Engineering; Department of Aeronautics and Astronautics, AFIT
Appointment Date: 2011 (AFIT/ENY); BS, Mechanical Engineering, University of Texas at Austin, 2002;
MS, Mechanical Engineering, University of Texas at Austin, 2004; PhD, Aeronautical Engineering, Air Force
Institute of Technology, 2009. Maj Rutledge’s research interests include experimental and computational
investigations of gas turbine heat transfer, unsteady fluid mechanics, inverse heat transfer and
aerothermodynamics. He has published articles in several journals and was awarded the Rohsenow Prize in
2008 by ASME. Maj Rutledge is a member of the ASME K-14 Gas Turbine Heat Transfer Committee,
ASME, AIAA, and Tau Beta Pi. He is a registered professional engineer in the State of Texas and has
deployed to Afghanistan in support of Operation Enduring Freedom. Tel. 937-255-3636 x4734,
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SPONSOR FUNDED RESEARCH PROJECTS

“Computational Fluid Dynamics Simulations of Fuel Film Cooling.” Sponsor: AFRL/RQ. Funding: \$19,990
– Rutledge 40%, Crowe 60%.

REFEREED JOURNAL PUBLICATIONS

Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T., “Scaling of Film Cooling Performance
From Ambient to Engine Temperatures,” *Journal of Turbomachinery*, Vol. 137, No. 7, Jul 2015.

Rutledge, J.L., Francis, S.A., Reeder, M.F., Petrosky, J.C., Babis, B.W., and Tryon, T.A., “Improved Method
of Investigating Thermal Radiation Effects on Military Aircraft Skins,” *Journal of Radiation Effects,
Research and Engineering*, Vol. 33, No. 1-E, pp. 112-124, May 2015.

Rutledge, J.L. and Polanka, M.D., “Computational Fluid Dynamics Evaluations of Unconventional Film
Cooling Scaling Parameters on a Simulated Turbine Blade Leading Edge,” *Journal of Turbomachinery*,
Vol. 136, No. 10, Oct 2014.

Rutledge, J.L. and Polanka, M.D., “Efficiency of an Ideal Brayton Cycle with a Constant-Volume
Interturbine Burner,” *Journal of Propulsion and Power*, Vol. 31, No. 3, pp. 970-975, May-Jun 2015.

Rutledge, J.L. and Polanka, M.D., “Waveforms of Time-Resolved Film Cooling Parameters on a Leading
Edge Model,” *Journal of Propulsion and Power*, Vol. 31, No. 1, pp. 253-264, Jan-Feb 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Greiner, N.J., Polanka, M.D., Rutledge, J.L., and Shewhart, A.T., “Experimental Investigation of Net Heat
Flux Reduction at Combustion Temperatures,” ASME Turbo Expo 2015, Montréal, Canada, Paper
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Greiner, N.J., Polanka, M.D., and Rutledge, J.L., “Scaling of Adiabatic Effectiveness and Net Heat Flux
Reduction from Near Ambient to Engine Temperatures,” ASME Turbo Expo 2015, Montréal, Canada,
Paper GT2015-42986, Jun 2015.

Rutledge, J.L., Polanka, M.D., and Bogard, D.G., “The Delta Phi Method of Evaluating Overall Film Cooling Performance,” ASME Turbo Expo 2015, Montréal, Canada, Paper GT2015-43288, Jun 2015.

Rutledge, J.L., Rathsack, T.C., Van Voorhis, M., and Polanka, M.D., “Film Cooling Parameter Waveforms on a Turbine Blade Leading Edge With Oscillating Stagnation Line,” ASME Turbo Expo 2015, Montréal, Canada, Paper GT2015-43283, Jun 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Lynch, A., Shewhart, A., Polanka, M.D., and Rutledge, J.L., “Effects of Hole Configuration, Surface Curvature, and Mach Number on Film Cooling in Fuel Rich Environments,” AIAA SciTech Conference, Orlando, FL, AIAA Paper 2015-0350, Jan 2015.

SIMMONS, RONALD J., Lt Col,

Assistant Professor of Aeronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2009 (AFIT/ENY); BS, Aeronautical Engineering & BS Astronautical Engineering, United States Air Force Academy, 1988; MS Aeronautical and Astronautical Engineering, Massachusetts Institute of Technology, 1990; PhD, Aerospace Engineering, The Ohio State University, 2009. Lt Col Simmons’ research interests include aerodynamics, re-entry dynamics, space propulsion, and turbine propulsion. His dissertation work investigated the optimal design and control of a variable cycle turbine engine with an independently modulated third stream. He is a command pilot with over 4,000 hours in six aircraft, and has also served as an assistant professor of Astronautics at the US Air Force Academy.

SWENSON, ERIC D.,

Associate Professor of Aerospace Engineering, Department of Aeronautics and Astronautics, AFIT Appointment Date: 2006 (AFIT/ENY); BS, Civil Engineering, The Ohio State University, 1993; MS, Astronautical Engineering, Air Force Institute of Technology, 1998; PhD, Aerospace Engineering, University at Texas at Austin, 2006. He is a retired Lt Col in the Air Force whose more than 25 years of service includes experience as an Astronautical Engineering Professor, Titan Launch Pad Engineer, Civil Engineer, and a Nuclear Measurements Technician. More recently, he has been a key player in AFIT’s recent expansion in space-related experimental research, including the development of 6U CubeSats, a satellite attitude simulator called SimSat, and various other space experiments. His previous research focused on solving multi-million degree of freedom finite element models with viscoelastic materials, satellite design and test, damage detection techniques, and system identification through optimization. He is a Technical Area Editor for the Journal of Small Spacecraft, and he is a member of Chi Epsilon, SPIE, Tau Beta Pi, and AIAA. Tel. 255-3636 x7479, email: Eric.Swenson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFRL/RV-AFIT 2012 MOA Research.” Sponsor: AFRL/RV. Funding: \$250,000 – Swenson 25%, Cobb 25%, Weisel 25%, Black 25%. [CSRA]

“Analysis of 3D Printing Satellite Component Housings.” Sponsor: Undisclosed. Funding: \$50,000. [CSRA]

“Application Development for Intelligent Imaging Satellites.” Sponsor: Undisclosed. Funding: \$97,000 – Swenson 25%, Simmons 25%, Jennings 25%, Cobb 25%. [CSRA]

“Satellite Design.” Sponsor: Undisclosed. Funding: \$100,000 – Swenson 50%, Cobb 50%. [CSRA]

“SIGINT Satellite Design, Build, and Test.” Sponsor: Undisclosed. Funding: \$80,000 – Jennings 25%, Swenson 25%, Simmons 25%, Cobb 25%. [CSRA]

“Use of Formal Methods Proofs and Run Time Assurance Bounds in the Design and Evaluation of a 6U CubeSat.” Sponsor: AFRL/RQ. Funding: \$25,000. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gross, K.H., Clark, M.A., Hoffman, J.A., Swenson, E.D., Cobb, R., Whalen, M.W., and Wagner, L.,
“Application and Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System,”
Space Forum, Pasadena, CA, Sep 2015. [CSRA]

Penn, D. and Swenson, E.D., “Impacts of Control Moment Gyroscope Gear Slack on Spacecraft Pointing
Performance,” AIAA/Utah State University Small Satellite Conference, Logan, UT, Aug 2015. [CSRA]

TORVIK, PETER J.,

Professor Emeritus of Aerospace Engineering and Engineering Mechanics, Department of Aeronautics and
Astronautics, (AFIT/ENY); BS, University of Minnesota, 1960; MS, University of Minnesota, 1962; PhD,
University of Minnesota, 1965; BA, Wright State University, 1980. Professor Torvik is a specialist in theory
of elasticity, wave propagation, shock and vibration, impact damage in aircraft systems, laser-material
interactions, and aircraft survivability/ vulnerability. His primary research interests include structural
dynamics, specifically damping, impact, and penetration mechanics. Dr. Torvik is the author of over 100
technical papers and reports and some 30 other publications. He served as Head of the Department of
Aeronautics and Astronautics, 1980-1990. He is the recipient of the AF Meritorious Civilian Service Award,
the AF Exceptional Civilian Service Award, the Outstanding Civilian Career Service Award, USAF, and the
John Leland Atwood Award and Medal, AIAA and ASEE. Dr. Torvik is a Fellow of AIAA, a Fellow of the
ASME, and a Fellow of Ohio Academy of Science.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Torvik, P. J. and Langley, B., “Material Properties of Hard Coatings Developed for High Damping,”
AIAA/SAE/ASEE Joint Propulsion Conference, Orlando, FL, AIAA Paper 2015-4195, Jul 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board & Member, International Journal of Turbo & Jet Engines.

WIESEL, WILLIAM E., Jr.,

Professor of Astronautical Engineering, Department of Aeronautics and Astronautics, AFIT Appointment
Date: 1977 (AFIT/ENY); BS, University of Massachusetts, 1970; MS, Harvard University, 1972; PhD,
Harvard University, 1974. Dr. Wiesel's research interests include applications of dynamical systems theory to
orbital mechanics and astrodynamics, especially KAM theory; estimation and control, planetary astronomy,
stability theory, and optimal control. Dr. Wiesel is the author of Spaceflight Dynamics, a leading
introductory text on astronautical engineering. He has authored over 40 technical papers and has been a
member of the department for over 35 years. Tel. 937-255-3636 x4312, email: William.Wiesel@afit.edu

REFEREED JOURNAL PUBLICATIONS

Wiesel, W.E., “A Numerical Solution to the Vinti Problem,” *Journal of Guidance, Control and Dynamics*,
Vol. 38, pp. 1757-1764, 2015. DOI: 10.2514/1.G000661. [CSRA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., “Estimating Non-Gravitational Accelerations on High Area to Mass Ratio (HAMR) Objects,”
16th AMOS Conference on Space Situational Awareness, Maui, HI, Sep 2015. [CSRA]

5.2. DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

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5.2.1. DOCTORAL DISSERTATIONS

- BINDEWALD, JASON M., *Adaptive Automation Design and Implementation*. AFIT/ENG/DS/15S-007. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFOSR. [ANT & CCR]
- CARBINO, TIMOTHY J., *Exploitation of Unintentional Ethernet Cable Emissions Using Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprints to Enhance Network Security*. AFIT/ENG/DS/15S-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]
- CLARK, MICHAEL R., *The Theory and Application of Privacy-Preserving Computation*. AFIT/ENG/DS/15M-013. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI. [CCR]
- CROSBY, JASON G., *Multi-Mode Analysis of Dual Ridged Waveguide Systems for Material Characterization*. AFIT/ENG/DS/15S-011. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RV.
- LAKE, ROBERT A., *Novel Applications of a Thermally Tunable Bistable Buckling Silicon-on-Insulator (SOI) Microfabricated Membrane*. AFIT/ENG/DS/15S-013. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: N/A.
- LIN, ALAN C., *Network Analysis with Stochastic Grammars*. AFIT/ENG/DS/15S-014. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: N/A. [CCR]
- STEINBOCK, MICHAEL J., *Adaptive Optics for Strong Turbulence Compensation*. AFIT/ENG/DS/15S-017. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD. [CDE]
- STEWART, KYLE E., *Novel Techniques for Secure Use of Public Cloud Computing Resources*. AFIT/ENG/DS/15S-018. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

5.2.2. MASTER'S THESES

- ABEITA, TRAVIS P., *Superconducting Quantum Interference Devices for the Detection of Magnetic Flux and Application to Airborne High Frequency Direction Finding*. AFIT/ENG/MS/15M-052. Faculty Advisor: Lt Col Jeremy Stringer. Sponsor: AFRL/RV.
- ALBEE, TRAVIS A., *Unique Two-Way Field Probe Concept Utilizing a Geodesic Sphere and Quad-Roto*. AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG/NRTF. [ANT]
- ARNEAL, JAMES A., *Spectral Textile Detection in the VNIR/SWIR Band*. AFIT/ENG/MS/15M-049. Faculty Advisor: Lt Col Jeffrey D. Clark. Sponsor: 711 HPW/RH.
- AUNG, RONALD M., *Operational Implementation Impact on RF-DNA Fingerprinting Performance*. AFIT/ENG/MS/15M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]
- BAILEY, ERIC J., *Single Platform Geolocation of Radio Frequency Emitters*. AFIT/ENG/MS/15M-028. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV. [ANT & CCR]
- BOYTER, DEVLIN T., *Identifying Image Manipulation Software from Image Features*. AFIT/ENG/MS/15M-051. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RI. [CCR]
- CATARIUS, ADRAIAN M., *Static Scene Statistical Non-Uniformity Correction*. AFIT/ENG/MS/15M-062. Faculty Advisor: Maj Michael D. Seal. Sponsor: N/A.

CERNERA, ROBERT C., *A System-Level Throughput Model for Quantum Key Distribution*. AFIT/ENG/MS/15S-069. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: LTS. [CCR]

CHRISTMAN, JOSHUA R., *Leveraging Human Insights by Combining Multi-Objective Optimization with Interactive Evolution*. AFIT/ENG/MS/15M-060. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

CORVIN, CHARITO M., *A Feasibility Study on the Application of the ScriptGenE Framework as an Anomaly Detection System in Industrial Control Systems*. AFIT/ENG/MS/15S-010. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

DONIGAN, THOMAS M., *Subtractive Plasma-Assisted-Etch Process for Developing High Performance Nanocrystalline Zinc-Oxide Thin-Film-Transistors*. AFIT/ENG/MS/15M-027. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/Ry.

DYE, GREGORY W., *Using IMPRINT to Guide Experimental Design with Simulated Task Environments*. AFIT/ENG/MS/15J-052. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [CCR]

FILLMORE, CASEY E., *Computational Electromagnetic Studies for Low-Frequency Compensation of the Reflector Impulse-Radiating Antenna*. AFIT/ENG/MS/15M-011. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG/NRTF. [ANT]

GABERT, SCOTT G., *Statistical Analysis of Heterogeneous Resolution Cells in Bistatic SAR Clutter*. AFIT/ENG/MS/15M-053. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFRL/Ry.

GALDEEN, MATTHEW T., *Modeling and Simulation of an Impedance Loaded Bow Tie Antenna*. AFIT/ENG/MS/15M-036. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A. [ANT]

GONZALES, RAMIRO N., Jr., *Application of Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting to Power Substation Emissions*. AFIT/ENG/MS/15M-034. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/Ry. [CCR]

GRIDLEY, MATTHEW J., *Experimental Method of Generating Electromagnetic Gaussian Schell-Model Beams*. AFIT/ENG/MS/15M-058. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFOSR.

GRUBER, DONALD A., *Tactical AI in Real Time Strategy Games*. AFIT/ENG/MS/15M-021. Faculty Advisor: Dr. Gary B. Lamont. Sponsor: N/A.

GUTIERREZ, ALYSSA N., *Cloud-Induced Uncertainty for Visual Navigation*. AFIT/ENG/MS/14D-043. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/Ry. [ANT]

GWIN, ALEXANDER H., *Implementation of Metal-Insulator Transition Materials and Phase Change Materials*. AFIT/ENG/MS/15M-016. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

HAEFNER, JOSEPH W., *Characterization and Analysis of Integrated Silicon Photonic Detectors for High-Speed Communications*. AFIT/ENG/MS/15M-071. Faculty Advisor: Maj Derrick Langley. Sponsor: AFOSR.

HERUSKA, BENJAMIN N., *Design and Characterization of a Secure Automatic Dependent Surveillance-Broadcast Prototype*. AFIT/ENG/MS/15M-041. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/Ry. [CCR]

HSIA, LELEIA A., *Gate-Level Commercial Microelectronics Verification with Standard Cell Recognition*. AFIT/ENG/MS/15M-069. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/RV.

HUTCHINSON, SCOTT A., *Distributed Kernelized Locality-Sensitive Hashing for Faster Image Based Navigation*. AFIT/ENG/MS/15M-070. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RV. [ANT & CCR]

JEON, JAE H., *Improving the Performance of the Space Surveillance Telescope as a Function of Seeing Parameter*. AFIT/ENG/MS/15M-050. Faculty Advisor: Dr. Kyle J. Kauffman. Sponsor: DARPA.

JONES, DAVID W., *Theoretical Limits of Lunar Vision Aided Navigation with Inertial Navigation System*. AFIT/ENG/MS/15M-020. Faculty Advisor: Dr. Kyle J. Kauffman. Sponsor: N/A. [ANT]

KAMRUD, ALEXANDER J., *Unified Behavior Framework for Discrete Event Simulation Systems*. AFIT/ENG/MS/15M-017. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/RQ. [CCR]

KAWECKI, JAMES E.C., *Initial Implementation and Testing of a Tightly-Coupled IMU/Pseudolite System*. AFIT/ENG/MS/15M-025. Faculty Advisor: Dr. John F. Raquet. Sponsor: 746 TS. [ANT]

KNISELY, ALAEXANDER G., *Biaxial Anisotropic Material Development and Characterization Using Rectangular to Square Waveguide*. AFIT/ENG/MS/15M-055. Faculty Advisor: Dr. Michael J. Havrilla. Sponsor: AFRL/RV.

LAFLEUR, ROBERT S., *Development of A Novel Hybrid Multi-Junction Architecture for Silicon Solar Cells*. AFIT/ENG/MS/15M-026. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFOSR.

LEIGHNER, ANDREW C., *FPGA Accelerated Discrete-SURF for Real-Time Homography Estimation*. AFIT/ENG/MS/15M-042. Faculty Advisor: Maj John M. Pecarina. Sponsor: N/A.

LEINES, MATTHEW T., *Terrain Referenced Navigation Using SIFT Features in LiDAR Range-Based Data*. AFIT/ENG/MS/14D-047. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/RV. [ANT]

LEMIEUX, JAMES A., *Experimental Verification of the Enhanced Interferometric Phased Array Laser System*. AFIT/ENG/MS/15M-010. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD. [CDE]

LOWDER, WILLIAM M., *Real-Time RF-DNA Fingerprinting of ZigBee Devices Using a Software-Defined Radio with FPGA Processing*. AFIT/ENG/MS/15M-054. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV. [CCR]

MCCAULEY, AARON K., *Analysis of Features for Synthetic Aperture Radar Target Classification*. AFIT/ENG/MS/15M-032. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFOSR.

MIRABILE, ANTHONY T., *Pilot Assisted Inertial Navigation System Aiding Using Bearings-Only Measurements Taken Over Time*. AFIT/ENG/MS/15M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/RV. [ANT]

NAGY, JOHN E., *Entity Recognition via Multimodal Sensor Fusion with Smart Phones*. AFIT/ENG/MS/15M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

NINE, JULIANA J., *(U) Detection, Classification, and Mitigation of Inauthentic GPS Signals Using Radio Frequency Distinct Native Attributes and Direction of Arrival Estimation*. AFIT/ENG/MS/15M-065. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: AFRL/RV. [ANT & CCR]

NISHIDA, JEFFREY K., *Estimating Single and Multiple Target Locations Using K-Means Clustering with Radio Tomographic Imaging in Wireless Sensor Networks*. AFIT/ENG/MS/15M-038. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR. [ANT]

PALTZER, NICHOLAS J., *Network Routing Using the Network Tasking Order, a Chron Approach*. AFIT/ENG/MS/15M-059. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFOSR. [CCR]

PAUL, BRADLY S., *Airborne Network Optimization with Dynamic Network Update*. AFIT/ENG/MS/15M-030. Faculty Advisor: Maj Thomas E. Dube. Sponsor: AFOSR. [CCR]

PIERCE, SCOTT J., *Modeling Navigation System Performance of a Satellite-Observing Star Tracker Tightly Integrated with an Inertial Measurement Unit*. AFIT/ENG/DS/15M-260. Faculty Advisor: Dr. John F. Raquet. Sponsor: USNO. [ANT]

POSTON, HOWARD E., *Generation of Strategies for Environmental Deception in Two-Player Normal-Form Games*. AFIT/ENG/MS/15J-004. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A. [ANT & CCR]

REXFORD, ANDREW C., *Credible Set Estimation, Analysis, and Applications in Synthetic Aperture Radar Canonical Feature Extraction*. AFIT/ENG/MS/15M-033. Faculty Advisor: Dr. Julie A. Jackson. Sponsor: AFOSR.

RICH, MICHAEL D., *Evaluating Machine Learning Classifiers for Hybrid Network Intrusion Detection Systems*. AFIT/ENG/MS/15M-046. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/Ry & AF CyTCoE. [CCR]

RICKS, DONOVAN L., *A Novel Analysis of Performance Classification and Workload Prediction Using Electroencephalography (EEG) Frequency Data*. AFIT/ENG/MS/15M-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [ANT]

ROADRUCK, BRIAN J., *Counter Weapon Control*. AFIT/ENG/MS/15M-056. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR. [ANT]

ROBERSON, DANIEL M., *The Unified Behavior Framework for the Simulation of Autonomous Agents*. AFIT/ENG/MS/15M-014. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: N/A.

ROHDE, JOHNATHAN L., *Urban Environment Navigation with Real-Time Data Utilizing Computer Vision, Inertial, and GPS Sensors*. AFIT/ENG/MS/15M-037. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/Ry. [ANT]

SHIREY, RUSSELL G., *Git as an Encrypted Distributed Version Control System*. AFIT/ENG/MS/15M-022. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A. [CCR]

SLIGAR, ANTHONY J., *Measuring Angular Rate of Celestial Objects Using the Space Surveillance Telescope*. AFIT/ENG/MS/15M-019. Faculty Advisor: Dr. Stephen C. Cain. Sponsor: DARPA.

SMITH, ANDREW M., *Robust Models for Operator Workload Estimation*. AFIT/ENG/MS/15M-064. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH. [ANT]

SPRANG, JOSHUA S., *Non-Linear Optimization Applied to Angle-of-Arrival Satellite-Based Geolocation with Correlated Measurements*. AFIT/ENG/MS/15M-044. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

SULLIVAN, NICHOLAS P., *Energy Harvesting & Recapture from Human Subjects: Dual-Stage MEMS Cantilever Energy Harvester*. AFIT/ENG/MS/15M-068. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

TANG, KHOA A., *Hyperspectral Based Skin Detection for Person of Interest Identification*. AFIT/ENG/MS/15M-031. Faculty Advisor: Lt Col Jeffrey D. Clark. Sponsor: 711 HPW/RH.

TAO, ALBERT B., *Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting Applied to SatCom Short Burst Data Modems Using a Software-Defined Radio*. AFIT/ENG/MS/15M-043. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/Ry. [CCR]

TATUM, RALPH K., *Exploration of Digital Circuits and Transistor-Level Testing In the DARPA TRUST Program*. AFIT/ENG/MS/15M-040. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/Ry.

THARP, JUSTIN S., *On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation*. AFIT/ENG/MS/15M-063. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/Ry. [ANT]

VAN, TAN, *Characterizing Multiple Wireless Sensor Networks for Large-Scale Radio Tomography*. AFIT/ENG/MS/15M-057. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR. [ANT & CCR]

WALTON, JOHN P., *Electrostatically Driven Large Aperture Micro-Mirror Actuator Assemblies for High Fill-Factor, Agile Optical Phase Arrays*. AFIT/ENG/MS/15J-003. Faculty Advisor: Dr. Ronald A. Coutu, Jr. Sponsor: AFRL/Ry.

WARNER, KRISTIAN E., *Electrical and Physical Property Characterization of Single Walled Carbon Nanotube Ink for Flexible Printed Electronics*. AFIT/ENG/MS/15M-066. Faculty Advisor: Maj Derrick Langley. Sponsor: AFRL/Ry.

WARNER, PHILLIP C., *Automatic Configuration of Programmable Logic Controller Emulators*. AFIT/ENG/MS/15M-024. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS. [CCR]

WERNER, KYLE P., *Precision Relative Positioning for Automated Aerial Refueling from a Stereo Imaging System*. AFIT/ENG/MS/15M-048. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ. [ANT]

WILLIAMS, ANTHONY S., *Expected Position Error for an Onboard Satellite GPS Receiver*. AFIT/ENG/MS/15M-029. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A. [ANT]

WILLINGER, COREY T., *Effects of Data Replication on Data Exfiltration in Mobile Ad Hoc Networks Utilizing Reactive Protocols*. AFIT/ENG/MS/15M-035. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL. [ANT]

WINN, MICHAEL M., *Constructing Cost-Effective and Targetable ICS Honeypots Suited for Production Networks*. AFIT/ENG/MS/15M-045. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS. [CCR]

WOLFE, TIMOTHY S., *Pulsed Radio Frequencies via Photoconductive Semiconductor Switch Driven Sources*. AFIT/ENG/MS/15M-039. Faculty Advisor: Dr. Andrew J. Terzuoli. Sponsor: N/A.

YAXLEY, KATE J., *Communication and Jamming BDA of OFDMA Communication Systems Using the Software Defined Radio Platform WARP*. AFIT/ENG/MS/15M-073. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A. [CCR]

ZEITLIN, ZACHARY J., *Fingerprinting Software Defined Networks and Controllers*. AFIT/ENG/MS/15M-067. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A. [CCR]

5.2.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BINDEWALD, JASON R., Capt,

Assistant Professor of Computer Science, Department of Electrical and Computer engineering, AFIT
Appointment Date: 2015 (AFIT/ENG), BACS, Gettysburg College, 2005; MS, Air Force Institute of Technology, 2015; PhD, Computer Science, Air Force Institute of Technology, 2015. Capt Bindewald's research interests include human-machine teaming, machine learning, autonomous agents, and player modeling. He is a member of AAAI and a member of Tau Beta Pi honorary society.
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REFEREED JOURNAL PUBLICATIONS

Bindewald, J.M., Miller, M.E., and Peterson, G.L., "A Function-to-Task Process Model for Adaptive Automation

System Design," International Journal of Human-Computer Studies, Vol. 72, No. 12, pp. 822-834, Dec 2014. [ANT]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J.M., Peterson, G.L., and Miller, M.E., "Trajectory Generation with Player Modeling," Advances in Artificial Intelligence: 28th Canadian Conference on Artificial Intelligence (Canadian AI 2015), 2-5 Jun 2015, Halifax, Nova Scotia, Canada, pp. 42-49. [ANT]

BORGHETTI, BRETT J.,

Assistant Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2008 (AFIT/ENG); BSEE, Worcester Polytechnic Institute, 1992; MSCS, Air Force Institute of Technology, 1996; PhD, Computer Science, University of Minnesota, 2006. Dr. Borghetti's research interests include machine learning, autonomous agents, and multi-agent systems.
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SPONSOR FUNDED RESEARCH PROJECTS

"Developing a Cyber Multi-Attribute Task Battery and Cognitive Model for Human Performance Evaluation in Cyber Operations." Sponsor: AFOSR. Funding: \$34,099 – Borghetti 50%, Rusnock 50%. [CCR]

"Support to NSF Scholarship for Service Program." Sponsor: AFRL/RV. Funding: \$12,247. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Boeke, D.K., Miller, M.E., Rusnock, C.F., and Borghetti, B.J., "Exploring Individualized Objective Workload Prediction with Feedback for Adaptive Automation" Proceedings of the 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, (ISERC), Nashville, TN, 30 May-2 Jun, 2015.

Shirey, R.G., Hopkinson, K.M., Stewart, K.E., Hodson, D.D. and Borghetti, B.J., "Analysis of Implementations to Secure Git for Use as an Encrypted Distributed Version Control System," 48th IEEE Hawaii International Conference on System Sciences, Kauai, HI, 5-8 Jan 15, pp 1530-1605.
<http://conferences.computer.org/hicss/2015/papers/7367f310.pdf>. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Sullivan, N.M., Borghetti, B.J., and Coutu, R.A., "Energy Harvesting & Recapture from Human Subjects: Dual-Stage Thermal MEMS Energy Converter," IEEE Conference on Reliability Science for Advanced Materials and Devices (RSAMD), Golden, CO, 7-9 Sep 2014.

BROWN, FRANK M.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 1961 (AFIT/ENG); BS, MS, PhD, The Ohio State University. Dr. Brown's research interests are discrete mathematics and operations research.

CAIN, STEPHEN C.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2003 (AFIT/ENG); BSEE, University of Notre Dame, 1992; MSEE, Michigan Technological University, 1994; PhD, University of Dayton, 2001. Dr. Cain's research interests include electro-optics, remote sensing, and signal processing. Tel. 937-255-3636 x4625, email: Stephen.Cain@afit.edu

REFEREED JOURNAL PUBLICATIONS

Tyler Hardy, Stephen Cain, Jae Jeon, and Travis Blake, Improving space domain awareness through unequal-cost multiple hypothesis testing in the space surveillance telescope, *Applied Optics*, Vol. 54, Issue 17, pp. 5481-5494, (2015).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Tyler Hardy (Presenter) and Stephen Cain, Proceedings of the SPIE 9469, Sensor and Systems for Space Applications VIII, Baltimore, MD, May 22, 2015

CARBINO, TIMOTHY J., Capt,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2015 (AFIT/ENG); BSCE, University of Florida, 2006; MSEE, Air Force Institute of Technology, 2012; PhD, Electrical Engineering, Air Force Institute of Technology, 2015. Capt Carbino's research interests include critical infrastructure protection, computer communication networks, computer security, side channel analysis, reconfigurable computing systems, Radio Frequency Intelligence, and VLSI design. He is a member of the Eta Kappa Nu and IEEE. Tel. 937-255-3636x4220, email: Timothy.Carbino@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, T. J., Temple, M., & Bihl, T. J. "Ethernet Card Discrimination using Unintentional cable Emissions and Constellation-Based Fingerprinting." In *Int'l Conf on Computing, Networking and Communications (ICNC)*, 2015 (pp. 369-373). IEEE. [CCR]

BOOKS AND CHAPTERS IN BOOKS

Carbino, T. J., Temple, M. A., and Lopez Jr, J. "A Comparison of PHY-Based Fingerprinting Methods Used to Enhance Network Access Control," In *ICT Systems Security and Privacy Protection*, Springer International Publishing, pp. 204-217, May 2015. [CCR]

CLARK, JEFFREY D., Lt Col,

Deputy Department Head and Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2011 (AFIT/ENG); BS, Electrical Engineering, University of Arkansas, 1994; MS, Electrical Engineering, Air Force Institute of Technology, 2006; PhD, Electrical Engineering, Air Force Institute of Technology, 2011. Lt Col Clark's research interests include artificial intelligence, machine learning, and hyperspectral remote sensing.

COLLINS, PETER J.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2006 (AFIT/ENG); BA, Bethel College, MN, 1985; BSEE, University of Minnesota, 1985; MSEE, Air Force Institute of Technology, 1990; PhD, Air Force Institute of Technology, 1996. His research interests include low observables, computational electromagnetics, radar cross section metrology, remote sensing, and

electromagnetic material design and analysis. He is a senior member of the IEEE. Tel. 937-255-3636 x7256, email: Peter.Collins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Enabling Technologies for Radar Scattering Measurements.” Sponsor: Undisclosed. Funding: \$120,593.

“Technical Support: RCS Metrology.” Sponsor: 796 TSS. Funding: \$30,000.

“Technical Support: Geospatial Intelligence (GEOINT) and Measurement and Signature Intelligence (MASINT).” Sponsor: NASIC. Funding: \$37,618. [CSRA]

“Unmanned Air Vehicle (UAV) and Payload Systems Technology (UPST).” Sponsor: Undisclosed. Funding: \$57,300. [ANT]

REFEREED JOURNAL PUBLICATIONS

M. W. Lukacs, P. J. Collins, and M. A. Temple, “Classification Performance using RF-DNA Fingerprinting of Ultra-Wideband Noise Waveforms,” IET Electronic Letters, Vol. 51, No. 10, pp. 787-789, May 2015. [CCR]

M. W. Lukacs, A. J. Zeqolari, P. J. Collins, and M. A. Temple, “RF-DNA Fingerprinting for Antenna Classification,” IEEE Antennas and Wireless Propagation Letters, Vol. PP, No. 99, Mar 2015. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. W. Lukacs, P. J. Collins, and M. A. Temple, “Device Classification Performance Modeling Using UWB Stimulated RF-DNA Fingerprinting,” 2015 IEEE AP-S Symposium on Antennas and Propagation and URSI CNC/USNC Joint Meeting, Vancouver, BC, Accepted, presented 19-25 Jul 2015. [CCR]

Knisely, A., Havrilla, M., Collins, Peter J., “Biaxial Anisotropic Sample Design and Rectangular to Square Waveguide Material Characterization System,” Metamaterials 2015, Oxford, UK, Accepted, presented 7-12 Sep 2015.

Fillmore, Casey and Collins, Peter J., “Exploring the Characteristics of the Reflector Impulse Radiating Antenna as an Array Element Abstract,” The 36th Antenna Measurement Techniques Association Symposium, Tucson, AZ, 12-17 Oct, 2014.

Galdeen, Matthew and Collins, Peter J., “Modeling and Simulation of a Resistance Loaded Bow Tie Antenna,” The 36th Antenna Measurement Techniques Association Symposium, Tucson, AZ, 12-17 Oct, 2014.

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Chapter 27 “Low-clutter Method for Bistatic RCS Measurement,” Peter J. Collins, in Handbook of Measurements: Benchmarks for Systems Accuracy and Precision, Taylor & Francis Group

PATENTS

Collins, P.J., “Low Clutter Method for Bistatic RCS Measurements,” U.S. Patent 8,947,295, awarded 3 Feb 2015.

CORBELL, PHILLIP M., Lt Col,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2014 (AFIT/ENG); BSEE, Southern Illinois University, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, Air Force Institute of Technology, 2006. Lt Col Corbell’s research interests

include Electronic Warfare, Navigation Warfare, Waveform Diversity, Phased array, Adaptive, Cognitive, MIMO, multi-static MTI Radar architectures, Software Defined Radios and other disruptive technologies. He is a member of Tau Beta Pi, Eta Kappa Nu, Alpha Lambda Delta, and IEEE. Tel. 937-255-3636x4370, email: Phillip.Corbell@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$150,000. [ANT]

“RFI Mitigation Support.” Sponsor: AFRL/RV. Funding: \$40,000. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J. Nine and P. Corbell, “Application of RF Distinct Native Attributes (RF-DNA) and Direction of Arrival (DoA) to Detect, Classify, and Mitigate Inauthentic GPS Signals,” Institute of Navigation Joint Navigation Conference, Orlando, FL, 22-25 Jun 2015. [ANT]

P. Corbell and A. Lemmenes, “On the Performance of GPS Timing Receivers in response to RF Interference,” Institute of Navigation Joint Navigation Conference, Orlando, FL, 22-25 Jun 2015. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

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COUTU, RONALD, A., Jr.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2008 (AFIT/ENG); BSEE, University of Massachusetts, Amherst, 1993; MSEE, California Polytechnic (CalPoly) State University, San Luis Obispo, 1995; PhD, Air Force Institute of Technology, 2004. Dr. Coutu’s research interests include microelectronics, microelectromechanical systems (MEMS) and MEMS fabrication with emphasis on micro electrical contacts, phase change materials, tunable metamaterials and terahertz components. His areas of expertise include design, fabrication, and test of micro/nano devices. He is a member of Tau Beta Pi, Eta Kappa Nu, SEM, SPIE, MRS, and a Senior Member of the IEEE. Tel. 937-255-3636 x7230, email: Ronald.Coutu@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Characterizing Metal-Insulator-Transition (MIT) Phase-Change Materials (PCM) for Micro-switching Elements.” Sponsor: AFOSR. Funding: \$50,950.

“Characterizing Ultrathin and Ultrathin Structured Films for Improved Detector Efficiency.” Sponsor: AFOSR. Funding: \$43,183.

“Design, Model, and Fabricate a 5x5 Large Tip, Tilt and Piston MEMS Micromirror Array.” Sponsor: AFRL/RV. Funding: \$95,995 –Coutu 80%, Langley 20%.

“Experimental Investigation of Thin Film Spreading Resistance Modeling for Improved Micro-Contact Performance.” Sponsor: AFOSR. Funding: \$45,903.

“Mask Making Support.” Sponsor: AFRL/RV. Funding: \$15,000.

“New: Low Loss Plasmonic Devices Using Transparent Conducting Oxides.” Sponsor: AFOSR. Funding: \$35,279.

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DAVIS, NATHANIEL J., IV,

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SPONSOR FUNDED RESEARCH PROJECTS

"GNSS Laboratory Compute Cluster." Sponsor: AFRL/RV. Funding: \$70,000. [ANT]

"Multi-Element Adaptive Aided Antenna (MA3) for Robust Low SWaP-C Military GNSS Applications."
Sponsor: AFRL/RV. Funding: \$75,000 – Gunawardena 90%, Raquet 10%. [ANT]

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Frank van Graas, Curtis Cohenour, Eric Vinande, Sanjeev Gunawardena, “GNSS Signal Characterization and Monitoring Using High Gain Antennas,” Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015), Tampa, FL, Sep 2015. [ANT]

HARTRUM, THOMAS C.,

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HAVRILLA, MICHAEL J.,

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SPONSOR FUNDED RESEARCH PROJECTS

“Material Measurement Laboratory Research.” Sponsor: AFRL/RY. Funding: \$302,400.

REFEREED JOURNAL PUBLICATIONS

M. Hyde and M. Havrilla, “Broadband, nondestructive characterization of PEC-backed materials using a dual-ridged-waveguide probe,” IET Science, Measurement and Technology, Vol. 9, No. 1, pp. 56-62, Feb 2015.

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J. Crosby, M. Hyde IV and M. Havrilla, "Single Mode Field Derivation and Simulation of a Dual Ridged Waveguide Dual Probe," Applied Computational Electromagnetics Society Conference Proceedings, pp. 218-219, Williamsburg, VA, Mar 2015.

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HODSON, DOUGLAS D.,

Assistant Professor of Software Engineering, Department of Electrical and Computer Engineering, AFIT
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Dr. Hodson's research interests include real-time distributed simulation architectures for training, test and analysis, networks, design patterns for modeling radar, and infrared effects. His research interests also include the modeling and simulation of Quantum Key Distribution protocols. Tel. 937-255-3636 x4719, email: Douglas.Hodson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Support of AFNES/RIPR Autonomy Effort.” Sponsor: AFRL/RQ. Funding: \$30,000 – Hodson 50%, Peterson 50%. [ANT]

REFEREED JOURNAL PUBLICATIONS

L.O. Mailloux, R.D. Engle, M.R. Grimaila, D.D. Hodson, J.M. Colombi, and C.V. McLaughlin, “Modeling Decoy State Enabled Quantum Key Distribution Systems,” *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, Accepted for Publication Apr 2015. [CCR]

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J.D. Morris, M.R. Grimaila, D. Hodson, C. McLaughlin, and D. Jacques, “Using the Discrete Event System Specification to Model Quantum Key Distribution System Components,” *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, 17 Oct 2014, pp. 1-24, DOI: [10.1177/1548512914554404](https://doi.org/10.1177/1548512914554404) [CCR]

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C.L. Haase, R.R. Hill, and D.D. Hodson, “Planning for LVC Simulation Experiments,” *Applied Mathematics*, Vol. 5, No. 14, pp. 2153-2167, Jul 2014.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, *Journal of Defense Modeling and Simulation*

HOPKINSON, KENNETH M.,

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SPONSOR FUNDED RESEARCH PROJECTS

“A Cognitive and Context Aware Approach to Networking in Mobile Environments.” Sponsor: AFOSR. Funding: \$42,169. [CCR]

“A Cognitive Recommender System for a Closed Feedback Tasking Loop.” Sponsor: NPS. Funding: \$150,000 – Hopkinson, 20%, McBee 20%, Oxley 20%, Schubert Kabban 20%. [CTISR]

“Cognitive and Mobile Networks.” Sponsor: AFRL/RI. Funding: \$120,000. [CCR]

“Enhancing Satellite Security (New).” Sponsor: Undisclosed. Funding: \$55,000. [CCR]

“HPC Summer Intern Support.” Sponsor: USACE. Funding: \$49,000.

“Using Cognitive Radios to Enhance Communications Capabilities.” Sponsor: Undisclosed. Funding: \$45,000 – Hopkinson 51%, Silvius 49%. [CCR]

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Bodnar, T., Tucker, C., Hopkinson, K., Bilen, S.G., Increasing the Veracity of Event Detection on Social Media Networks Through User Trust Modeling, IEEE International Conference on Big Data (IEEE BigData 2014), 27-30 Oct 2014, Washington DC, USA, pp. 636-643. [CCR]

HOUPIS, CONSTANTINE H.,

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SPONSOR FUNDED RESEARCH PROJECTS

"Beam Control for Optical Phased Array Weapons." Sponsor: AFOSR. Funding: \$24,107 – Hyde 95%,
Fiorino 5%. [CDE]

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M. W. Hyde IV, S. Basu, X. Xiao, and D. G. Voelz, "Producing any desired far-field mean irradiance pattern
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cylinder," *Optics Communications*, Vol. 338, pp. 233-239, Mar 2015, doi: 10.1016/j.optcom.2014.10.052.
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materials using a dual-ridged-waveguide probe," *IET Science, Measurement & Technology*, Vol. 9, No. 1,
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Milo W. Hyde IV, Santasri Basu, and Jason D. Schmidt, "Two-dimensional simulation of optical wave
propagation through atmospheric turbulence," *Optics Letters*, Vol. 40, No. 2, pp. 233-236, Jan 2015, doi:
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approaches for generating electromagnetic Gaussian Schell-model sources," *Optics Express*, Vol. 22, No.
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wavefront sensing," *Laser Focus World*, Vol. 50, No. 11, pp. 41-44, Nov 2014. JIF: 0.260 [CDE]

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M. W. Hyde IV, S. Basu, X. Xiao, and D. G. Voelz, "Producing any desired far-field mean irradiance pattern
using a partially-coherent Schell-model source and phase-only control," *Imaging and Applied Optics:
Optics and Photonics Congress (OPC)*, PW3E.2 (3 pp.), Arlington, VA, Jun 2015. [CDE]

David Voelz, Xifeng Xiao, Santasri Basu, Milo W. Hyde IV, Olga Korotkova, "Modeling the electromagnetic
Gaussian Schell-model source," *Imaging and Applied Optics: Optics and Photonics Congress (OPC)*,
PW3E.1 (3 pp.), Arlington, VA, Jun 2015. [CDE]

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M. Havrilla, A. Bogle, and M. Hyde, "Improved bandwidth in rectangular waveguide material characterization measurements," Antenna Measurement Techniques Association 36th Annual Meeting & Symposium, pp. 427-431, Tucson, AZ, Oct 2014.

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Matthew J. Gridley, Milo W. Hyde IV, Mark F. Spencer, and Santasri Basu, "Experimental method of generating electromagnetic Gaussian Schell-model beams," Proceedings of SPIE (SPIE Optics and Photonics), Vol. 9617, 16 pp., San Diego, CA, Aug 2015. [CDE]

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Michael J. Steinbock, Jack E. McCrae, and Milo W. Hyde, "WaveProp based simulation framework for detailed target-in-the-loop HEL system modeling," Directed Energy Professional Society (DEPS) Annual Directed Energy Symposium, pg. 23, Anaheim, CA, Mar 2015. [CDE]

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JACKSON, JULIE A.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
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SPONSOR FUNDED RESEARCH PROJECTS

"Multistatic Radar Simulation, Analysis, and Development." Sponsor: NASIC. Funding: \$50,000.

“Research in Bistatic Clutter Analysis and Software-Defined Radar System Development.” Sponsor: AFRL/RY. Funding: \$40,000.

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D. Reising, M. Temple, and J. A. Jackson, “Discriminating Authorized and Rogue Devices in an OFDM-based Network Using Dimensionally Reduced RF-DNA Fingerprints,” IEEE Transactions on Information Forensics and Security, Vol. 10, No. 6, pp. 1180-1192, Jun 2015.

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R. Rademacher, J. A. Jackson, A. Rexford, and C. Schubert Kabban, “Credible Set Estimation for SAR Feature Extraction,” IEEE International Radar Conference, Washington DC, 11-15 May 2015, pp. 1-6.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

R. Rademacher, A. Rexford, J. A. Jackson, and C. Schubert Kabban, “Quadrature-based Credible Set Estimation,” Poster, AFRL/RY ATR Center Annual Review, Wright State University, 6 Aug 2015.

S. Stevens and J. A. Jackson, “Emitter Selection Criteria for Passive Multistatic Synthetic Aperture Radar Imaging,” Poster, AFRL/RY ATR Center Annual Review, Wright State University, 6 Aug 2015.

KAUFFMAN, KYLE J.,

Research Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, Miami University, 2003; MS, Miami University, 2009; PhD, Air Force Institute of Technology, 2012. Dr. Kauffman's areas of interest include alternative navigation sensors, computational optimization, remote sensing, radar-based navigation, autonomous navigation and control, inertial measurement system integration, large-scale navigation platform development, and navigation using signals of opportunity.

LAKE, ROBERT A. Capt,

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Lake, R.A. and Coutu, Jr., R.A., “Using Cross-linked SU-8 to Flip-Chip Bond, Assemble and Package MEMS Devices,” IEEE Transactions on Components, Packaging and Manufacturing Technology, Vol. 5, No. 3, pp. 301-306, Mar 2015. (DOI: 10.1109/TCPMT.2015.2395999)

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LAMONT, GARY B.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1970 (AFIT/ENG); BS of Physics, 1961; MSEE, 1967, PhD, 1970; University of Minnesota. Dr.

Lamont teaches courses in computer science and computer engineering. His research interests include: evolutionary computation, artificial immune systems, intrusion and anomaly detection, information security, parallel and distributed computation, combinatorial optimization problems (single objective and multi-objective), software engineering, digital signal processing, and intelligent and distributed control. He has advised many MS and PhD students in these disciplines. Dr. Lamont has authored several textbooks (Multi-Objective EAs, Computer Control), various book chapters, as well as numerous papers. Dr. Lamont was also an engineering systems analyst for the Honeywell Aerospace Division for 6 years. He is a member of IEEE (senior member) ACM, ASEE, SIAM, Tau Beta Pi, and Eta Kappa Nu. Tel. 937-255-3636 x4718, email: Gary.Lamont@afit.edu

REFEREED JOURNAL PUBLICATIONS

Stringer, J.; Akers, G.; Lamont, G., “Resource management construct for an adaptive DBF electronic support receiver,” IEEE Transactions on Aerospace and Electronic Systems, Vol.51, No.1, pp.203-216, Jan 2015

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LANGLEY, DERRICK, Maj,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2011 (AFIT/ENG); BS, Electrical Engineering, University of Central Florida, 2003; MS, Electrical Engineering, Wright State University, 2007; PhD, Air Force Institute of Technology, 2012. Maj Langley’s research interests include microelectronics, microelectromechanical systems (MEMS), nanotechnology, optics and metamaterials. His areas of expertise include design, fabrication, and testing of micro/nano devices. He is a member of SPIE, Eta Kappa Nu, and SEM.

SPONSOR FUNDED RESEARCH PROJECTS

“Technical Support: Research and Development in Integrated Circuits.” Sponsor: AFRL/RV. Funding: \$25,000.

REFEREED JOURNAL PUBLICATIONS

Enriching Undergraduate Research at the Air Force Institute of Technology through COEUR Principles”: Lanzerotti, M. Y., Varga, M., Creighton, S. J., Cahil, D. L. Langley, D., Martin, R. K., Council on Undergraduate Research, Vol. 35, No. 3, pp 12 - 21, Spring 2015.

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“Increasing Student and Faculty Participation and Student Learning in an Undergraduate STEM Summer Research Program in a Government Institution through a Higher Education Partnership”: Lanzerotti, M. Y., Creighton S. J., Varga, M., Martin, R., Langley, D., Cahill, D. L., 122th American Society for Engineering Education Annual Conference & Exposition, Seattle WA, Paper ID#11158, pp 1 – 22, 14 – 17 Jun 2015.

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“Standard Cell Recognition (SCR) for Gate-Level Commercial Microelectronics Verification”: Hsia, L., Langley, D. Seery, M., Lanzerotti, M., Orlando, L., Government Microcircuit Applications & Critical Technology Conference, St. Louis MO, Paper 11.4, pp 1 - 4, 23 - 26 Mar 2015.

“Dual-Role Undergraduate Interdisciplinary Research Program in Science, Technology, Engineering and Mathematics (STEM)”: Hiteshue, E., Irvin, K., Lanzerotti, M., Hochheiser, S., Geselowitz, M., Langley, D., Martin, R., Chattopadhyay, B., 5th IEEE Integrated STEM Education Conference (ISEC 2015), pp 70 - 75, 7 Mar 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Electrothermal MEMS Actuators for Large Deflection Optical Beamsteering”: Starman, L. A., Langley, D., Hall, H. J., Society for Experimental Mechanics – SEM Annual Conference and Exposition on Experimental and Applied Mechanics 2015, Costa Mesa CA, Presentation 511, Presentation Only, 8 - 11 Jun 2015.

“Post Processed Foundry Fabricated MEMS Micromirror Structures for Large Nagle Optical Scanning”: Starman, L. A., Langley, D., Hall, H. J., Society for Experimental Mechanics – SEM Annual Conference and Exposition on Experimental and Applied Mechanics 2015, Costa Mesa CA, Presentation 507, Presentation Only, 8 - 11 Jun 2015.

LIN, ALAN C. Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); BSCE, Rutgers University, 2004; MSCS, Air Force Institute of Technology, 2008; PhD, Computer Science, Air Force Institute of Technology, 2015. Maj Lin’s research interests include machine learning/data mining, space systems, modeling and simulation, and software engineering. He is a member of Tau Beta Pi. Tel. 937-255-3636 x4757. Alan.Lin@afit.edu

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SPONSOR FUNDED RESEARCH PROJECTS

“Detection and Estimation Algorithms for Temporally Multiplexed Spectropolarimetric LADAR.” Sponsor: AFRL/RW. Funding: \$47,387.

“Information Integrity for Autonomous Systems.” Sponsor: AFRL/RQ. Funding: \$36,000 – Martin 90%, Raquet 10%. [ANT]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Development Support for Hardware Assurance.” Sponsor: AFRL/RY. Funding: \$73,851. [CCR]

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- M. Lanzerotti, C. Cerny, and R. K. Martin, "A Theoretical Phase Calculation Approach for N Simultaneous Signals," IEEE Transactions on Aerospace and Electronic Systems, Vol. 51, No. 2, Apr 2015, pp. 1-6.
- S. Hartzell, L. Burchett, R. Martin, J. Mautz, C. Taylor, and A. Terzuoli, "Geo-location of Fast-Moving Objects from Satellite-based Angle-of-Arrival Measurements," IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, Vol. 8, No. 7, Jul 2015, pp. 3396-3403.

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- Abraham, R. K. Martin, and K. Mathews, "Combining Image Processing with Signal Processing to Improve Radio Position Estimation," in Proc. IEEE Vehicular Technology Conf. 2015-Spring, Glasgow, Scotland, May 2015, 4 pgs. [CCR]
- M. Y. Lanzerotti, S. Creighton, M. Varga, R. K. Martin, D. Langley, and D. Cahill, "Increasing Student and Faculty Participation and Student Learning in an Undergraduate STEM Summer Research Program in a Government Institution through a Higher Education Partnership," in Proc. ASEE Annual Conf. & Expo., Seattle, WA, Jun 2015, 22 pgs.

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Senior Area Editor, IEEE Signal Processing Letters.

MAYBECK, PETER S.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
 Appointment Date: 1973 (AFIT/ENG); BS, Massachusetts Institute of Technology, 1968; PhD, Massachusetts Institute of Technology, 1972. Dr. Maybeck's research interests include optimal estimation and stochastic control Kalman filtering, adaptive estimation, pointing and tracking, optimally aided inertial navigation systems, and multiple model adaptive filtering. He is the author of the widely recognized three-volume reference text, "Stochastic Models, Estimation and Control," and over 100 technical articles. Dr. Maybeck has received numerous national and local awards including the C. Holmes MacDonald Distinguished Young Electrical Engineering Teach and the ASEE Frederick Emmons Terman Award as the outstanding Electrical Engineering Professor in the US and 1985. He is a fellow of the IEEE.
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MENDENHALL, MICHAEL J.,

Assistant Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT
 Appointment Date: 2014 (AFIT/ENG); BS, Computer Engineering, Oregon State University, 1996; MS, Computer Engineering, AFIT, 2001; PhD, Electrical Engineering, Rice University, 2006. Dr. Mendenhall's research interests include Radio Frequency Intelligence (RFINT), Feature Selection for Intrusion Detection, Dismount Detection and Characterization, persistent Surveillance in Urban Environments, Qualia Exploitation of Sensor Technology (QUEST), and Wind-turbine Radar interaction modeling.

SPONSOR FUNDED RESEARCH PROJECTS

“Analytic Cloud-Based Outage Prediction.” Sponsor: NSA. Funding: \$91,116 – Mendenhall 33%, Lin 33%, Peterson 33%. [CCR]

“Hyperspectral Classification and Sensor Fusion for Dismount Skin and Clothing Identification.” Sponsor: 711 HPW. Funding: \$40,000.

“Phase I Support: DISA Critical Infrastructure Protection.” Sponsor: DISA. Funding: \$30,000. [CCR]

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MILLS, ROBERT F.,

Director of Center for Cyberspace Research, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2003 (AFIT/ENG); BS, Electrical Engineering, Montana State University, 1983; MS, Electrical Engineering, AFIT, 1987; PhD, Electrical Engineering, University of Kansas, 1994. Dr. Mill’s research interests include network management and security, cyber operations and warfare, insider threat mitigation, and electronic warfare. He is a Senior Member of the IEEE and is a member of the Eta Kappa Nu and Tau Beta Pi honor societies. Tel. 937-255-3636 x4527, email: Robert.Mills@afit.edu

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Vaughan, S.L., Mills, R.F., Grimaila, M.R., Peterson, G.L., Oxley, M.E., Dube, T.E., and Rogers, S.K., “QuEST for Malware Type-Classification,” SPIE Defense+ Security. International Society for Optics and Photonics, Baltimore MD, 17-21 Apr 2015. [CCR]

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MULLINS, BARRY E.,

Professor of Computer Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2004 (AFIT/ENG); BS, Computer Engineering (cum laude), University of Evansville, 1983; MS, Computer Engineering, Air Force Institute of Technology, 1987; PhD, Electrical Engineering, Virginia Polytechnic Institute and State University, 1997. Dr. Mullins’ research interests include cyber operations, malware analysis, reverse code engineering, computer/network security, SCADA (supervisory control and data acquisition) security, computer communication networks, embedded (sensor) and wireless networking, and reconfigurable computing systems. Tel. 937-255-3636 x7979, email: Barry.Mullins@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Development and Implementation of a Testbed for Research and Analysis of Malware.” Sponsor: DHS. Funding: \$225,000 – Mullins 20%, Humpheries 20%, Butts 20%, Robinson 20%. [CCR]

“Software Defined Networking Research Support.” Sponsor: NSA. Funding: \$120,000. [CCR]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“IASP Tuition and Resource Support for the AFIT Center for Cyberspace Research (CCR).” Sponsor: NSA. Funding: \$130,308. [CCR]

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M. M. Winn, M. J. Rice, S. Dunlap, J. Lopez, B. E. Mullins, “Constructing Cost-Effective And Targetable Industrial Control System Honeypots For Production Networks,” International Journal of Critical Infrastructure Protection, 1 May 2015, Elsevier, DOI: <http://dx.doi.org/10.1016/j.ijcip.2015.04.002>, pp. 1-12. [CCR]

B.W. Ramsey, T. D. Stubbs, B. E. Mullins, M. A. Temple, and M. A. Buchner, “Wireless critical infrastructure protection using low-cost RF fingerprinting receivers,” International Journal of Critical Infrastructure Protection, 11 Dec 2014, Elsevier, DOI: [10.1016/j.ijcip.2014.11.002](http://dx.doi.org/10.1016/j.ijcip.2014.11.002), pp. 1-20. [CCR]

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NYKL, SCOTT L.,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2015 (AFIT/ENG); B.S. Software Engineering, University of Wisconsin-Platteville, 2006; MS, Computer Science, Ohio University, 2012; PhD, Computer Science, Ohio University, 2013. Dr. Nykl’s research interests include Computer Graphics, Interactive 3D Graphics, Level of Detail, Image-Based Rendering, GPGPU Programming/Parallel Computation, Distributed Real Time Visualizations, Computer Vision, Computational Geometry, Sensor Fusion, Linear Algebra, Numerical Analysis, Synthetic Vision (SVS), Augmented Reality (AR) Parallel/Concurrent Programming, Multi-Core/Multi-Threading, Algorithms, Big Data, and Networking, Data Structures. Tel. 937-255-3636x4395, email: Scott.Nykl@afit.edu

PACHTER, MEIR,

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SPONSOR FUNDED RESEARCH PROJECTS

“Autonomous Control and Navigation.” Sponsor: AFRL/RQ. Funding: \$20,000. [ANT]

“Control & Estimation in the Presence of Adversarial Action and Uncertainty.” Sponsor: AFOSR. Funding: \$46,104. [ANT]

“Decision Support Techniques.” Sponsor: AFRL/RD. Funding: \$6,002. [ANT]

“Self-Defense Missile Guidance.” Sponsor: AFRL/RW. Funding: \$25,000. [ANT]

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E. Garcia, D. Casbeer and M. Pachter, “Cooperative Strategies for Optimal Aircraft Defense from an Attacking Missile,” *Journal of Guidance, Control, and Dynamics*, Vol. 30 No. 8, Aug 2015, pp 1510-1520. [ANT]

I. Exarchos, P. Tsiotras and M. Pachter, “On the Suicidal Pedestrian Differential Game,” *Dynamic Games and Applications*, Vol. 5 No. 3 pp 297-317, 2015. [ANT]

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D. Casbeer, K. Kalyanam, P. Chandler and M. Pachter, “Moving Ground Target Isolation by a UAV Using Predicted Observations,” *Conference on Decision and Control*, Los Angeles, CA, 15-17 Dec 2014, Paper TuC12.4 [ANT]

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BOOKS AND CHAPTERS IN BOOKS

Khanh D. Pham and Meir Pachter, “A Risk-Averse Differential Game Approach to Multi-Agent Tracking and Synchronization with Stochastic Objects and Command Generators,” *Dynamics of Information Systems – Computational and Mathematical Challenges*, Vol. VIII, C. Vogiatis, J. Walteros and P. Pardalos, Eds., pp. 21-44, Springer 2014, ISBN 978-3-319 10045-6. [ANT]

M. Pachter and K. Pham, "Informational Issues in Decentralized Control," Dynamics of Information Systems – Computational And Mathematical Challenges, Vol. VIII, C. Vogiatzis, J. Walteros and P. Pardalos, Eds., pp. 45-76, Springer, 2014. [ANT]

A Relyea and M. Pachter, "A Covariance Analysis of Vision-Aided Inertial Navigation: 3-D Free Fall Case," Advances in Estimation, Navigation, and Spacecraft Control, D. Choukroun, Editor, pp. 309-328, Springer, 2015, ISBN 978-3-662-44784-0. [ANT]

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REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Pecarina, J., Fu, M. & Liu, J. C. Observation and Mitigation of Causal Re-Ordering in Distributed Business Process Logs. In Proceedings of the International Conference on Collaboration Technologies and Systems (CTS) IEEE. 2015. (Nominated for Outstanding Paper, Presented Jun 2015, Atlanta, GA)

PETERSON, GILBERT L.,

Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2002 (AFIT/ENG); BS, Architecture University of Texas at Arlington, 1995; MS, Computer Science, University of Texas at Arlington, 1998; PhD, University of Texas at Arlington, 2001. Dr. Peterson's research interests include uncertainty in artificial intelligence, robotics, machine learning, and digital forensics. Tel. 937-255-6565 x4281, email: Gilbert.Peterson@afit.edu

REFEREED JOURNAL PUBLICATIONS

King, D.W. and Peterson, G.L., "Epaminondas: Exploring Combat Tactics," ICGA Journal, Vol. 37 No.3, 2015, pp. 131-143

Bindewald, J.M., Miller, M.E. and Peterson, G.L., "A Function-to-Task Process Model for Adaptive Automation System Design," International Journal of Human-Computer Studies, Vol. 72, No. 12, 2014, pp. 822-834. [ANT & CCR]

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Schmitt, D.T. and Peterson, G.L., "Timing Mark Detection on Nuclear Detonation Video," 2014 IEEE Applied Image Pattern Recognition Workshop (AIPR), 2-14. pp. 1-5.

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BOOKS AND CHAPTERS IN BOOKS

Peterson, G., and Sheno, S., Advances in Digital Forensics X, Springer-Verlag, 2014.

PIERCE, SCOTT, Maj,

Deputy Director of Autonomy and Navigation Technology Center, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, Brigham Young University, 2002; MSEE, Air Force Institute of

Technology, 2008; PhD, Air Force Institute of Technology, 2015. Maj Pierce's research interests include image-aided navigation, autonomous control, and flight path optimization. He is a member of ION. Tel. 937-255-3636 x3419, email: Scott.Pierce@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Star Tracker Integration Modeling for UAV Flight Profiles." Sponsor: AFRL/RW. Funding: \$25,000 – Pierce 80%, Raquet 20%. [ANT]

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Nathan E. Smith, Richard G. Cobb, Scott J. Pierce, and Vincent M. Raska. "Uncertainty Corridors for Three-Dimensional Collision Avoidance," Journal of Guidance, Control, and Dynamics, Vol. 38, No. 6 (2015), pp. 1156-1162. [ANT]

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Pierce, S., J. Raquet, G. Hennessy, "Satellite Observations Tightly-Integrated with Inertial Measurement Units for Navigation in GPS-Denied Environments," ION Joint Navigation Conference, Orlando, FL, Jun 2015. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Pierce, Scott, "AFIT Celestial Navigation Research," Star Tracker Working Group, Washington DC, 13 May 2015.

Pierce, Scott, "Modeling Star Tracker Integration with IMUs," ION Dayton Chapter Meeting, 18 Apr 2015.

PYATI, VITTAL P.,

Professor Emeritus of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1983 (AFIT/ENG); BE, University of Madras, India, 1953; MSE, Marquette University, 1962; PhD, Electrical Engineering, University of Michigan, 1966. Dr. Pyati's fields of expertise include electromagnetics, radar, low observables, and electronic ware. Dr. Pyati has authored over 40 publications in journals and DOD conferences. He has been a consultant to various Air Force organizations.

RAMSEY, BENJAMIN W. P., Maj,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, North Carolina State University, 2004; MS, Space Studies, American Military University, 2009; MS, Electrical Engineering, Air Force Institute of Technology, 2009; PhD, Computer Science, Air Force Institute of Technology, 2014. Maj Ramsey's interests include wireless computer networks and critical infrastructure protection. He is a member of IEEE, Eta Kappa Nu, and Tau Beta Pi. Tell 973-255-3636 x4603, email: Benjamin.Ramsey@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Combined Effects Analysis." Sponsor: AFRL/RV. Funding: \$35,000. [CCR]

"Wireless Network Research Support." Sponsor: NSA. Funding: \$100,000. [CCR]

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B. Ramsey, T. D. Stubbs, B. E. Mullins, M. A. Temple, "Wireless Critical Infrastructure Protection using Low-Cost RF Fingerprinting Receivers," Int'l Journal of Critical Infrastructure Protection, Dec 2014, doi: 10.1016/j.ijcip.2014.11.002. [CCR]

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B. Ramsey, B. Mullins, W. Lowder, and M. Temple, "Sharpening the Stinger: Tuning KillerBee for Critical Infrastructure Warwalking," Military Communications Conference 2014 (MILCOM 2014), Baltimore, MD, 6-8 Oct 2014, pp. 104-109. [CCR]

C. Badenhop, J. Fuller, J. Hall, B. Ramsey and M. Rice, "Evaluating ITU-T G.9959 wireless systems in the critical infrastructure," 9th Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection, Arlington, VA, 16-18 Mar 2015. [CCR]

H. Patel, M. Temple, and B. Ramsey, "Comparison of High-end and Low-end Receivers for RF-DNA Fingerprinting," Military Communications Conference 2014 (MILCOM 2014), Baltimore, MD, 6-8 Oct 2014, pp. 24-29. [CCR]

RAQUET, JOHN F.,

Director of the Autonomy and Navigation Technology Center, Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1998 (AFIT/ENG); BS, US Air Force Academy, 1989; MS, Massachusetts Institute of Technology, 1991; PhD, University of Calgary, Canada, 1998. Dr. Raquet's areas of interest include Global Positioning System (GPS) precise positioning, non-GPS precision navigation, optically-aided navigation, navigation 101 using signals of opportunity, integration of MEMS-based inertial measurement units with other sensors, autonomous vehicle navigation and control, and electromagnetic interference and mitigation techniques affecting GPS performance. Tel. 937-255-3636 x4580, email: John.Raquet@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Absolute Positioning Using Earth Fields." Sponsor: DARPA. Funding: \$260,000 – Raquet 60%, Kauffman 40%. [ANT]

"ANT Center and Laboratory Support per Attachment 6 of the MOA between AFIT and AFRL." Sponsor: AFRL/RV. Funding: \$250,000 – Raquet 50%, Haker 50%. [ANT]

"Development of Electronic Warfare (EW) Trainer." Sponsor: AFRL/FY. Funding: \$120,000. [ANT]

"GNSS Testbed Development." Sponsor: AFRL/RV. Funding: \$297,245 – Raquet 10%, Gunawardena 90%. [ANT]

"GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development." Sponsor: AFRL/RW. Funding: \$265,000 – Raquet 50%, Woolley 25%, Jacques 25%. [ANT]

"Multi-Sensor Navigation Demonstration." Sponsor: USA CERDEC. Funding: \$30,000. [ANT]

"Project Management Support for Autonomous Aerial Vehicle Competition." Sponsor: AFRL/RV. Funding: \$5,000. [ANT]

"Star Trackers for Non-GPS Navigation." Sponsor: Draper Lab. Funding: \$20,000 – Raquet 90%, Woolley 10%. [ANT]

"Support for Alternative Navigation Research." Sponsor: DARPA. Funding: \$50,000 – Raquet 80%, Pierce 20%. [ANT]

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Shockley, J. and J. Raquet, "Navigation of Ground Vehicles Using Magnetic Field Variations," Navigation, Vol. 61 No. 4, pp. 237-252, Winter (Dec) 2014. [ANT]

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Calhoun, S. and J. Raquet, "Vision-Aided Integrity Monitor for Precision Relative Navigation Systems," Proceedings of 2015 ION International Technical Meeting, Dana Point, CA, Jan 2015. [ANT]

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Marietta, D., M. Smearcheck, and J. Raquet, "SPIDER and FLY: Navigation Data Simulation and Post-Processing Software Suite," ION Joint Navigation Conference, Orlando, FL, Jun 2015. [ANT]

Venable, D., J. Campbell, K. Kauffman, J. Raquet, M. Smearcheck, D. Marietta, J. Kresge, "Unmanned Aerial System Vision Aided Navigation (UVAN) Rapid Reaction Effort," ION Joint Navigation Conference, Orlando, FL, Jun 2015. [ANT]

Gunawardena, S., M. Carroll, J. Raquet, "GNSS Threat Detection Using Nominal Chip-Shape Monitoring: Feasibility Study Using Live Sky Data," ION Joint Navigation Conference, Orlando, FL, Jun 2015. [ANT]

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Haker, J. and J. Raquet, "Global Navigation Satellite System Signal Decomposition and Parameterization Algorithm," US Patent No. 9,025,640. Issued 5 May 2015. [ANT]

RICE, MASON J., LTC,

Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 2014 (AFIT/ENG); BS, Electrical Engineering, Florida Institute of Technology, 1995;
MS, Electrical and Computer Engineering, University of Florida, 2003; PhD, Computer Science, University of Tulsa, 2011. LTC Rice's research interests are information assurance, networking, and telecommunication systems, cyber-physical systems (SCADA), and cyber-based policy and strategy. Tel. 937-255-3636 x4620, email: Mason.Rice@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“MUTC Integrated SCADA Testbed (MISTB) Development.” Sponsor: AFSPC. Funding: \$15,026. [CCR]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M. Winn, M. Rice, S. Dunlap, Cost-effective and targetable industrial control system honeypots, S4, Digital Bond, Miami, FL (Jan 2015).

SEAL, MICHAEL D., Maj,

Deputy Department Head, Assistant Professor of Electrical Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, EE, University of Missouri-Rolla, 2002; MS, EE, Air Force Institute of Technology, 2007; PhD, EE, Air Force Institute of Technology, 2013. Maj Seal’s research interests are Plasmonic & Frequency Selective Surfaces, Laser Detection & Ranging (LADAR), and optical metrology. Member of SPIE. Tel. 937-255-3636 x3369, email: Michael.Seal@afit.edu

REFEREED JOURNAL PUBLICATIONS

M.D. Seal, N.R. Murphy, J.P. Lombardi, M.A. Marciniak, Selective thermal emission from a patterned metalized plastic, *Infrared Physics & Technology*, Vol. 67, Nov 2014, pp. 250-255, ISSN 1350-4495.

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STONE, SAMUEL J., Maj,

Electrical Engineering Division Chief, Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, Computer Engineering, Wright State University, 2003; MS, Electrical Engineering, Air Force Institute of Technology, 2008; PhD, Electrical Engineering, Air Force Institute of Technology, 2013. Maj Stone’s research interests include Radio Frequency Intelligence, VLSI design, anti-tamper semiconductor hardware design, counterfeit device detection, and device design verification. Tel. 937-255-3636 x6605, email: Samuel.Stone@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Phase I Support RF-Based Characterization of Systems.” Sponsor: AFRL/RV. Funding: \$45,000. [CCR]

REFEREED JOURNAL PUBLICATIONS

S. Stone, M. Temple, “Detecting anomalous programmable logic controller behavior using RF-based Hilbert transform features and a correlation-based verification process,” *International Journal of Critical Infrastructure Protection*, Vol. 9, pp. 41-51, Jun 2015. [CCR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

B. Stone, S. Stone, "Radio Frequency Based Reverse Engineering of Microcontroller Program Execution," NAECON OIS Conference, 17-19 Jun 2015 University of Dayton's River Campus, Dayton, OH. [CCR]

J. Wylie, S. Stone, "Detecting Anomalous Behavior in Microcontrollers Using Unintentional Radio Frequency (RF) Emissions," NAECON OIS Conference, 17-19 Jun 2015 University of Dayton's River Campus, Dayton, OH. [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

R. Deppensmith, S. Stone, "Age-Based Variance in Semi-Conductor Electro-Magnetic Emission," CHASE Conference on Secure/Trustworthy Systems and Supply Chain Assurance, 9 Apr 2015, University of Connecticut, Storrs, CT.

STRINGER, JEREMY P., Lt Col,

Assistant Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2013 (AFIT/ENG); BS, EE, United States Air Force Academy, 1998; MSEE, Air Force Institute of Technology, 2000; PhD, EE, Air Force Institute of Technology, 2013. Lt Col Stringer's research interests are Adaptive Beamforming, HF-Direction Finding, Passive Radar, Cognitive Radar, and Computational Electromagnetics. Member of IEE, HKN, and TBP. Tel. 937-255-3636 x4684, email: Jeremy.Stringer@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Wideband Beamforming." Sponsor: AFRL/RV. Funding: \$36,646 – Stringer 95%, Lamont 5%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Stringer, J.; Akers, G.; Lamont, G., "Resource management construct for an adaptive DBF electronic support receiver," Aerospace and Electronic Systems, IEEE Transactions on , Vol.51, No.1, pp.203,216, Jan 2015 doi: 10.1109/TAES.2013.130453

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TEMPLE, MICHAEL A.,

Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT Appointment Date: 1996 (AFIT/ENG); BSE (1985) and MSE (1986), Southern Illinois University, Edwardsville IL; PhD, Air Force Institute of Technology, 1993. Dr. Temple's research interests include passive emitter identification, tracking and location using RF Distinct Native Attribute (RF-DNA) fingerprinting and complex waveform generation via Spectrally Modulated, and Spectrally Encoded (SMSE) processing. Sponsored research efforts in Command, Control, Communications and Intelligence (C3I), and Electronic Warfare (EW), as adopted by and/or transitioned to agencies within the US Department of Defense, has provided over \$2M in R&D Technology benefit. Senior member of IEEE since Jan 2002. Tel. 937-255-3636 x4279, email: Michael.Temple@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"MUTC MISTB Development." Sponsor: USA/Camp Atterbury. Funding: \$174,250 – Temple 50%, Hill 50%. [CCR]

"MUTC RFINT Research, Development and Demonstration." Sponsor: 2MSOB. Funding: \$28,252 – Temple 50%, Rice 50%. [CCR]

“MUTC RFINT Research, Development and Demonstration.” Sponsor: USASOC. Funding: \$12,208 – Temple 50%, Rice 50%. [CCR]

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Riesing, Temple and Jackson, “Authorized and Rogue Device Discrimination Using Dimensionally Reduced RF-DNA Fingerprints,” IEEE Trans on Info Forensics and Security, Vol. 10, Issue. 6, pp. 1180-1192, Jun 2015. [CCR]

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Lukacs, Collins, Temple, “Classification Performance using “RF-DNA” Fingerprinting of Ultra-Wideband Noise Waveforms,” IET Electronic Letters, Vol. 51, Issue. 10, pp. 787-789, May 2015. [CCR]

Patel, Temple, Baldwin, Ramsey, “Introduction of a Random Forest Classifier to ZigBee Device Network Authentication Using RF-DNA Fingerprinting,” Jour of Information Warfare (JIW), Vol. 13, Issue: 3, pp. 33-45, Aug 2014. [CCR]

Patel, Temple, Baldwin, “Improving ZigBee Device Network Authentication Using Ensemble Decision Tree Classifiers with RF-DNA Fingerprinting,” IEEE Trans on Reliability, Vol. 64, No. 1, pp. 221-233, Mar 2015. [CCR]

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Carbino, Temple, Lopez, “A Comparison of PHY-Based Fingerprinting Methods to Enhance Network Access,” 2015 Int’l Conf on Sys Security and Privacy (IFIP-SEC), Hamburg, GE, pp. 204-217, May 2015, 22% Accept Rate. [CCR]

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Patel, Temple, Ramsey, “Assessment of RF-DNA Fingerprinting Using Random Forest Classification With Features From High-Cost and Low-Cost Receivers,” 2014 Military Comm Conf (MILCOM14), pp. 24-29, Oct 2014. [CCR]

Lopez, Temple, “Inferring Field Device Identity and Operating State Using Physical Features of HART Signals,” 2014 Int’l Conf on Critical Info Infrastructures Security (CRITIS14), Limassol, Cyprus, Oct 2014. [CCR]

PATENTS

Cobb, Temple, Baldwin, Garcia, Laspe, U.S. Patent, “Intrinsic Physical Layer Authentication of Integrated Circuits,” No. 9,036,891, 19 May 2015. [CCR]

TERZUOLI, ANDREW J., Jr.,

Associate Professor of Electrical Engineering, Department of Electrical and Computer Engineering, AFIT
Appointment Date: 1982 (AFIT/ENG); BS, Electrical Engineering, Polytechnic Institute of Brooklyn, 1969;
MS, Electrical Engineering, Massachusetts Institute of Technology, 1970; PhD, Electrical Engineering, The
104 Ohio State University, 1982. Dr. Terzuoli’s research areas have included Antennas and Electromagnetics;
Computer Model Based Studies; Application of Parallel Computation, VLSI Technology, and RISC
Architecture to Numerical and Transform Methods; Remote Sensing and Communication; Passive RF
Sensing; Wave Scattering, Radar Cross Section, and Stealth (LO/CLO) Technology; Machine Vision and
Image Processing; and Automated Object Recognition. He has published numerous reports and articles in
journals and conference proceedings in these and related areas. His research is funded by various agencies
including AFRL and NASIC. Prior to joining AFIT in 1982, Dr. Terzuoli was a research associate at the
ElectroScience laboratory at The Ohio State University and was a member of the technical staff at the Bell
Telephone Laboratories in New Jersey. He is an active officer of IEEE and a fellow of the Electromagnetics
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SPONSOR FUNDED RESEARCH PROJECTS

“Remote Sensing and Communications for Advanced Technical Exploitation.” Sponsor: NASIC. Funding:
\$110,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- T. Wolfe, E. Moore, R. Burchett, A. Francis, D. Langley, J. Petrosky, A. Terzuoli, and T. Zens, “Feasibility of Photoconductive Semiconductor Switches (PCSS) in Pulsed Power Systems as an Enabling Technology,” Proceedings of the 2015 IEEE Pulsed Power Conference (PPC 2015), Austin, TX, 31 May – 04 Jun 2015.
- S. Hartzell, L. Burchett, R. Martin, J. Mautz, C. Taylor, A. Terzuoli, “Geo-location of Fast-Moving Objects from Satellite-based Angle-of-Arrival Measurements,” IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (JSTARS), Vol. 8, No. 7, Jul 2014, pp 3396-3403
- J. Sprang, D. Hesser, J. Roos, J. Mautz, M. Sambora, C. Taylor, J. Sugrue, A. Terzuoli, “Correlated Error Analysis for the Non-Linear Optimization AOA Geolocation Algorithm,” Proceedings of the 2015 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2015), Milano, IT, 26-31 Jul 2015.
- L. Burchett, E. Moore, J. Sugrue, A. Terzuoli, “Application of Motion Reconstruction to ISAR Data,” Proceedings of the 2015 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2015), Milano, IT, 26-31 Jul 2015.

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- T. Wolfe, E. Moore, R. Burchett, S. Nickolas, A. Francis, D. Langley, J. Petrosky, A. Terzuoli, and T. Zens, “Integrated Computational Study of an Optoelectronic Pulsed Power Radio Frequency Source,” Proceedings of the 2014 Applied Computational Electromagnetics Society Conference (ACES 2015), Williamsburg, VA, 22-26 Mar 2015.
- T. Wolfe, A. Francis, D. Langley, J. Petrosky, A. Terzuoli, T. Zens, “High Power Ultra Wideband Short Pulse (UWBSP) Electromagnetics (EM) Application For Wide Band Gap (WBG) Photoconductive Semiconductor Switches (PCSS),” Proceedings of the 2015 IEEE International Conference on Electromagnetics in Advanced Applications (ICEAA 2015), Torino, IT, 07-11 Sept 2015.

WOOLLEY, BRIAN G., Maj,

Computer Science and Engineering Division Chief, Assistant Professor of Computer Science, Department of Electrical and Computer Engineering, AFIT Appointment Date: 2012 (AFIT/ENG); BS, Computer Engineering, California State University, Sacramento, 2002; MS Computer Engineering, Air Force Institute of Technology, 2007; PhD, Computer Engineering, University of Central Florida, 2012. Maj Woolley's research interests include artificial intelligence for autonomous vehicles, evolutionary computation of control behaviors, and sensor fusion via computer vision techniques for world modeling. Tel. 937-255-3636 x4618, email: Brian.Woolley@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision." Sponsor: AFRL/RQ. Funding: \$94,455 – Woolley 50%, Raquet 25%, Pecarina 25%. [ANT]

"Machine Learning Algorithms for Anomaly Detection in Persistent Infrared Systems." Sponsor: NASIC. Funding: \$35,000. [ANT]

"Unmanned Air Vehicle (UAV) and Payload Systems Technology (UPST)." Sponsor: Undisclosed. Funding: \$96,800 – Woolley 51%, Jacques 49%. [ANT]

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Justin S. Tharp and Brian G. Woolley, "Structure from Motion Based Vision-Aided Navigation," In Proceedings of the 9th annual information meeting of the Consortium of Ohio Universities on Navigation and Timekeeping (COUNT'15). [ANT]

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Brian G. Woolley. Sensing the World. University of Dayton, Innovation Institute, Dayton, OH, 27 May 2015.

Kyle S. Werner and Brian G. Woolley. Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision. AFIT-AFRL National Engineers Week Poster Session. Feb 23, 2015, WPAFB, USA. Dean's Choice Award Winner (#1/50).

Justin S. Tharp and Brian G. Woolley. On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation. AFRL/RYM Front Office Group, 24 Mar 2015, WPAFB, USA.

VITAYAUDOM, KEVIN P., Capt,

Instructor, Department of Electrical and Computer engineering, AFIT Appointment Date: 2014 (AFIT/ENG); BS, EE, University of Portland, 2006; MS, EE, Air Force Institute of Technology, 2008. Capt Vitayaudom's research interests are Adaptive Optics, Beam and Wavefront Control, Statistical Signal Processing, Satellite Tracking and Imaging, Imaging through Turbulence, and Wave-optics Simulations. He is a member of Tau Beta Pi, Eta Kappa Nu, SPIE, OSA, and IEEE. Tel. 937-255-3636 x4442, email: Kevin.Vitayaudom@afit.edu

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5.3.1. DOCTORAL DISSERTATIONS

- BENSON, MICHAEL R., *Identifying the Experimental and Theoretical Effective Characteristics of Nonaligned Anisotropic Metamaterials*. AFIT/ENP/DS/15J-008. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: N/A. [CDE]
- BLANK, LARRY A., *Potential Energy Curves and Associated Line Shape of Alkali-Metal and Noble-Gas Interactions*. AFIT/ENP/DS/14D-051. Faculty Advisor: Dr. David E. Weeks. Sponsor: HELJTO.
- BUTLER, SAMUEL D., *Experimental and Theoretical Basis for a Closed-Form Spectral BRDF Model*. AFIT/ENP/DS/15S-021. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/Ry. [CDE & CTISR]
- DEXTER, MICHAEL L., *Investigation and Development of Atmospheric Nuclear Detonation Optical Forensics Techniques*. AFIT/ENP/DS/15S-022. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]
- ENGLERT, JOHN W., *Estimating Peak Magnetic Fields within the Source Region Using Remanent Magnetization: An Application to Nuclear Forensics*. AFIT/ENP/DS/14D-037. Faculty Advisor: Dr. James C. Petrosky. Sponsor: DHS.
- FEE, JAMES R., *Modeling Electromagnetic Pulse at Air Burst Altitudes*. AFIT/ENP/DS/15S-023. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.
- HOLSTON, MAURIO S., *Characterization of Point Defects in Lithium Aluminate (LiAlO₂) Single Crystals*. AFIT/ENP/DS/15S-025. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.
- MILLER, WOODY S., *Temperature Dependent Rubidium-Helium Line Shapes and Fine Structure Mixing Rates*. AFIT/ENP/DS/15S-027. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA. [CDE]
- SLAUGHTER, ROBERT C., *Multidimensional Analysis of Nuclear Detonations*. AFIT/ENP/DS/15S-029. Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA. [CSRA]

5.3.2. MASTER'S THESES

- ANDERSON, GREGORY M., *Development of a Standard Maritime C₂N Profile Using Satellite Measurements*. AFIT/ENP/MS/15M-141. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]
- BARNETT, BRIAN L., *Ionizing and Non-ionizing Radiation Effects in Thin Layer Hexagonal Boron Nitride*. AFIT/ENP/MS/15M-099. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.
- BRANDT, LOGAN J., *Analysis of Muon Induced Neutrons in Detecting High Z Nuclear Materials*. AFIT/ENP/MS/15M-109. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFOSR.
- CALVER, TIMOTHY, *Fe:ZnSe Solid-State Power Amplifier for an Optical Parametric Master Oscillator*. AFIT/ENP/MS/15M-075. Faculty Advisor: Maj Manuel R. Ferdinandus. Sponsor: AFRL/Ry.
- CARDOZA, JOSEPH A., *A Simple Model for Fine Structure Transitions in Alkali-Metal Noble-Gas Collisions*. AFIT/ENP/MS/15M-079. Faculty Advisor: Dr. David E. Weeks. Sponsor: HELJTO.

DEAN, CHRISTOPHER P., *Aircraft Paint Damage by Thermal Pulse and Characterization of the Wind Tunnel-Enhanced AFIT Thermal Irradiation Test System*. AFIT/ENP/MS/15M-083. Faculty Advisor: Dr. James C. Petrosky. Sponsor: AFNWC.

DODD, MARK T., *Coherent Thermal Emission from Photonic Nanostructures Composed of TA, W, GE, and HfO₂ Thin Films*. AFIT/ENP/MS/15M-006. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: DAGSI.

ERWIN, WILLIAM J., *Verification and Validation of Monte Carlo N-Particle 6 for Computing Gamma Protection Factors*. AFIT/ENP/MS/15M-090. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA. [CTISR]

FERGUSON, IAN P., *Photoluminescence and Optically Stimulated Luminescence Studies of LiAlO₂ and LiGaO₂ Crystals*. AFIT/ENP/MS/15M-106. Faculty Advisor: Dr. Nancy C. Giles. Sponsor: DTRA.

FISH, MICHAEL C., *Comparison of Streak and Frame Film Light Intensity Curves*. AFIT/ENP/MS/15M-080. Faculty Advisor: LTC Stephen R. McHale. Sponsor: DTRA.

GREEN, ASHLEY E., *Comparison of Varying Mass-to-Yield Ratio Nuclear Detonations Using DIRSIG*. AFIT/ENP/MS/15M-094. Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA. [CSRA]

HALL, JOSHUA D., *Modeling of Muon Chemistry in the Presence of Electric Fields Using COMSOL*. AFIT/ENP/MS/15M-108. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DHS.

HARRIS, CAMERON N., *The Efficiency of Methionine as a Radioprotectant of Bacillus Anthracis for Cell Viability and Outgrowth Time after UVC and Gamma Irradiation*. AFIT/ENP/MS/15M-105. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: AFNWC.

HOWARD, SAMANTHA R., *Automated Sunspot Detection and Classification Using SOHO/MDI Imagery*. AFIT/ENP/MS/15M-078. Faculty Advisor: Dr. William F. Bailey. Sponsor: N/A.

JACKSON, PETER T., *Determination of Dimensions and Yield of Nuclear Fireballs from Test Films*. AFIT/ENP/MS/15M-103. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA. [CSRA]

KEY, SCOTT W., *Surface Geometry and Chemistry of Hydrothermally Synthesized Single Crystal Thorium Dioxide*. AFIT/ENP/MS/15M-087. Faculty Advisor: Dr. Tony D. Kelly. Sponsor: DHS.

KRANICH, SHANNON N., *Correlation of Solar X-ray Flux and SID Modified VLF Signal Strength*. AFIT/ENP/MS/15M-077. Faculty Advisor: Dr. William F. Bailey. Sponsor: AFRL/RV.

MATTERS, DAVID A., *Analysis of the Nuclear Structure of Rhenium-186 Using Neutron-Induced Reactions*. AFIT/ENP/MS/15M-098. Faculty Advisor: Dr. John W. McClory. Sponsor: DHS.

MCCLUNG, BRANDON T., *Investigating GAIM-GM's Capability to Sense Ionospheric Irregularities via Walker Satellite Constellations*. AFIT/ENP/MS/15M-076. Faculty Advisor: Dr. William F. Bailey. Sponsor: N/A.

MCINTEE, NICHOLAS J., *The Effect of Anisotropic Scatter on Atmospheric Neutron Transport*. AFIT/ENP/MS/15M-085. Faculty Advisor: Dr. Kirk A. Mathews. Sponsor: AFTAC.

MCKINNEY, JOSEPH L., *Nuclear Cloud Rise Film Analysis and Yield Determination*. AFIT/ENP/MS/14D-012. Faculty Advisor: Lt Col Stephen R. McHale. Sponsor: DTRA.

MORAN, PAUL J., *Scaling of an Optically Pumped Mid-Infrared Rubidium Laser*. AFIT/ENP/MS/15M-104. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

MORENO, DAVID C., *Tropical Cyclone Intensity and Position Analysis Using Passive Microwave Imager and Sounder Data*. AFIT/ENP/MS/15M-093. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: JTWC.

MORRISON, MICHAEL, *Multiple Detector Optimization for Hidden Radiation Source Detection*. AFIT/ENP/MS/15M-082. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA.

PARDO, CHRISTIAN C., *Optimizing Biological Agent Detection for Military Bases Utilizing a Statistical Model of Innate Filter Systems*. AFIT/ENP/MS/15M-084. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: DTRA.

PARKER, MICHAEL J., *Coupling Nuclear Induced Phonon Propagation with Conversion Electron Mössbauer Spectroscopy*. AFIT/ENP/MS/15J-054. Faculty Advisor: Dr. Larry W. Burggraf. Sponsor: DHS.

PETERSON, GLENN, *Photoemission Characterization of Novel Uranium Materials*. AFIT/ENP/MS/15M-101. Faculty Advisor: Dr. Tony D. Kelly. Sponsor: DHS.

REINECKE, CHRISTOPHER D., *Methodology for Nuclear Cloud Analysis from Atmospheric Test Films*. AFIT/ENP/MS/15M-107. Faculty Advisor: LTC Stephen R. McHale. Sponsor: DTRA.

ROSENTHAL, JAMES M., *Absorption Spectroscopy of Rubidium in an Alkali Metal Dispenser Cell and Bleached Wave Analysis*. AFIT/ENP/MS/15M-102. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO. [CDE]

STOYANOV, DIMITAR, *Investigating of Field-Collected Data Using Diffuse and Specular, Forward and Reverse Radiative Transfer Models*. AFIT/ENP/MS/15M-100. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RX. [CDE]

SWANSON, BRANDY A., *Investigating the Impacts of Particle Size and Wind Speed on Brownout*. AFIT/ENP/MS/15M-097. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: N/A.

TRAVIS, ANDREW J., *Utilizing Four Dimensional Lightning and Dual-Polarization Radar to Develop Lightning Initiation Forecast Guidance*. AFIT/ENP/MS/15M-092. Faculty Advisor: Lt Col Robert S. Wacker. Sponsor: AFWA/45 WS.

TULIP, CHRISTOPHER M., *Bandwidth Broadening by Reduction of Chromatic Aberration Effects Using Second-Stage Diffractive Optics*. AFIT/ENP/MS/15M-086. Faculty Advisor: Lt Col Anthony L. Franz. Sponsor: USAFA/DFP.

VAN ZANDT, NOAH R., *Modeled and Measured Partially Coherent Illumination Speckle Effects from Sloped Surfaces for Tactical Tracking*. AFIT/ENP/MS/15M-257. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO. [CDE]

VANHOOSE, TAMARA B., *X-ray Shielding Effectiveness of Multifunctional Composite Materials*. AFIT/ENP/MS/15M-081. Faculty Advisor: Dr. John W. McClory. Sponsor: AFRL/RX.

WILLIAMS, KELLEY J., *Evidence for the Inhibition of Dengue Virus Binding in the Presence of Silver Nanoparticles*. AFIT/ENP/MS/15M-089. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/RH. [ANT]

WILSON, KODY A., *Non-Destructive Techniques for Classifying Aircraft Coating Degradation*.
AFIT/ENP/MS/15M-088. Faculty Advisor: Dr. Michael R. Hawks. Sponsor: AFRL/RX.

5.3.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BARTLETT, KEVIN S., Lt Col,

Assistant Professor of Atmospheric Science, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, University of California, Los Angeles, 1997; MS, Air Force Institute of Technology, 2004; PhD, SUNY-Albany, 2013. Lt Col Bartlett's research covers a wide range of topics in the atmospheric sciences to include problems in numerical weather prediction, dust and thunderstorm modeling, as well as lightning, radar and satellite exploitation for space launch and aviation operations. Before joining AFIT he was Commander, Detachment 1, 18th Weather Squadron, and Staff Weather Officer to the 3rd Infantry and 10th Mountain Divisions in Iraq and New York and most recently deployed to Afghanistan as the Chief Meteorologist for NATO and US Forces. He is a member of the American Meteorological Society, the Air Weather Association, and the American Geophysical Union. Tel. 937-255-3636 x4520, email: Kevin.Bartlett@afit.edu

BAILEY, WILLIAM F.,

Associate Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1978 (AFIT/ENP); BS, United States Military Academy, 1964; MS, The Ohio State University, 1966; PhD, Air Force Institute of Technology, 1978. Dr. Bailey's research interests center on weakly ionized gases and reactive kinetics with special applications to semiconductor processing in gas discharges, shock characterization in ionized flows, and solutions of the inhomogeneous electron kinetic equation. Dr. Bailey has published over 20 papers in refereed conference proceedings and international journals and chaired over 25 theses and dissertations. He is a member of Tau Beta Pi, Sigma Pi Sigma, and Sigma Xi. Tel. 937-255-3636 x4501, email: William.Bailey@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

McClung, B. T., Bailey, W., "Investigating GAIM's Capability to Ingest Data of Ionospheric Irregularities via Walker Satellite Constellations," Presented at the 14th Annual Student Conference at the 95th Annual Meeting of the American Meteorology Society, 4-8 Jan 2015, Phoenix, AZ.

Howard, S. R., Bailey, W. F. Bartlett, K.S., Loper, R.D., "Automated Sunspot Detection & Classification Using SOHO MDI Imagery," Presented at the 14th Annual Student Conference at the 95th Annual Meeting of the American Meteorology Society, 4-8 Jan 2015, Phoenix, AZ.

Kranich, S. N., Bailey, W.F., Loper, R. D., Balasubramaniam, K.S., "Correlation of Solar X-ray Flux and SID Modified Signal Strength," Presented at the 14th Annual Student Conference at the 95th Annual Meeting of the American Meteorology Society, 4-8 Jan 2015, Phoenix, AZ.

BOREL-DONOHUE, CHRISTOPH C.,

Research Associate Professor, Department of Engineering Physics, AFIT Appointment Date: 2010 (AFIT/ENP); Dipl. El. Eng ETH, Swiss Federal Institute of Technology, Zurich, Switzerland, 1981; PhD, University of Massachusetts, 1988. Dr. Borel's research focuses on visible through thermal hyperspectral data analysis; atmospheric correction, temperature-emissivity separation, Bidirectional Reflectance Distribution Function (BRDF) modeling, adjoint radiosity methods to retrieve reflectance in complex environments, spatial/spectral sharpening and data fusion, Fourier transform spectrometer imaging, atmospheric correction of satellite imagery, scene simulation in the visible and infrared using computer graphics, end-to-end modeling of hyperspectral sensors, and top of atmosphere albedo of the earth.

BRIDGMAN, CHARLES J.,

Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 1960 (AFIT/ENP); BS, United States Naval Academy, 1952; MS, North Carolina State University, 1958; PhD, North Carolina State University, 1963. Dr. Bridgman's interests center around nuclear weapon effects and military nuclear power applications. He has been associated with nuclear weapon defense since 1952. He was a member of the first military team to be operational on the H-bomb. His current research interest is nuclear weapon fallout modeling. He is the author of a textbook, "Introduction to the Physics of Nuclear

Weapons Effects,” and numerous technical articles in a wide variety of journals. In his 38 years on the AFIT faculty, he has chaired over 120 MS theses and PhD dissertations. He has received several awards, including Tau Beta Pi Teacher of the Year, the Gage H. Crocker Outstanding Professor Award, and the Order of the Nucleus Award. Dr. Bridgman is a Fellow of the American Nuclear Society.

BUNKER, DAVID J.,

Director, Center for Technical Intelligence Studies and Research, and Research Assistant Professor of Engineering Physics, Department of Engineering Physics, AFIT Appointment Date: 2010 (AFIT/ENP); BS, Aerospace-Engineering, Pennsylvania State University, 1984; MS, Mechanical Engineering, University of Dayton, 1988; PhD, Aerospace Engineering Sciences, University of Colorado, 1994. Dr Bunker’s research interests include applications of measurement and signature technology, remote sensing, and technical intelligence. Additional interests include high angle of attack and vertical flow structures, unsteady fluid dynamics, experimental wind tunnel testing, and low-speed fluid mechanics.

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$144,399 – Bunker 25%, Borel-Donohue 25%, Hopkinson 25%, Oxley 25%. [CTISR]

BURGGRAF, LARRY W.,

Professor of Engineering Physics and Chemical Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP); BA, Chemistry, Olivet Nazarene University, 1968; MS, Chemistry, The Ohio State University, 1971; MA, Applied Mathematics, University of West Florida, 1977; PhD, Chemistry, University of Denver, 1981; Postdoctoral Associate, Computational Chemistry, Iowa State University, 1993. Dr. Burggraf conducts experimental and theoretical research in physical chemistry and materials chemistry including radiation biophysics, exotic atom chemistry, positron spectroscopy, surface and cluster spectroscopy, excitonic nanomaterials, atomic force microscopy, gamma spectroscopy, and imaging to solve DOD, DHS and DOE problems in WMD non-proliferation. Theoretical research to model surfaces, clusters, nanomaterials and exotic-atom molecules applies quantum mechanics modeling to interpret experimental results. Dr. Burggraf has authored more than 50 refereed archival publications. He has successfully advised 45 Master’s students, eight PhD students, and is currently advising five PhD students. Tel. 937-255-3636 x4507, email: Larry.Burggraf@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Efficient Predictions of Excited States for Nanomaterials using ACES III & IV.” Sponsor: USACE. Funding: \$220,000.

“Surface Chemistry of Positrons and Positronium Atoms: Modeling and Spectrometry.” Sponsor: AFOSR. Funding: \$41,868.

REFEREED JOURNAL PUBLICATIONS

“Theoretical investigation of stabilities and optical properties of $\text{Si}_{12}\text{C}_{12}$ clusters,” X.F. Duan, L.W. Burggraf, *The Journal of Chemical Physics* 142, 034303 (2015).

“Investigation of the Compton Rescue technique” A.W. Stevenson, C.S. Williams, L.W. Burggraf, *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, Vol. 351, pp. 46–50 (15 May 2015).

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Positron Annihilation 3-D Momentum Spectrometry by Synchronous 2D-ACAR and DBAR,” Larry W. Burggraf, A.M. Bonavita, C.S. Williams, *Bulletin of the American Physical Society*, 46th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Vol. 60, No. 7 (Talk, Jun 10, 2015)

“Exciton Resonances in Novel Silicon Carbide Polymers,” Larry Burggraf and Xiaofeng Duan, Bulletin of the American Physical Society, 46th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, Vol. 60, (Poster, 7 Jun 11, 2015)

“Theoretical Investigation Optical Properties of $\text{Si}_{12}\text{C}_{12}$ Clusters and Oligomers having Potential as Excitonic Materials,” Xiaofeng Duan and Larry Burggraf, Bulletin of the American Physical Society, APS Mar Meeting 2015, San Antonio TX, Vol. 60, No.1 (Poster, Mar 5, 2015)

BUTLER, SAMUEL D., Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Applied Physics (Computer Science Emphasis), Brigham Young University, 2004; MS, Physics, Air Force Institute of Technology, 2010; PhD, Physics, Air Force Institute of Technology, 2015. Maj Butler’s research is primarily focused on development of optical scatter models for use in remote sensing applications, particularly in the IR. He has also previously been involved in munitions development, quantum mechanical scattering, cryptography, and quantum information. Maj Butler has published one refereed journal article and four conference presentations. He has also deployed to Afghanistan as a deputy IG in support of Operation: Enduring Freedom. Maj Butler is a member of SPIE. Tel. 937-255-3636 x4385, email: Samuel.Butler@afit.edu

REFEREED JOURNAL PUBLICATIONS

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. “Experimental analysis of bidirectional reflectance distribution function cross section conversion term in direction cosine space,” *Optics Letters*, 40: 2445–2448 (2015). (Impact Factor: 3.292) [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. “Comparison of microfacet BRDF model elements to diffraction BRDF model elements,” *Proc. SPIE*, 94720C (2015). [CDE]

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. “Experimental measurement and analysis of wavelength-dependent properties of the BRDF,” *Proc. SPIE*, 96110G (2015). [CDE]

CLINTON, JUSTIN A.,

Visiting Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2013 (AFIT/ENP); BS, Nuclear Engineering, 2004; PhD, Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY, 2011. Dr. Clinton’s research interests are in the area of radiation detection, both experimental and theoretical modeling, as it applies to nuclear forensics. His expertise includes particle transport, Monte Carlo methods, analog and digital data acquisition and analysis, and detector development. Dr. Clinton is a member of the American Nuclear Society (ANS) as well as the Institute of Electrical and Electronics Engineers (IEEE). Tel. 937-255-6565 x4586, email: Justin.Clinton.@afit.edu

REFEREED JOURNAL PUBLICATIONS

A. W. Decker, S. R. McHale, M. P. Shannon, J. A. Clinton, J. W. McClory, “Novel Bonner Sphere Response Functions Using MCNP6,” *IEEE Transactions on Nuclear Science*, Vol.62, No.4, pp.1689-1694, Aug 2015.

A.W. Decker, M.P. Shannon, J.A. Clinton, J.W. McClory, S.R. McHale, “Verification and Validation of Monte Carlo N-particle Code 6 (MCNP6) with Neutron Protection Factor Measurements of an Iron Box,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 252-259, May 2015.

T. P. Genda, J. W. McClory, S. R. McHale, J.A. Clinton, B.R. Kowash, “Optimization of Detector Placement for High Energy Photon Interrogation of Special Nuclear Material,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 130-140, May 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

W. J. Erwin, J. A. Clinton, J. W. McClory, S. R. McHale, “Verification and Validation of Monte Carlo N-Particle Code 6 (MCNP6) with Gamma Protection Factor Measurements,” *2015 Hardened Electronics and Radiation Technology Conference* in Chantilly, VA on 23 Apr 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

A. W. Decker, S. R. McHale, M. P. Shannon, J. A. Clinton, J. W. McClory “Novel Bonner Sphere Response Function Calculations Using MCNP6,” *2014 IEEE Nuclear Science Symposium* in Seattle, WA on 5 Nov 2014.

FEE, JAMES R. JR., Lt Col,

Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Purdue University, 1997; MS, Air Force Institute of Technology, 2002; PhD, Air Force Institute of Technology, 2015. Lt Col Fee’s research is primarily focused on computational simulation of nuclear weapon effects with a focus in electromagnetic pulse. He has also previously managed radiation hardened microelectronics programs for satellite and missile systems. Lt Col Fee has published one refereed journal article and one conference presentation. He also deployed to Iraq as an Intelligence Advisor in support of Operation New Dawn. Lt Col Fee is the faculty advisor and member of the American Nuclear Society and additionally holds a Master of Military Operational Art and Science from Air University (2012). Tel. 937-255-3636 x4438, email: James.Fee@afit.edu

FERDINANDUS, MANUEL R., Maj,

Assistant Professor of Optical Sciences, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, Seattle University, 1999; MS, Rochester Institute of Technology, 2007; PhD, University of Central Florida, 2014. Maj Ferdinandus performs research into nonlinear optics, optical limiting, infrared laser sources and hyperspectral target detection. Previously he has worked in space operations and satellite system acquisition. He has published two refereed journal articles and seven conference presentations. Maj Ferdinandus is a member of the Optical Society of America. Tel. 937-255-6565 x4339, email: Manuel.Ferdinandus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Organic Chromophores for Sensor Hardening.” Sponsor: AFOSR. Funding: \$31,868.

FIORINO, STEVEN T.,

Director, Center for Directed Energy, and Research Associate Professor of Atmospheric Physics, AFIT Appointment Date: 2003 (AFIT/ENP); BS, Geography (Climatology), The Ohio State University, 1987; BS, Meteorology, Florida State University, 1989; MS, Atmospheric Dynamics, The Ohio State University, 1993; PhD, Physical Meteorology, Florida State University, 2002. Dr. Fiorino’s research interests include retrieving environmental parameters via microwave remote sensing; developing signal processing algorithms to fuse meteorological data collection with non-weather ISR platforms; evaluating uncertainty in high-energy laser engagement due to atmospheric effects; and improving microphysical characterizations for nuclear fallout, transport, and dispersion. He has published broadly in meteorological, directed energy, and military journals. Dr. Fiorino is a member of the American Meteorological Society, American Institute of Aeronautics and Astronautics, the Directed Energy Professional Society, Society of Photo-Instrumentation Engineers (SPIE), and additionally holds a Master of Military Operational Art and Science from Air University (2003). Tel. 937-255-3636 x4506, email: Steven.Fiorino@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“2015 AFIT Center for Directed Energy HPC Internship Program (HIP).” Sponsor: USACE. Funding: \$48,000. [CDE]

“2015 AFIT Center for Directed Energy Summer Intern (DESI) Program.” Sponsor: AFRL/RD. Funding: \$50,000 – Fiorino 90%, Perram 5%, Marciniak 5%. [CDE]

“Additions to AFIT Atmospheric Effects Software Code for AFRL/RD.” Sponsor: AFRL/RD. Funding: \$126,250. [CDE]

“Airborne Aero-optics Lab Beam Control Collection and Evaluation.” Sponsor: HELJTO. Funding: \$133,842. [CDE]

“Atmospheric Characterization for Directed Energy Applications (Phase II SBIR).” Sponsor: MDA. Funding: \$40,000. [CDE]

“CDE Model Integration with Deconfliction Project.” Sponsor: AFLCMC. Funding: \$17,205. [CDE]

“CY2015 HELJTO M&S TAWG Product Development.” Sponsor: HELJTO. Funding: \$350,000. [CDE]

“CY2015 HELJTO AP TAWG Research and Analysis.” Sponsor: HELJTO. Funding: \$370,000. [CDE]

“Modification of AFIT Atmospheric Software Code for AFRL/RD.” Sponsor: Undisclosed. Funding: \$107,000. [CDE]

“Support to AFRL Directed Energy High Performance Computing Application Software Initiative.” Sponsor: AFRL. Funding: \$120,000. [CDE]

“Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation.” Sponsor: AFOSR. Funding: \$270,000 – Fiorino 55%, Cusumano 45%. [CDE]

REFEREED JOURNAL PUBLICATIONS

He, P., C.G. Nunalee, S. Basu, J. Minet, M.A. Vorontsov and S.T. Fiorino, 2015: “Influence of Heterogeneous Refractivity on Optical Wave Propagation in Coastal Environments” *Meteorology & Atmospheric Physics*, DOI: 10.1007/s00703-015-0391-3. [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Fiorino S.T., S. Shirey, A. DeMarco, P. He, and S. Basu “Capturing realistic boundary layer aerosol and turbulence effects in WRF and other numerical weather models” Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015. [CDE]

Burchett, L.R. and S.T. Fiorino, “Vertical Scaling of Cn2 in Volumetric Weather Radar Measurements” Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015. [CDE]

Meier, D.C. and S.T. Fiorino, “Comparison of Index of Refraction Structure Function (Cn2) Profiles Derived from Polar-orbiting Satellite Data and Numerical Weather Prediction Models” Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015. [CDE]

Basu, S.i, J.E. McCrae, Z. Pollock, P. He, C. Nunalee, S. Basu, D.G. Voelz and S. T. Fiorino “Comparison of atmospheric refractive index gradient variations derived from time-lapse imagery and mesoscale modeling” Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015. [CDE]

McCrae, J.E. and S.T. Fiorino, “Simulation of Atmospheric Compensation for a Laser Phased Array in the Presence of Target Speckle,” 2015 IEEE Aerospace Conference Big Sky, MT. (1-6 Mar 2015). [CDE]

Voelz, D., X. Xiao, I. Dragulin, J. Barraza, S. Basu, J.E. McCrae, Z. Pollock and S.T. Fiorino, "Low Cost Digital Photography Approach to Monitoring Optical Bending and Guiding in the Atmosphere," 2015 IEEE Aerospace Conference Big Sky, MT, 1-6 Mar 2015. [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., D.C. Meier, L.R. Burchett, M.F. Via, C.A. Rice, B.J. Elmore, and K.J. Keefer, "Using Satellite, NWP, and Atmospheric Refraction Assessments to Enhance Radiative Transfer Characterizations for Remote Sensing and Directed Energy Applications," (Poster), 19th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans and Land Surface (IOAS-AOLS), 95th Annual American Meteorological Society Meeting, Phoenix, AZ. (Jan 2015). [CDE]

FRANZ, ANTHONY L., Lt Col,

Assistant Professor of Physics, Deputy Department Head, Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, United States Air Force Academy, 1992; MS, Air Force Institute of Technology, 1997; PhD, University of Maryland, 2007. Lt Col Franz's research focuses on lasers and optics. His recent work has focused on developing light weight diffractive optics for use on satellites and novel approaches for imaging and hyperspectral imaging systems. Before joining AFIT, he was a physics faculty member at the Air Force Academy for eight years and deployed to Iraq and Afghanistan. He has also worked in nuclear treaty monitoring and infrared missile engagement modeling and-simulation. Lt Col Franz is a member of the American Association of Physics Teachers and the American Physical Society. Tel. 937-255-3636 x4429, email: Anthony.Franz@afit.edu

GILES, NANCY C.,

Professor of Physics and Head, Department of Engineering Physics, AFIT Appointment Date: 2009 (AFIT/ENP); BS, University of North Carolina at Chapel Hill, 1981; PhD, North Carolina State University, 1987. Dr. Giles' research focuses on solid-state physics: photoluminescence (PL), absorption, Raman, and magnetic resonance (EPR) spectroscopy leading to identification of point defects in semiconducting and optical materials; PL excitation and time-resolved PL spectroscopies; nonlinear optical materials; laser-host materials; and scintillators. She is the author of 182 archival publications in refereed journals. Before joining AFIT, she was a physics faculty member at West Virginia University for 19 years. Her current work includes studies of scintillator materials for improved detection of nuclear radiation, wide band-gap semiconductors for photorefractive applications, and infrared non-linear optical materials for infrared countermeasures. Dr. Giles is a member of the Optical Society of America, American Physical Society, and Materials Research Society. Tel. 937-255-3636 x4601, email: Nancy.Giles@afit.edu

REFEREED JOURNAL PUBLICATIONS

M. S. Holston, I. P. Ferguson, N. C. Giles, J. W. McClory, and L. E. Halliburton, "*Identification of defects responsible for optically stimulated luminescence (OSL) from copper-diffused LiAlO₂ crystals*," Journal of Luminescence Vol. 164, pp. 105-111 (Aug 2015).

E.M. Golden, N. C. Giles, S. Yang, and L. E. Halliburton, "*Interstitial silicon ions in rutile TiO₂ crystals*," Physical Review B 91, Article No. 134110 (7 pages) (Apr 2015).

M.S. Holston, J. W. McClory, N. C. Giles, and L. E. Halliburton, "*Radiation-induced defects in LiAlO₂ crystals: Holes trapped by lithium vacancies and their role in thermoluminescence*," Journal of Luminescence Vol. 160, pp. 43-49 (Apr 2015).

E. M. Golden, S. A. Basun, A. A. Grabar, I. M. Stoika, N. C. Giles, D. R. Evans, and L. E. Halliburton, "*Sulfur vacancies in photorefractive Sn₂P₂S₆ crystals*," Journal of Applied Physics Vol. 116, Article No. 244107 (8 pages) (Dec 2014).

GOLDEN, ERIC M., Maj,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, West Virginia University, 2003; MS, Air Force Institute of Technology, 2008; PhD, Air Force Institute of Technology, 2014. Maj Golden's current research is focused on the characterization of point defects in semiconductors ($\text{Sn}_2\text{P}_2\text{S}_6$, TiO_2 , ZnO) and nonlinear optical materials (CdSiP_2 , KTiOPO_4). Characterization techniques of interest include electron paramagnetic resonance, electron-nuclear double resonance, Fourier transform infrared spectroscopy, and photoluminescence. His previous assignments include the Air Force Research Laboratory Directed Energy and Munitions Directorates where he managed and performed research in space situational awareness and hardware-in-the-loop simulation. Maj Golden is currently advising one MS student. Tel: 937-255-3636 x4518, email: Eric.Golden@afit.edu

REFEREED JOURNAL PUBLICATIONS

E. M. Golden, N. C. Giles, Shan Yang, and L. E. Halliburton. *Interstitial silicon ions in rutile TiO_2 crystals*. Physical Review B **91**, 134110 (2015).

E. M. Golden, S. A. Basun, A. A. Grabar, I. M. Stoika, N. C. Giles, D. R. Evans, and L. E. Halliburton. *Sulfur vacancies in photorefractive $\text{Sn}_2\text{P}_2\text{S}_6$ crystals*. Journal of Applied Physics **116**, 244107 (2014).

GROSS, KEVIN C.,

Director, Center for Technical Intelligence Studies & Research, and Associate Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Wright State University, 1998; MS, Wright State University, 2001; PhD, Air Force Institute of Technology, 2007. Dr. Gross' main interests are remote sensing, spectroscopy, and radiative transfer, and his research is focused on the remote sensing of chemically evolving systems in the battlespace (detonation fireballs, muzzle flashes, rocket and jet engine plumes, smokestack effluents, etc.) using hyperspectral, radiometric and high-speed imagery techniques. He is developing hyperspectral imaging and spectral retrieval algorithms for quantitative combustion and flow field diagnostics. He is also leading a new effort to develop polarimetric hyperspectral imaging for improved target detection and robust material identification. He has 24 archival publications in peer reviewed journals and has secured over \$3M in external funding. He has successfully chaired nine MS students, one PhD student, and is currently advising five PhD students. He is a member of the Optical Society of America (OSA), SPIE, and the Combustion Institute. Tel: 937-255-3636 x4558, email: Kevin.Gross@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Adapting and Improving Atmospheric Correction Algorithms for Wide-Band Hyperspectral Imaging Sensors." Sponsor: NASIC. Funding: \$50,000 – Gross 75%, Fiorino 25%. [CTISR & CDE]

"Nondestructive Aircraft Coating Evaluation (NACE) Methods." Sponsor: AFRL/RX. Funding: \$50,000. [CTISR]

"Overhead Persistent Infrared (OPIR) Target Discovery and Phenomenology." Sponsor: NGA. Funding: \$125,000. [CTISR]

"Overhead Persistent Infrared (OPIR) Research and Algorithm Development." Sponsor: NGA. Funding: \$100,000. [CTISR]

"Polarimetric HSI for Improved Radioactive Source Detection Sensitivity and Localization Accuracy." Sponsor: DTRA. Funding: \$327,403 – Gross 45%, Kowash 45%, Marciniak 5%, McClory 5%. [CTISR]

"Polarimetric Hyperspectral Imaging of Metal Coupons." Sponsor: Undisclosed. Funding: \$48,326 – Gross 75%, Marciniak 25%. [CTISR]

"Spectropolarimetric Imaging of Disturbed Earth (SIDE)." Sponsor: USACE. Funding: \$44,000 – Hawks 80%, Gross 20%. [CTISR]

“Target Tracking.” Sponsor: Undisclosed. Funding: \$55,000. [CTISR]

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Open Skies Education Briefing.” Sponsor: NASIC. Funding: \$50,000 – Gross 50%, Terzuoli 50%. [CTISR]

REFEREED JOURNAL PUBLICATIONS

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Combustion kinetics of laser irradiate porous graphite from imaging Fourier transform spectroscopy*,” accepted for Combustion and Flame, 2015. [CDE & CTISR]

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Thermal degradation of poly(methyl methacrylate) with a 1.064 μm Nd:YAG laser in buoyant flow*” Polymer Degradation and Stability, **121**, 78-89, Nov 2015. [CDE & CTISR]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hans G. Korth, Kody A. Wilson, Kevin C. Gross, Michael R. Hawks and Timothy C. Zens, “Nondestructive evaluation of aircraft coatings with infrared diffuse reflectance spectra,” Proceedings of the SPIE, Vol. 9485 (2015). [CTISR]

Jacob A. Martin, Kevin C. Gross, “Estimating Index of Refraction from Polarimetric Hyperspectral Imagery,” presented at the OSA FTS/HISE meeting at the UCLA Lake Arrowhead Conference Center, Lake Arrowhead, CA between 1-4 Mar 2015. [CTISR]

Michael R. Rhoby, Kevin C. Gross, “IFTS for Harmonically Unsteady Combustion,” presented at the OSA FTS/HISE meeting at the UCLA Lake Arrowhead Conference Center, Lake Arrowhead, CA between 1-4 Mar 2015.

Joel G. Holder, Jacob A. Martin, Kevin C. Gross, “Mathematical Model and Experimental Methodology for Calibration of a LWIR Polarimetric-Hyperspectral Imager,” presented at the 43rd IEEE International Workshop on Applied Imagery and Pattern Recognition at the Cosmo Club, Washington DC between 14-16 Oct 2014. [CTISR]

Jacob A. Martin, Kevin C. Gross, “Exploring polarimetric hyperspectral imaging as a tool for improved material identification,” presented at the 43rd IEEE International Workshop on Applied Imagery and Pattern Recognition at the Cosmo Club, Washington DC between 14-16 Oct 2014. [CTISR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Imaging Spectroscopy for Combustion Diagnostics,” Colloquium, Department of Physics, Wright State University, Dayton, OH, 20 Mar 2015. (Invited talk.)

“Remote Sensing Research Overview,” Spectroradiometric Working Group, National Geospatial-Intelligence Agency, Springfield, VA, 10 Mar 2015. (Invited talk.)

HAGER, GORDON D.,

Research Professor of Chemical Physics, Department of Engineering Physics, AFIT Appointment Date: 2007 (AFIT/ENP); BS, Western Washington University, 1968; PhD, Washington State University, 1973. Dr. Hager’s research primarily focuses on high-power chemical and gas phase lasers, including laser device development, characterization, and scaling. His current research emphasizes the spectroscopy and kinetics of diode pumped alkali lasers for tactical weapons applications. He has advised eight MS students, eight PhD students, and eight postdoctoral researchers. He has published over 50 refereed articles and led the team to demonstrate the first supersonic Chemical Oxygen-Iodine Laser.

REFEREED JOURNAL PUBLICATIONS

Gordon D. Hager, Gordon E. Lott, Aaron J. Archibald, L. Blank, David E. Weeks, and Glen P. Perram, “*High pressure line shapes for Cs D1 and D2 lines and empirically informed interaction potentials*” *Journal of Quantitative Spectroscopy and Radiative Transfer*, **147**, 261-273, Nov 2014.

HAWKS, MICHAEL R.,

Research Assistant Professor of Optical Engineering (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Astrophysics, Michigan State University, 1991; MS, Engineering Physics, AFIT, 1993; PhD, Optical Sciences, AFIT, 2006. Dr. Hawks’ main research interests include electro-optic and infrared (EO/IR) remote sensing. Specific application areas include monocular passive ranging and hyperspectral and polarimetric imaging. He previously taught at the United States Air Force Academy and has conducted research in chemical lasers, space object identification, chem/bio agent detection, infrared countermeasures, nuclear detonation detection, and other remote sensing applications at the Air Force Research Laboratory and other assignments. He has received 12 research grants, chaired nine MS committees and published 26 technical papers and reports. He is a member of the Optical Society of America and SPIE and is a retired USAF Lt Col. Tel. 937-255-3636 x4828, email: Michael.Hawks.ctr@afit.edu

HENGESOLD, ROBERT L.,

Professor Emeritus of Physics, Department of Engineering Physics, AFIT Appointment Date: 1961 (AFIT/ENP); AB, Thomas More College, 1956; MS, University of Cincinnati, 1961; PhD, University of Cincinnati, 1965. Dr. Hengesold’s research areas center on experimental solid state physics, semiconductor physics, optical diagnostics, and electron and laser spectroscopy. He is the author of over 100 archival publications and over 215 presentations at technical meetings. He has served as advisor on over 17 doctoral dissertations and 80 master’s theses. He is currently carrying out studies of (1) depth resolved cathodoluminescent spectroscopy of materials suitable for neutron absorbing semiconductor solid state detectors and (2) optical characterization of compound semiconductor materials and superlattice structures for mid-infrared diode lasers and detectors. This work involves collaborative efforts with the Directed Energy and Sensors Directorates at AFRL and DTRA. Dr. Hengesold received the Air University Commander’s Award for Faculty Achievement in 1982, the Gage H. Crocker Outstanding Professor Award in 1996, the Outstanding Professional Achievement Award from the Affiliate Society Council of the Engineering and Science Foundation of Dayton in 1997, and the General Bernard A. Schriever Award in 1999. He was elected a Fellow of the American Physical Society in 2008. Tel. 937-255-3636 x4502, email: Robert.Hengesold@afit.edu

HOGSED, MICHAEL R., Lt Col,

Assistant Professor of Engineering Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Baylor University, 1997; MS, Oklahoma State University, 1999; PhD, Air Force Institute of Technology, 2005. Lt Col Hogsed’s research focuses on radiation effects on advanced microelectronic materials and devices. Currently under investigation are hexagonal boron nitride (h-BN) and germanium tin (Ge_xSn_{1-x}) materials, as well as GaN-based high electron mobility transistors. Lt Col Hogsed also has 10 years experience in the Air Force nuclear enterprise as an analyst and S&T manager for a variety of nuclear matters, to include treaty monitoring, weapon employment planning factors, and counterproliferation intelligence. Lt Col Hogsed has published three refereed journal articles and one conference presentation. Tel. 937-255-3636 x4547, email: Michael.Hogsed@afit.edu

JENNIGES, JANELLE V., Capt,

Assistant Professor of Space Physics, Department of Engineering Physics, AFIT Appointment Date: 2015 (AFIT/ENP); BS, Meteorology-Climatology, University of Nebraska - Lincoln, 2005; MBA, University of Phoenix, 2009; MS, Applied Physics, Air Force Institute of Technology, 2011; PhD, Physics, Utah State University, 2015. Capt Jenniges’ research covers a wide range of topics in the space physics to include the improved specification of ionospheric space weather models, the structure of the high-latitude electric fields, and the transition of cutting-edge research to operational forecast products. Before her assignment at AFIT, Capt Jenniges served as a forecaster in the 21st Operational Weather Squadron in Germany and as a Staff Weather Officer in 17th Air Force during the standup of Air Forces Africa. She was also the flight

commander of the Space Weather Operations Center in Omaha, NE. She is a member of Tau Beta Pi National Honor Society, the Golden Key National Honor Society, and the American Geophysical Union. Tel. 937-255-3636 x4646, email: Janelle.Jenniges@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Jenniges, J.V., “A Study of the Dayside High-Latitude Ionospheric Electrodynamics During Extended Solar Minimum,” Doctor of Philosophy Dissertation, Utah State University, Logan, UT (2015).

Jenniges, J.V., Sojka, J.J., Heelis, R.A., and David, M., “Approximating Midlatitude Fall-off Velocity Profiles in the Dawn and Dusk Sectors of the High-Latitude Convection Pattern,” Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR) Workshop, Seattle, WA (Poster, 24 Jun 2015).

Jenniges, J.V., Sojka, J.J., and Heelis, R.A., “Evaluating Midlatitude Fall-off Dependencies of the High Latitude Convection Pattern,” American Geophysical Union Fall Meeting, San Francisco, CA (Poster, 17 Dec 2014).

KELLY, TONY D.,

Research Assistant Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BA, Physics, California State University-Bakersfield, 2006; MS, Physics, University of Nebraska-Lincoln, 2010; PhD, Nuclear Engineering, Air Force Institute of Technology, 2013; Research Assistant Professor, Nuclear Engineering, Air Force Institute of Technology, 2014. Dr. Kelly conducts experimental and theoretical research in developing detectors and materials for radiation detection including photoemission spectroscopy, x-ray absorption fine structure spectroscopy, x-ray fluorescence, and radiation effects on electronics. His theoretical research models materials’ electronic bulk and surface properties.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J.L. Mann, M.A. Tyra, J.L. Molloy, J. Buscaglia, K. Pfeuffer, J. Dettman, J. Leggitt, T.D. Kelly, J.W. McClory, and S. Jerome, “Surrogate Post-Detonation Urban Debris Standard Reference Material,” presented at the *Tenth International Conference on Methods and Applications of Radioanalytical Chemistry* in Kona, HI on 13 Apr 2015.

S. Key, T. D. Kelly, A. Li, J. Petrosky, J.W. McClory, and J. Matthew Mann “Surface Mapping of Single Crystal ThO₂ with Atomic Force Microscopy,” for the *ANS 2014 Winter Meeting and Technology Expo* in Anaheim, CA on 11 Nov 2014.

G. Peterson, T. D. Kelly, J. Petrosky, D. Turner, J. W. McClory, and J. Matthew Mann “Photoemission Studies of the Single Crystal Thorium-Uranium Dioxide Alloys,” for the *ANS 2014 Winter Meeting and Technology Expo* in Anaheim, CA on 11 Nov 2014.

LEWIS, C. DAVID, Capt,

Assistant Professor of Physics, Department of Engineering Physics, AFIT, Appointment Date: 2014 (AFIT/ENP); BS/BA, Physics/Chemistry, Duke University, 2005; MS, Applied Physics, Air Force Institute of Technology, 2009; PhD, Physics, Air Force Institute of Technology, 2011. Capt Lewis’ primary research interests focus on computationally modeling quantum mechanical, electrodynamical, and aeronautical phenomenon for applications to various classes of lasers, hypersonic/plasma/EM interactions, interaction of microwaves with electronics, and chemical/biological agent neutralization. Before joining AFIT, Capt Lewis has served in a number of scientific roles including assignments at AFRL Sensors Directorate and the Defense Threat Reduction Agency (DTRA). At AFRL, he was a lead researcher on electronic attack techniques to disrupt/disable surveillance radars, small UAVs, and IEDs. At DTRA, he was chief scientist for offensive counter-WMD advanced technologies where he brought together directed energy, access denial technologies, and counter-communication techniques to develop highly asymmetrical capabilities to hold at risk chemical and biological production, storage facilities, and the means to employ those weapons. Tel. 937-255-3636 x4695, email: Charlton.Lewis@afit.edu

LEWIS, DOUGLAS R., LTC,

Assistant Professor of Biodefense Science, Department of Engineering Physics, AFIT, Appointment Date: 2012 (AFIT/ENP); BS, Biology, USAF Academy 1991, MS, Genetics, Pennsylvania State University 1995, PhD, Biodefense, George Mason University 2012. LTC Lewis' previous research focused on genetic components of the insect immune system, genetic response to laser induced damage, peptide capture of biological agents, genetic identification of smallpox, and the organizational factors which have influenced the development of the US Biodefense program. Before joining AFIT, he served 16 years in the US Air Force and five years in the US Army to include assignments as an aircraft maintenance officer and as an Assistant Professor of Biology at the Air Force Academy. He also served in counter-WMD positions with the Defense Intelligence Agency (DIA), Air Staff, as an US/UK exchange scientist and with the Defense Threat Reduction Agency (DTRA). His current research is investigating the ability of graphene to serve as a biological detector. His other interest is investigating the possibility of developing a biological collection network based upon native collection entities. Tel. 937-255-3636 x4569, email: Douglas.Lewis@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Lewis, Douglas R. "The Shaping of United States Biodefense Posture" USAF Center for Unconventional Weapons Studies.

Williams, Kelley; Lewis, Douglas; Hussain Saber; and Benjamin Christian. "Evidence for Inhibition of Dengue Virus Binding in the Presence of Silver Nanoparticles" (Poster) DTRA 2015 CBD S&T Conference

LI, ALEX G.,

Research Associate Professor, Department of Engineering Physics, AFIT Appointment Date: 1995 (AFIT/ENP); BS, Changchun University of Science and Technology, 1982; PhD, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, 1990. Dr. Li has over 20 years of research experience using AFM, SEM, FTIR, Raman, photoluminescence, EPR, ESCA, and XRD to characterize glass, ceramics, semiconductors, polymers, nano-carbon composites, and biological materials. He has published, mostly as the lead author, over two dozen peer-reviewed journal articles, including one top-ten download article of the Institute of Physics (IOP). He also conducted computer modeling of thermal transport and thermal stress in polymers, composites, and other advanced multifunctional materials. Dr. Li invented a novel AFM nano-patterning technique for producing sub-100 nm two-dimensional nanostructures in polymers and held one patent for a proton conductor material. He was a post-doctoral fellow at Nagoya Institute of Technology and Aichi Institute of Technology prior to working for AFIT in 1995. Dr. Li had taught two core courses, Materials Characterization (MATL 680) and Materials Selection and Processing (MATL 685), for the AFIT materials science program. His current research includes experiment and computer modeling of thermal, mechanical, and electrical properties of granular systems, memristive devices and systems, biomaterials, ceramic matrix composites (CMC), and polymer matrix composites ceramic (PMC). Tel. 937-255-3636 x4576, email: Alex.Li@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Tamping-Induced Phase Transitions in Protective Materials for WMD-Related Sensing and Monitoring." Sponsor: DTRA. Funding: \$138,540 – Li 75%, Zens 25%.

LOPER, ROBERT D.,

Assistant Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 2014 (AFIT/ENP); BS, University of Dayton, 1994; MS, University of Texas at Dallas, 1998; MTS, United Theological Seminary, 2011; PhD, Air Force Institute of Technology, 2013. Dr. Loper's research interests are in computational quantum physics, centering on collisional broadening and shifting of atomic spectral lines, and space physics, centering on solar astrophysics. Dr. Loper is a member of Tau Beta Pi and Sigma Pi Sigma. Tel. 937-255-3636 x4333, email: Robert.Loper@afit.edu

MAGNUS, AMY L.,

Research Assistant Professor, Department of Engineering Physics, AFIT Appointment Date: 2007 (AFIT/ENP); BSEE, Rochester Institute of Technology, 1990; MSEE, Air Force Institute of Technology, 1995; PhD, Air Force Institute of Technology, 2003. Dr. Magnus conducts and manages research in machine intelligence, near and remote sensing, pattern recognition, network science, and distributed intelligence with particular interest in signal to symbol translations and query based intelligence assessments of sensor management systems. She designs dynamic multi-modal experiments for Multi-INT analysis of kinetic events and interactive teams to ensure authoritative reporting of actionable information. She also designs assessment tools that for unobtrusive interrogation of human subjects in order to reveal competency and stress associated with interactions with data, physical interfaces, and other forms of intelligence. Dr. Magnus has published 16 articles, chaired two MS thesis committees, and is writing a book on human and computer intelligence. She is a retired Major, USAF. Tel. 937-255-3636 x4555, email: Amy.Magnus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Signatures from Human Activities.” Sponsor: AFOSR. Funding: \$33,500. [CTISR]

“Topological Constraints for Integrated Circuits.” Sponsor: AFOSR. Funding: \$43,637.

MARCINIAK, MICHAEL A.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1999 (AFIT/ENP); BS, St. Joseph’s College, 1981; BSEE, University of Missouri, 1983; MSEE, Air Force Institute of Technology, 1987; PhD, Air Force Institute of Technology, 1995. Dr. Marciniak’s research interests include various aspects of light-matter interaction, including (1) polarimetric scatterometry of nanostructured materials, such as photonic crystals, plasmonic materials, and optical meta-materials; (2) bidirectional reflectance distributions for optical signatures; and (3) high-energy laser damage assessment. He has published 25 refereed and 66 other publications and chaired 7 PhD and 49 MS thesis committees. He holds one patent. He is a retired Lt Col, USAF, with 22 years of service. Tel. 937-255-3636 x4529, email: Michael.Marciniak@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Dynamic Data-Driven Focusing of Light Scattered from Diffuse Reflectors using Phase Modulation.”
Sponsor: AFOSR. Funding: \$90,060. [CDE]

“Radiometrically Accurate BRDF’s in the Infrared.” Sponsor: Undisclosed. Funding: \$100,000. [CDE]

“Understanding the Spectral Dependence of the BRDF.” Sponsor: AFRL/RY. Funding: \$70,000. [CDE]

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Nauyoks, S. E. and Marciniak, M. A., “Effects of a measurement floor on Mueller matrix measurements in a DRR BSDF system,” *Applied Optics*, Vol. 54, No. 18, pp. 5668-5674, Jun 2015 [CDE]

Butler, S. D., Nauyoks, S. E., and Marciniak, M. A., “Experimental analysis of BRDF cross section conversion term in direction cosine space,” *Optics Letters*, Vol. 40, No. 11, pp. 2445-2448, Jun 2015 [CDE]

Benson, M. R., Kinsley, A. G., Marciniak, M. A., Seal, M. D., and Urbas, A. M., “Permittivity and permeability tensor extraction technique for arbitrary anisotropy materials,” *IEEE Photonics Journal*, Vol. 7, Issue 3, Jun 2015 [CDE]

Baumann, S. M., Hurst, B. E., Marciniak, M. A., Perram, G. P., “Fiber laser heating and penetration of aluminum in shear flow,” *Optical Engineering*, Vol. 53, No. 12, pp. 122510(1-7), Dec 2014 [CDE]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Stoyanov, D. M., Marciniak, M. A., and Meola, J., “Comparative study of spectral diffuse-only and diffuse-specular radiative transfer models and field-collected data in the LWIR,” *Proceedings of SPIE*, Vol. 9611, Sep 2015 [CDE]
- Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Experimental measurement and analysis of wavelength-dependent properties of BRDF” *Proceedings of SPIE*, Vol. 9611, Sep 2015 [CDE]
- Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Comparison of microfacet BRDF model elements to diffraction BRDF model elements,” *Proceedings of SPIE*, Vol. 9472, May 2015 [CDE]
- Baumann, S. M., Keenan, C., Marciniak, M. A., and Perram, G. P., “Spectral and temperature-dependent infrared emissivity measurements of painted metals for improved temperature estimation during laser damage testing,” *Proceedings of SPIE*, Vol. 92337, Oct 2014 [CDE]

PATENTS

- “Remote sensing of hidden objects,” M. G. Hoelscher and M. A. Marciniak, US Patent No. 8,976,256 B2, 10 Mar 2015 [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- “Methodology for extracting permittivity and permeability tensors from anisotropy materials,” M. Benson, M. Marciniak and A. Urbas, presented at the 10th Annual Dayton Engineering Sciences Symposium (DESS 2014, 0102) held on 28 Oct 2014 in Dayton, OH
- “Spectral and Spatial Coherent Emission of Thermal Radiation from Thin Film Metal-Semiconductor Resonators,” M. Dodd, M. Marciniak and J. Jones, presented at the 10th Annual Dayton Engineering Sciences Symposium (DESS 2014, 0102) held on 28 Oct 2014 in Dayton, OH

MATHEWS, KIRK A.,

Professor Emeritus of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 1987 (AFIT/ENP); BS, California Institute of Technology, 1971; MS, Air Force Institute of Technology, 1982; PhD, Air Force Institute of Technology, 1983. Dr. Mathews’ research interests center on computational methods for neutral particle radiation transport and modeling and analysis of nuclear phenomena and measurements, including enrichment cascade modeling, high altitude radiation transport, blast and shock, nuclear thermal radiation, deconvolution of radiation spectra, and statistical analysis of nuclear measurements. Dr. Mathews has published 20 papers in refereed journals and 21 conference proceedings and chaired 35 theses and 13 dissertations. He is a member of the American Nuclear Society and Tau Beta Pi.

MCCLORY, JOHN W.,

Associate Professor of Nuclear Engineering, Department of Engineering Physics, AFIT Appointment Date: 2008 (AFIT/ENP); BS, Physics, Rensselaer Polytechnic Institute, 1984; MS, Physics, Texas A&M University, 1993; PhD, Nuclear Engineering, Air Force Institute of Technology, 2008. Dr. McClory’s expertise is in radiation effects, nuclear physics, and nuclear weapon effects. His research includes determining the effect of space and nuclear weapon radiation on electronic and structural materials. It also includes the interaction of radiation with matter and the use of nuclear reactions to inform nuclear forensics techniques. He has advised eight PhD students (three current) and 29 M.S. students (four current), received 13 research grants, and published 56 journal articles during his time on the AFIT faculty. He is a member of the IEEE Nuclear and Plasma Sciences Society, American Nuclear Society, and Materials Research Society. Tel. 937-255-3636 x7308, email: John.McClory@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENP Research In Support Of Defense Threat Reduction Agency Nuclear Technologies.” Sponsor: DTRA. Funding: \$65,000. [CSRA & CTISR]

“Irradiation of Thin Film Systems.” Sponsor: AFRL/RY. Funding: \$16,000 – McClory 50%, Hogsed 50%. [CSRA]

“Rapid Location of Radiation Sources In Complex Environments Using Optical and Radiation Sensors.” Sponsor: DTRA. Funding: \$322,542 – McClory 25%, Borel-Donohue 50%, Magnus 15%, Tuttle 10%. [CTISR]

REFEREED JOURNAL PUBLICATIONS

A. W. Decker, S. R. McHale, M. P. Shannon, J. A. Clinton, J. W. McClory, “Novel Bonner Sphere Response Functions Using MCNP6,” *IEEE Transactions on Nuclear Science*, Vol.62, No.4, pp.1689-1694, Aug 2015. [CTISR]

M.S. Holston, I.P. Ferguson, N.C. Giles, J.W. McClory, L.E. Halliburton, “Identification of defects responsible for optically stimulated luminescence (OSL) from copper-diffused LiAlO₂ crystals,” *Journal of Luminescence*, Vol. 164, pp.105-111, Aug 2015. <http://dx.doi.org/10.1016/j.jlumin.2015.03.01362>.

A.W. Decker, M.P. Shannon, J.A. Clinton, J.W. McClory, S.R. McHale, “Verification and Validation of Monte Carlo N-particle Code 6 (MCNP6) with Neutron Protection Factor Measurements of an Iron Box,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 252-259, May 2015. [CTISR]

C.A. Lenyk, D.J. Bunker, J.W. McClory, S.R. McHale, B.R. Kowash, “Defining a Methodology for Data Analysis Using Streak Films,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 85-98, May 2015. [CSRA]

T. P. Genda, J. W. McClory, S. R. McHale, J.A. Clinton, B.R. Kowash, “Optimization of Detector Placement for High Energy Photon Interrogation of Special Nuclear Material,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 130-140, May 2015. [CTISR]

M.R. Morello, J.W. McClory, J.D. Cordeiro, B.R. Kowash, “Estimating Disruption Ignitions from a Nuclear Weapon Detonation Using Fire Following Earthquake Methodology,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 99-111, May 2015.

M.S. Holston, J.W. McClory, N.C. Giles, L.E. Halliburton, “Radiation-induced defects in LiAlO₂ crystals: Holes trapped by lithium vacancies and their role in thermoluminescence,” *Journal of Luminescence*, Vol. 160, pp.43-49, Apr 2015. <http://dx.doi.org/10.1016/j.jlumin.2014.11.018>

R.C. Slaughter, T.R. Peery, J.W. McClory, “Two-dimensional temperature analysis of nuclear fireballs using digitized film,” *Journal of Applied Remote Sensing*, Vol. 9, 095096 (11 pages), Jan 2015. <http://dx.doi.org/10.1117/1.JRS.9.095096>. [CSRA]

S. Ashley Francis, James C. Petrosky, John W. McClory, and Cory D. Cress, “Effects of Proton and X-ray Irradiation on Graphene Field-Effect Transistors with Thin Gate Dielectrics,” *IEEE Transactions on Nuclear Science*, Vol. 61, No. 6, pp. 3010-3017, Dec 2014. <http://dx.doi.org/10.1109/TNS.2014.2364780> [CSRA]

D.A. Buchanan, M.S. Holston, A.T. Brant J.W. McClory, V.T. Adamiv, Ya.V. Burak, and L.E. Halliburton, “Electron paramagnetic resonance and thermoluminescence study of Ag²⁺ ions in Li₂B₄O₇ crystals,”

Journal of Physics and Chemistry of Solids, Vol. 75, Issue 12, pp. 1347-1353, Dec 2014.
<http://dx.doi.org/10.1016/j.jpcs.2014.07.014>

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- A.E. Green, T.R. Peery, R.C. Slaughter, J.W. McClory, "Physical Modeling of Nuclear Detonations in DIRSIG," *2014 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, Paper No. 0929-1 (6 pages), Oct 2014. <http://dx.doi.org/10.1109/AIPR.2014.7041907> [CSRA]
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MCHALE, STEPHEN R., LTC,

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SPONSOR FUNDED RESEARCH PROJECTS

"Diode Pumped Rare Gas Lasers." Sponsor: HELJTO. Funding: \$378,531. [CDE]

"In-Process Monitoring of Additive Manufacturing." Sponsor: NASA. Funding: \$63,082. [CDE]

"Merging Hyperspectral Imagery and Multi-Scale Modeling for Laser Lethality." Sponsor: HELJTO. Funding: \$158,024 – Perram 80%, Marciniak 20%. [CDE]

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PETROSKY, JAMES C.,

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SPONSOR FUNDED RESEARCH PROJECTS

"Nuclear Survivability Experimentation, Modeling, and Data Verification (Continuation)." Sponsor: AFNWC. Funding: \$200,000 – Petrosky 35%, McClory 25%, Reeder 25%, Rutledge 15%.

"Radiation Effects on GaN devices." Sponsor: AFRL/RX. Funding: \$30,000.

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SPONSOR FUNDED RESEARCH PROJECTS

"AFRL-AFIT MOA Partnership Agreement #1." Sponsor: AFOSR. Funding: \$376,907.

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Sean S. Kohles, Anum Barki, Kimberly D. Kendricks, and Ronald F. Tuttle, Biomechanical Analysis of Pack Load Influences on Gait Signatures Derived From Gröbner Basis Theory, Journal of Forensic Biomechanics, 2014, 5:1, 14 Oct 2014

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SPONSOR FUNDED RESEARCH PROJECTS

"Excited State Potential Energy Surfaces of He+Ar*." Sponsor: AFOSR. Funding: \$33,870.

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WOLF, PAUL J.,

Professor of Physics, Department of Engineering Physics, AFIT Appointment Date: 1994 (AFIT/ENP), and Associate Dean for Academic Affairs, Graduate School of Engineering and Management (AFIT/EN); BS, Regis College, 1978; MS, Air Force Institute of Technology, 1979; PhD, Air Force Institute of Technology, 1985. Dr. Wolf serves as the Associate Dean for Academic Affairs responsible for administrative leadership for all academic matters in the Graduate School and serves as AFIT's accreditation liaison to the Higher Learning Commission and ABET. Dr. Wolf's current scholarly interests include emergent behaviors of complex systems, foundations of quantum mechanics, and existential threat analyses. Dr. Wolf has made experimental contributions to atomic/molecular spectroscopy, reactive and non-reactive collision kinetics, laser-based thin film deposition processes, ionospheric and atmospheric chemistry, and environmental monitoring. Prior to joining the AFIT faculty in 1994, Dr. Wolf served as Director/Principal Investigator of the Materials Physics Division at the F.J. Seiler Research Laboratory (USAF, CO), Assistant Professor of Physics in the Physics Department at the U.S. Air Force Academy, and Research Director for Impulse Laser Effects at the Defense Nuclear Agency. He has published over 20 papers. Tel. 937-255- 0452, email: Paul.Wolf@afit.edu

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SPONSOR FUNDED RESEARCH PROJECTS

“Optical and Electrical Characterization of Direct Bandgap GeSn and GeSiSn Semiconductors and Devices.”
Sponsor: AFOSR. Funding: \$57,500.

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5.4.1. DOCTORAL DISSERTATIONS

KNIGHT, EMILY A., *Modeling Radiation Effectiveness for Inactivation of Bacillus Spores*. AFIT/ENC/DS/15S-001. Faculty Advisor: Dr. William P. Baker. Sponsor: DTRA.

SEYMOUR, RICHARD S., *Testing the Adequacy of a Semi-Markov Process*. AFIT/ENC/DS/15S-003. Faculty Advisor: Dr. Christine M. Schubert Kabban. Sponsor: N/A.

5.4.2. MASTER'S THESES

ARQUETTE, DAVID M., *Symmetry Groups for Linear Programming Relaxations of Orthogonal Array Problems*. AFIT/ENC/MS/15M-003. Faculty Advisor: Dr. Dursun A. Bulutoglu. Sponsor: AFOSR.

BROWN, GREGORY E., *Accuracy of Time Phasing Aircraft Development Using the Continuous Distribution Function*. AFIT/ENC/MS/15M-173. Faculty Advisor: Dr. Edward D. White. Sponsor: AFLCMC.

HERON, REY A., *Forecasting DOD Mid-Acquisition Space Program Final Costs Using WBS Level 2 and 3 Data*. AFIT/ENC/MS/15M-179. Faculty Advisor: Dr. Edward D. White. Sponsor: SAF/AFCAA.

LEWIS, MEGAN E., *Recent Advances in Compressed Sensing: Discrete Uncertainty Principles and Fast Hyperspectral Imaging*. AFIT/ENC/MS/15M-002. Faculty Advisor: Maj Dustin G. Mixon. Sponsor: NSF.

SMITH, NATHAN C., *Examining the Return on Investment of Test and Evaluation*. AFIT/ENC/MS/15M-183. Faculty Advisor: Dr. Edward D. White. Sponsor: OSD. [ANT]

5.4.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AKERS, BENJAMIN F.,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2011 (AFIT/ENC); BS, Pennsylvania State University, 2003; MA, University of Wisconsin - Madison, 2005; PhD, University of Wisconsin - Madison, 2008. Dr. Akers' research interests include nonlinear waves, applied mathematics, fluid mechanics, and numerical analysis. Dr. Akers' current research considers the stability and existence of traveling water waves as well as the fluid flows induced by high energy lasers. Tel. 937-255-3636 x4522, email: Benjamin.Akers@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Overturned Traveling Waves." Sponsor: Simon Foundation. Funding: \$14,000.

REFEREED JOURNAL PUBLICATIONS

Akers, B., "Modulational Instabilities of Periodic Traveling Waves in Deep Water," *Physica D.*, Vol. 300, Apr 2015, pp 26-33.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Akers, B., "Numerical Continuation Methods," ENC Colloquium. Air Force Institute of Technology, 5 Dec 2014.

Akers, B., "The Steepest Traveling Waves," Department Seminar. Ursinus College, 27 Jan 2015.

Akers, B., "The Steepest Traveling Waves," Applied Math Seminar. University of Illinois-Chicago, 23 Feb 2015.

Akers, B., "Resonant Interaction Theory," AFIT/ENC Brown Bag, Air Force Institute of Technology, 11 Jun 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board: Journal of Shipping and Ocean Engineering, 2014-2015.

BAKER, WILLIAM P.,

Associate Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1986 (AFIT/ENC); BA, University of California at Irvine, 1969; MA, University of California at Irvine, 1970; PhD, Northwestern University, 1987. Dr. Baker's research interests include asymptotic and perturbation methods, wave propagation and scattering theory, applied mathematics, functional analysis, low observables, and numerical analysis. Dr. Baker's current research is in thermal dynamics of high speed wear, vibrational dynamics of thermally loaded materials, and dynamics and control of satellite structures. Dr. Baker is a Master Navigator with prior military assignments in flight test, satellite communications, cruise missile, and radar analysis. Tel. 937-255-3636 x4517, email: William.Baker@afit.edu

BENNETT, BENJAMIN F., Maj,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, USAF Academy, 2000; MBA, University of New Mexico, 2003; MA, University of New Mexico, 2003; PhD, Arizona State University, 2014. Maj Bennett's research interests are in the area of empirical corporate finance, specifically corporate governance, board structure, executive compensation, and incentives. Tel. 937-255-3636 x4669, email: Benjamin.Bennett3@afit.edu

BULUTOGLU, DURSUN A.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland at College Park, 1996; PhD, University of California, Berkeley, 2001. Dr. Bulutoglu's research interests include design of experiments and combinatorial problems in statistics. His papers are on finding GMA (generalized minimum aberration) factorial designs by enumerating all non-isomorphic orthogonal arrays. The tools he uses for enumerating orthogonal arrays are integer programming, constraint programming, and isomorphism rejection. Tel. 937-255-3636 x4704, email: Dursun.Bulutoglu@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Improving Exact Algorithms for Finding Efficient Designs and Test Suites for Test and Evaluation."

Sponsor: AFOSR. Funding: \$44,708.

REFEREED JOURNAL PUBLICATIONS

Gutman, A.J., Bulutoglu, D.A., and White, E.D., "Supersaturated Designs With the Maximum Number of Factors for a Given Resolution-Rank," *Journal of Statistical Theory and Practice* **2** (2015), 419-435.

Geyer, A.J., Bulutoglu, D.A., and Rosenberg, S.J., The LP relaxation orthogonal array polytope and its permutation Symmetries, *Journal of Combinatorial Mathematics and Combinatorial Computing* **91** (2014), 165-176.

Bulutoglu, D.A. and Ryan, K.J., "Algorithms for finding generalized minimum aberration designs," *Journal of Complexity* **31** (2015), 577-589.

FICKUS, MATTHEW C.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2004 (AFIT/ENC); BS, University of Maryland, Baltimore County, 1995; MS, University of Maryland, Baltimore County, 1997; PhD, University of Maryland, College Park, 2001. Dr. Fickus' research interests include applied harmonic analysis, frame theory, and compressed sensing. Tel. 937-255-3636 x4513, email: Matthew.Fickus@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"ATD: Frame-Theoretic Algorithms for Smart Sensing." Sponsor: NSF. Funding: \$64,309 – Fickus 50%, Mixon 50%.

REFEREED JOURNAL PUBLICATIONS

Fickus, M., Mixon, D.G., Lewis, M., and Peterson, J., "Compressive hyperspectral imaging for stellar spectroscopy," *IEEE Signal Process. Lett.* **22** (2015) 1829-1833.

Fickus, M., Jasper, J., Mixon, D.G., and Peterson, J., "Group-theoretic constructions of erasure-robust frames," *Linear Algebra Appl.* **479** (2015) 131-154.

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Fickus, M. and Mixon, D.G., "Projection retrieval: theory and algorithms," *Proc. Sampl. Theory Appl.* (2015) 183-186.

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Fickus, M. and Watson, C.E., “Detailing the equivalence between real equiangular tight frames and certain strongly regular graphs,” Proc. SPIE 9597 (2015) 959719/1-10.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fickus, M., “A new approach for constructing equiangular tight frames,” SPIE Optics & Photonics, Wavelets and Sparsity XVI, San Diego, CA, 12 Aug 2015.

Fickus, M., “An introduction to finite frames,” Workshop on “Frames and Algebraic & Combinatorial Geometry,” University of Bremen, Bremen, Germany, 28 Jul 2015.

Fickus, M., “Some new real equiangular tight frames,” 11th International Conference on Sampling Theory and Applications, Washington DC, 27 May 2015.

Fickus, M., “Some new constructions of equiangular tight frames,” AMS Special Session on “Frames and Their Applications” at the 2015 Joint Mathematics Meetings, San Antonio, TX, 10 Jan 2015.

GEYER, ANDREW J., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, North Dakota State University, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2014. Lt Col Geyer’s research interests include design of experiments, combinatorial optimization problems in statistics, statistical performance metrics, and statistical classification techniques. The tools he uses are integer programming, constraint programming, graph isomorphism rejection, and multivariate statistical analysis. Lt Col Geyer has served as a weather officer in F-16, AH-64, OH-58D, and CH-47 flying units as well in units supporting US Army and Special Operations ground forces. Tel. 937-255-3636 x4584, email: Andrew.Geyer@afit.edu

REFEREED JOURNAL PUBLICATIONS

Haac, B., Varela, C., Geyer, A., Cairns, B., and Charles, A., “The Utility of the Kampala Trauma Score as a Triage Tool in a Sub-Saharan African Trauma Cohort.” *World Journal of Surgery*, 39.2 (2015): 356-362.

Geyer, A., Dursun, J., Bulutoglu, A., and Rosenberg, S.J., “The LP Relaxation Orthogonal Array Polytope and its Permutation Symmetries.” *Journal of Combinatorial Mathematics and Combinatorial Computing*, Vol. 91, pp. 165-176, Nov 2014.

KAPPEDAL, RYAN D., Lt Col,

Assistant Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2014 (AFIT/ENC); BS, United States Air Force Academy, 1999; MS, Air Force Institute of Technology, 2008; PhD, University of Washington, 2014. Lt Col Kappedal was a visiting fellow at the University of Chicago’s Data Science for Social Good Fellowship summer of 2015. His research interests include Machine Learning, Big Data, Statistical Genetics, Neuroscience (MRI imaging), and Compressed Sensing. He has served as an intelligence officer at various levels and deployed twice in support of Operation Iraqi Freedom. Tel. 937-255-3636 x4630, email: Ryan.Kappedal@afit.edu.

REFEREED JOURNAL PUBLICATIONS

Cruz, I., Kappedal, A., Mackenzie, R.D., S. M., Hailey, D. W., Hoffman, T. L., Schilling T. F., and Raible, D. W., “Robust regeneration of adult zebrafish lateral line hair cells reflects continued precursor pool maintenance,” *Developmental Biology*, Vol. 402, Issue 2, 15 Jun 2015, Pages 229–238.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Santerre, J.W., Boisvert, S., Davis, J.J., Kappedal, R.D., Xia, F., and Stevens, R. (2015) Antimicrobial Resistance Detection with Random Forests.

Santerre, J.W., Davis, J.J., Kappedal, R.D., Xia, F., and Stevens, R. (2015) Integrating Antimicrobial Resistance Classification and Feature Selection on an Online Bioinformatics Platform.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Referee: *Journal of Electronic Imaging*, 2014-2015.

LAIR, ALAN V.,

Professor of Mathematics and Head, Department of Mathematics and Statistics, AFIT Appointment Date: 1982 (AFIT/ENC); BA, North Texas State University, 1970; MS, Texas Tech University, 1972; PhD, Texas Tech University, 1976. Dr. Lair's research interests include parabolic and elliptic partial differential equations, functional analysis, applied mathematics, and nonlinear diffusion. He has published several papers on the properties of solutions of various nonlinear partial differential equations. Tel. 937-255-3636 x4519, email: Alan.Lair@afit.edu

REFEREED JOURNAL PUBLICATIONS

Lair, A.V. and Mohammed, A., "Large solutions to semi-linear elliptic systems with variable exponents," *Journal of Mathematical Analysis and Applications*, 420 (Dec 2014), 1478-1499.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board, International Scholarly Research Notices.

MCBEE, BRIAN K., Lt Col,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2011 (AFIT/ENC); BS, Brigham Young University, 1992; MS, University of Colorado, Colorado Springs, 1998; MS, The Ohio State University, 2004; MS, Virginia Polytechnic and State University, 2011; PhD, Virginia Polytechnic and State University, 2011. Lt Col McBee's primary research interests include numerical partial differential equations and control as applied to fluid dynamics, numerical methods with emphasis on finite elements, geodetic science, and applications of mathematics in intelligence gathering. He has served as an intelligence officer providing RC-135 support and reporting, near-real-time space and missile events analysis, foreign counter-space capabilities assessments, battlestaff-level modeling and simulation exercise support, and national-agency-level training and education oversight for Title X training, as well as Advanced Geospatial Intelligence (AGI) and synthetic aperture radar (SAR) exploitation. Tel. 937-255-3636 x4635, email: Brian.McBee@afit.edu

MIXON, DUSTIN G., Maj,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2012 (AFIT/ENC); BS, Central Washington University, 2004; MS, Air Force Institute of Technology, 2006; MA, Princeton University, 2010; PhD, Princeton University, 2012. Maj Mixon's research interests include applied harmonic analysis, frame theory, compressed sensing, signal processing, and mathematical data science. He has served as an Air Force analytical scientist for three years modeling biological responses to radiofrequency radiation. Tel. 937-255-3636 x4516, email: Dustin.Mixon@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Sampling Strategies for Smarter Sensing." Sponsor: AFOSR. Funding: \$38,150.

"Sampling Theory for Modern Inverse Problems." Sponsor: AFOSR. Funding: \$115,322.

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- Fickus, M., Jasper, J., Mixon, D.G., and Peterson, J., “Group-theoretic constructions of erasure-robust frames,” *Linear Algebra and its Applications*, 479 (2015) 131-154.
- Fickus, M., Lewis, M.E., Mixon, D.G., and Peterson, J., “Compressive hyperspectral imaging for stellar spectroscopy,” *IEEE Signal Processing Letters* 22 (2015) 1829-1833.
- Eldar, Y.C., Sidorenko, P., Mixon, D.G., Barel, and Cohen, O., “Sparse phase retrieval from short-time Fourier measurements,” *IEEE Signal Processing Letters* 22 (2015) 638-642.

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- Mixon, D.G., “Phase transitions in phase retrieval.” *Excursions in Harmonic Analysis, Volume 4: The Feb Fourier Talks at the Norbert Wiener Center*, R. Balan, M. Begue, J. J. Benedetto, W. Czaja, K. A. Okoudjou eds., Birkhauser, pp. 123-148, 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

- Mixon, D.G., Fickus, M., Peterson, J., and Jasper, J., Steiner equiangular tight frames redux, *Proc. Sampl. Theory Appl.* (2015) 347-351.
- Mixon, D.G., and Fickus, M., Projection retrieval: Theory and algorithms, *Proc. Sampl. Theory Appl.* (2015) 183-186.
- Mixon, D.G., “Recent advances in mathematical data science,” Mathematisches Forschungsinstitut Oberwolfach Workshop: Applied Harmonic Analysis and Sparse Approximation, Oberwolfach, Germany, 18 Aug 2015.
- Mixon, D.G., “Recent advances in mathematical data science,” SPIE Optics and Photonics, Wavelets and Sparsity XVI, San Diego, CA, 10 Aug 2015.
- Mixon, D.G., “Four open problems in frame theory,” *Frames and Algebraic & Combinatorial Geometry*, University of Bremen, Bremen, Germany, 29 Jul 2015.
- Mixon, D.G., “Projection retrieval: Theory and algorithms,” *Sampling Theory and Applications (SampTA)*, American University, Washington D.C., 26 May 2015.
- Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, University of California, San Diego, San Diego, CA, 14 Jan 2015.
- Mixon, D.G., “Compressive classification and the rare eclipse problem,” Joint Mathematics Meetings, Special Session on Frames and their Applications, San Antonio, TX, Jan 11, 2015.
- Mixon, D.G., “Unit norm tight frames in finite-dimensional spaces,” AMS Short Course on Finite Frame Theory: A Complete Introduction to Overcompleteness, San Antonio, TX, 8 Jan 2015.
- Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, Texas A&M, College Station, TX.
- Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, Colorado State University, Fort Collins, CO, 22 Dec 2014.
- Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, University of California, Davis, Davis, CA, 18 Dec 2014.

Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, Ohio State University, Columbus, OH, 15 Dec 2014.

Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” Department of Mathematics Colloquium, Michigan State University, East Lansing, MI, 11 Dec 2014.

Mixon, D.G., “Phase retrieval: Approaching the theoretical limits in practice,” School of Mathematics Colloquium, University of Minnesota, Minneapolis, MN, 4 Dec 2014.

Mixon, D.G., “Frame theory: Applications and open problems,” Sparse Representations, Numerical Linear Algebra, and Optimization Workshop, Banff International Research Station (BIRS), Banff, AL, 6 Oct 2014.

OXLEY, MARK E.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1987 (AFIT/ENC); Researcher, Sensor Fusion Laboratory, Center for Operational Analysis (COA); Researcher, Center for Autonomy and Navigation Technology (ANT); and Researcher, Center for Technical Intelligence Studies and Research (CTISR). BS, Cumberland College, 1978 (Renamed to University of the Cumberland’s in 2005); MS, Purdue University, 1980; PhD, North Carolina State University, 1987. Dr. Oxley’s research interests include partial differential equations, free and moving boundary value problems, finite-time extinction problems, functional analysis, optimization, artificial neural networks, wavelet analysis, classifier fusion, information fusion and evaluation of fusion techniques, receiver operating characteristic (ROC) curves, and ROC manifolds. Tel. 937-255-3636 x4515, email: Mark.Oxley@afit.edu

REFEREED JOURNAL PUBLICATIONS

Klimack, W. K., Kloeber, J.M., Bauer, K.W., and Oxley, M.E., “An Empirical Examination of Multiple Objective Risk Attitudes,” *Decision Analysis* Vol. 12, iss 2, (2015), pp 96-103, Jun 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Fitch, J. A., Oxley, M.E., and Schubert Kabban, C.M., “Optimal Fusion Rules for Label Fusion of Dependent Classification Systems,” 18th International Conference on Information Fusion, pp. 605-612, Washington DC, 6-9 Jul 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

M.R., Peterson, G.L., Oxley, M.E., Dube, T.E., and Rogers, S.K., “QuEST for malware type-classification,” *Proc. SPIE 9458, Cyber Sensing 2015*, paper 945807, 14 May 2015.

Fitch, J. A., Oxley, M.E., and Schubert Kabban, C.M., “Optimal Fusion Rules for Label Fusion of Independent Classification Systems,” *Proc. SPIE 9474, Signal Processing, Sensor/Information Fusion, and Target Recognition XXIV*, paper 94740T, 21 May 2015.

Oxley, M. E., “A Mathematical View of Signature Discovery for Classification Systems,” Joint Mathematical Meetings, Special Session on Signature Discovery, 10 Jan 2015, San Antonio TX (invited talk).

PETERSON, JESSE D., Capt,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2013 (AFIT/ENC); BS, South Dakota State University, 2006; MS, Air Force Institute of Technology, 2008; PhD, University of Missouri – Columbia, 2013. Capt Peterson’s research interests include applied harmonic analysis and frame theory. He has served as an Air Force analytical scientist operationally testing and evaluating A-10C, F-16, F-15C, F-15E, and F-22 aircraft. Tel. 937-255-3636 x4619, email: Jesse.Peterson@afit.edu

REFEREED JOURNAL PUBLICATIONS

Fickus, M., Lewis, M.E., Mixon, D.G., and Peterson, J., "Compressive hyperspectral imaging for stellar spectroscopy," *IEEE Signal Processing Letters* 22, (2015) 1829-1833.

Fickus, M., Jasper, J., Mixon, D.G., and Peterson, J., "Group-theoretic constructions of erasure-robust frames," *Linear Algebra and its Applications*, 479, (2015) 131-154.

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OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Mixon, D. G., and Peterson, J., "Learning Boolean functions with concentrated spectra," *Proceedings of SPIE* 9597, (2015).

Fickus, M., Jasper, J., Mixon, D.G., and Peterson, J., "Quasi-symmetric designs and equiangular tight frames," *Proceedings of SPIE* 9597, (2015).

QUINN, DENNIS W.,

Professor Emeritus of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); BA, Mathematics, University of Delaware, 1969; MS, Applied Mathematics, University of Delaware, 1971; PhD, Applied Mathematics, University of Delaware, 1973. Dr. Quinn's fields of expertise include numerical methods, finite elements, finite differences, integral equation methods, numerical analysis, functional analysis, system identification, and applied mathematics. Dr. Quinn has advised several MS students in modeling toxic chemical exposure. Dr. Quinn has published papers dealing with integral and finite element solutions of acoustic problems, using the telegrapher's equation to model lightning, using the method of characteristics in cancer risk assessment, using the diffusion equation to model diffusion through the skin in pharmacokinetic modeling, and using the boundary element method for moving boundary problems.

REEGER, JONAH A., Capt,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2013 (AFIT/ENC); BS, Mathematical Sciences, United States Air Force Academy, 2007; MA, Computational and Applied Mathematics, Rice University, 2009; PhD, Applied Mathematics, The University of Colorado Boulder, 2013. Capt Reeger's primary research interests include Taylor series and Padé approximation methods, multi-step methods, optimization and optimal control, radial basis functions, pseudospectral methods, and the Painlevé equations. He has served as an Air Force analytical scientist on the acquisition of an experimental infrared satellite. Tel. 937-255-3636 x3320, email: Jonah.Reeger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Ghrist, M., Fornberg, B., and Reeger, J.A., "Stability ordinates of Adams predictor-corrector methods," *BIT Numerical Mathematics*, 55(3):733-750, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Humphreys, C.J., Cobb, R.G., Kauffman, K., and Reeger, J.A., "Optimal Mission Path for the Uninhabited Loyal Wingman," *The 16th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Aviation Forum* 2015. Dallas, TX. 22-26 Jun 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Reeger, J.A. and Fornberg, B., "Numerical Quadrature over the Surface of a Sphere," *Colloquium, Department of Mathematical Sciences, University of Cincinnati, Cincinnati, OH*, 23 Sep 2015.

Reeger, J.A., and Fornberg, B., “Explorations of the Solution Space of the Fourth Painlevé Equation,” The 13th International Symposium on Orthogonal Polynomials, Special Functions, and Applications. The National Institute for Standards and Technology, Gaithersburg, MD, 1-5 Jun 2015.

Reeger, J.A., and Fornberg, B., “Explorations of the Solution Space of the Fourth Painlevé Equation,” The 9th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, University of Georgia, Athens, GA, 1-4 Apr 2015.

Reeger, J.A., and Fornberg, B., “On Solving Initial Value Problems in the Presence of Poles: Solutions of the Fourth Painlevé Equation with No Closed Form,” Colloquium, Department of Mathematics and Statistics, Air Force Institute of Technology, Wright-Patterson AFB, OH, 12 Feb 2015.

REYNOLDS, DANIEL E.,

Assistant Professor Emeritus of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1974 (AFIT/ENC); AB, University of Rochester, 1965; MS, Air Force Institute of Technology, 1971; MS, Wright State University, 1983. Professor Reynolds’ research interests include management cybernetics, learning theory, and exploring ways computer graphics can support statistical and mathematical education. In 1989, Professor Reynolds received Tau Beta Phi’s Outstanding Professor Award.

SCHUBERT KABBAN, CHRISTINE M.,

Associate Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 2010 (AFIT/ENC); BA, University of Dayton, 1992; MBA, Wright State University, 1994; MS, Wright State University, 1995; PhD, Air Force Institute of Technology, 2005. Dr. Schubert Kabban’s research interests include classification techniques, diagnostic testing, ROC curve theory and extensions, information fusion, modeling and prediction, regression and regression extensions, survey design and analysis, and general biostatistics. Dr. Schubert Kabban’s current research is in evaluating the performance of classification systems and information-fused systems via ROC methodology, sequential strategies for classification, structural health monitoring of airframes, as well as epidemiological applications to disease prediction and medical diagnostics. Tel. 937-255-3636 x4549, email: Christine.SchubertKabban@afit.edu

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Schubert, C.M. and Guennel, T., “Comparing performance of multi-class classification systems with ROC manifolds: when volume and correct classification fails,” *Communications in Statistics: Simulation and Computation* 44(3): 719-738, 2015.

Hoopes, D.J., Johnstone, P.A., Chapin, P.S., Schubert C.M., Lee, W.R., Chen, A.B., Fraass, B.A., Skinner, W.J.K., and Marks, L.B., “Practice Patterns for Peer Review in Radiation Oncology,” *Practical Radiation Oncology* 5(1): 32-38, 2015. DOI: 10.1016/j.pro.2014.04.004.

DeNeve, A., Ryan, E.T., Ritschel, J.D., and Schubert Kabban, C., “Taming the Hurricane of Acquisition Cost Growth—Or At Least Predicting It,” *Defense Acquisition Research Journal* 22(1): 84-105, 2015.

Pepperl, A.A., Rooney, M.B., Parker, A., Burk, R.S., Kabban, C.M., Wetzel, P.A., and Grap, M.J., “Effect of Alertness Level and Backrest Elevation on Skin Interface Pressure,” *Wounds: A Compendium of Clinical Research and Practice* 26(12): 334-341, 2014. PMID: 25785776.

Barker, S.B., Knisely, J.S., Schubert, C.M., Green, J.D., and Ameringer, S., “The Effect of an Animal-Assisted Intervention on Anxiety and Pain in Hospitalized Children,” *Anthrozoös* 28(1): 101-112, 2015.

Patel, H., Schubert Kabban, C., Baldwin, R., and Montminy, D., “Statistical analysis and comparison of linear regression attacks on the advanced encryption standard,” *International Journal of Information and Communication Technology* (IJICT) 7(2-3): 159-184, 2015.

Schubert Kabban, C.M., Greenwell, B.M., DeSimio, M.P., and Derriso, M.M., “The Probability of Detection for SHM Systems: Repeated Measures Data,” *Structural Health Monitoring* 14(3): 252-264, 2015. DOI: 10.1177/1475921714566530.

Herr, J.K., Salyer, J., Flattery, M., Lyon, D.E., Goodloe, L., Schubert, C.M., and Clement, D.G., “Heart Failure Symptom Clusters and Functional Status – A Cross Sectional Study,” *Journal of Advanced Nursing* 71(6): 1274-1287. DOI: 10.1111/jan.12596.

Wolf, E.G., Baugh, L.M., Schubert Kabban, C.M., Richards, M.F., and Prye, J., “Cognitive Function in a Traumatic Brain Injury Hyperbaric Oxygen Randomized Trial,” *Undersea and Hyperbaric Medicine* 42(4): 313-332, 2015.

Grap, M.J., Burk, R.S., Lucas, V., Munro, C.L., Wetzel, P.A., and Schubert, C.M., “Use of high frequency ultrasound to detect changes in skin integrity: an image evaluation validation procedure,” *Intensive and Critical Care Nursing* 31(3): 141-147, 2015. DOI: <http://dx.doi.org/10.1016/j.iccn.2014.08.002>.

Ahmed, A.E., McClish, D.K., Schubert, C.M., and AL-Jahdali, H.H., “Believe the Extreme (BE) Strategy at the Optimal Point: What Strategy will it become?” *Austin Biom and Biostat* 2(3): 1022, 2015.

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Fitch, J., Oxley, M.E., and Schubert Kabban, C.M., “Optimal Fusion Rules for Multi-label Fusion of Independent Classification System Families,” Processing of the SPIE Defense and Security Symposium: Signal Processing, Sensor/Information Fusion, and Target Recognition XXIV, 9474OT (Baltimore, MD, 21 May 2015); doi:10.1117/12.2178883; <http://dx.doi.org/doi:10.1117/12.2178883>.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Schubert Kabban, C.M., “Using Classification Trees to Optimize the Performance of Sequential Tests,” Wright State University Department of Mathematics and Statistics Colloquium. 27 Feb 2015.

Schubert Kabban, C.M., Performance Evaluation and Validation in Structural Health Monitoring Systems, AFOSR 2015 Multiscale Structural Mechanics Annual Grantees Meeting. Fort Walton Beach, FL, 13-17 Jul 2015.

Schubert Kabban, C.M., Optimizing Accuracy of a Sequence of Tests: How Do We Determine the Order of the Tests, Joint Statistical Meeting 2015. Seattle, WA, 8-13 Aug 2015.

Schubert Kabban, C.M., Inverse Estimation for Damage Assessment in SHM: Moving Beyond the Probability of Detection, 10th International Workshop of Structural Health Monitoring. Stanford, CA, 1-3 Sep 2015.

SEYMOUR, RICHARD S., Lt Col,

Assistant Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 2015 (AFIT/ENC); BS, US Air Force Academy, 2000; MS, Air Force Institute of Technology, 2009; PhD, Air Force Institute of Technology, 2015. Lt Col Seymour's research interests include stochastic process model acceptance techniques and parameter estimation problems. Lt Col Seymour's current research

considers the adequacy of a semi-Markov process with respect to the observed data used to fit the process.
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SRITHARAN, SIVAGURU S.,

Provost & Vice Chancellor, AFIT Appointment Date: 2015 (AFIT/CL). BSc (Hons.) University of Sri Lanka (1977); MS, University of Washington, (1979); Ph.D., University of Arizona. Dr. Sritharan's research includes control theory, stochastic analysis, functional analysis, and numerical analysis of aerodynamics at all range of Mach numbers and electromagnetics. Dr. Sritharan's current research focuses on mathematical and computational issues relevant to hypersonics, directed energy weapons and autonomy.
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SPONSOR FUNDED RESEARCH PROJECTS

"Stochastic Analysis and Control of Compressible Flow with General Levy Noise." Sponsor: ARO. Funding: \$99,500.

REFEREED JOURNAL PUBLICATIONS

"Stochastic Navier-Stokes Equations in Unbounded Channel Domains," Co-authors Manil Mohen and Utpal Manna, *Journal of Mathematical Fluid Mechanics*, Mar 2015, Vol. 17, Issue 1, pp 47-86.

"Non-Detection Probability of Diffusing Targets in the Presence of a Moving Searcher," co-author B. Fernando, *Communications on Stochastic Analysis*, Vol. 8, No. 2, (2014), pp. 191-203.

"Mild Solutions to Stochastic Navier-Stokes Equation with Jump Noise in L^p Spaces," Co-Authors B. Fernando and B. Rudiger, *Mathematische Nachrichten*, Vol. 288, Issue 14-15, pp. 1565–1800, (2015).

"Stochastic Quasilinear Partial Differential Equations of Evolution," Co-author B. Fernando, *Infinite Dimensional Analysis and Quantum Probability and Related Topics*, Vol. 18, Issue 03, Sep 2015.

"Inversion Methods for Laser Parameter Extraction with Phenomenological Model Based on Off-Axis Sensor Measurements," Co-authors Vaibhav Kukreja, Nathan Moshman and John De Grassie. *Inverse Problems in Science and Engineering*, Published on-line, Jun 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Communications on Stochastic Analysis

WHITE, EDWARD D., III,

Professor of Statistics, Department of Mathematics and Statistics, AFIT Appointment Date: 1998 (AFIT/ENC); BS, University of Tampa, 1990; MAS, Ohio State University, 1991; PhD, Texas A&M University, 1998. Dr. White's research interests include design of experiments, categorical data analysis, biostatistics, and model building. Tel. 937-255-3636 x4540 , email: Edward.White@afit.edu

REFEREED JOURNAL PUBLICATIONS

Bridgeforth, S., Ritschel, J.D., White, E., and Keaton, G., "Using Earned Value Data to Forecast the Duration of Department of Defense Space Acquisition Programs," *Journal of Cost Analysis and Parametrics* 8(2) (2015), 92–107.

B. Boehmke, Johnson, A., White, E., Weir, J., and Gallagher, M., "Bending the Cost Curve: Moving the Focus from Macro-level to Micro-level Cost Trends with Cluster Analysis," *Journal of Cost Analysis and Parametrics* 8(2) (2015), 126–148.

Petter, J.L., Ritschel, J.D., and White, E.D., "Stability Properties in Department of Defense Contracts: Answering the Controversy," *Journal of Public Procurement* 15(3) (2015), 341–364.

Dougherty, S., Simpson, J., Hill, R., Pignatiello, J., and White, E., “Nonlinear Screening Designs for Defense Testing: An Overview and Case Study,” *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology* 12(3) (2015), 335–342.

Dougherty, S., Simpson, J., Hill, R., Pignatiello, J., and White, E., “Effect of Heredity and Sparsity on Second-Order Screening Design Performance,” *Quality and Reliability Engineering International* 31 (2015), 355–368.

Gutman, A.J., Bulutoglu, D.A., and White, E.D., “Supersaturated Designs with the Maximum Number of Factors for a Given Resolution-Rank,” *Journal of Statistical Theory and Practice* 9(2) (2015), 419–435.

Dougherty, S., Simpson, J., Hill, R., Pignatiello, J., and White, E., “Augmentation of Definitive Screening Designs (DSD+),” *International Journal of Experimental Design and Process Optimisation* 4(2) (2014), 91–115.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Maupin, G.M., Tvaryanas, A.P., White, E.D., and Lysfjord, H.J., Risk Factors for Incident Post-Deployment Mental Health Conditions Among United States Air Force Medical Service Personnel, Military Health System Research Symposium, Ft. Lauderdale, FL, 17-20 Aug 2015.

Boehmke, B., Johnson, A., White, E., Weir, J., and Gallagher, M., A Multilevel Understanding of Tooth-to-Tail, Industrial and Systems Engineering Research Conference, 65th IIE Annual Conference and Expo, Nashville, TN, 30 May -2 Jun 2015.

Rusnock, C.F and White, E.D., III, Predicting Cost Growth for Military and Civil Space Systems, Industrial and Systems Engineering Research Conference, 65th IIE Annual Conference and Expo, Nashville, TN, 30 May -2 Jun 2015. Recognition: Engineering Economy Track Best.

WOOD, AIHUA W.,

Professor of Mathematics, Department of Mathematics and Statistics, AFIT Appointment Date: 1994 (AFIT/ENC); BS, Beijing University, 1984; MS, University of Connecticut, 1988; PhD, University of Connecticut, 1990. Dr. Wood's research interests include partial differential equations, electromagnetic wave propagation, and Boltzmann equations. Tel. 937-255-3636 x4272, email: Aihua.Wood@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Distributional Monte Carlo Methods for Rarefied Gas Dynamics.” Sponsor: AFOSR. Funding: \$46,477.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Launching Equity in the Academy across the Dayton Entrepreneurial Region (LEADER).” Sponsor: NSF. Funding: \$30,004.

REFEREED JOURNAL PUBLICATIONS

Li, P, L. Wang, and A. Wood, “Analysis of Transient Electromagnetic Scattering from Three Dimensional Cavities,” *SIAM J. Appl. Math.* Vol. 75, No. 4, pp.1675-1699 (2015).

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Wood, A. W., “Topics on EM scattering from cavities,” Beijing University of Science and Technology, Beijing, China, Dec 2014.

Wood, A.W., “Addressing Unconscious Bias,” AFRL Women’s groups WPAFB and Kirtland AFB (via VTC) and leadership, WPAFB, OH, 30 Mar 2015.

Wood, A.W., "A Distributional Monte Carlo Method for the Boltzmann Equation," Math Colloq, Illinois Institute of Technology, Chicago, 27 Apr 2015.

Wood, A.W., "A Distributional Monte Carlo Method for the Boltzmann Equation," Math Brown Bag Seminar, AFIT, 14 May 2015.

Wood, A.W., "A Distributional Monte Carlo Method for the Boltzmann Equation," AFOSR Computational Math Program Review, Arlington, VA, 5 Aug 2015.

Wood, A.W., "Transient EM Scattering from Multiple Cavities," ICEEA 2015, Torino, Italy, 7 Sep 2015.

5.5. DEPARTMENT OF OPERATIONAL SCIENCES

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5.5.1. DOCTORAL DISSERTATIONS

BOEHMKE, BRADLEY C., *Grabbing the Air Force by the Tail: Applying Strategic Cost Analytics to Understand and Manage Indirect Cost Behavior*. AFIT/ENS/DS/15S-076. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC & HQ USAF/A4. [COA]

CHALYVIDIS, CHRISTOS E., *Supply Chain Interoperability Measurement*. AFIT/ENS/DS/15J-001. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: N/A.

GEHRET, GREGORY H., *Advancing Cost-Effective Readiness by Improving the Supply Chain Management of Sparse, Intermittently-Demanded Parts*. AFIT/ENS/DS/15M-256. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AFSC.

KALLEMYN, BENJAMIN S., *Modeling Network Interdiction Tasks*. AFIT/ENS/DS/15S-032. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

KRESTER, MICHAEL P., *Building Enterprise Transition Plans through the Development of Collapsing Design Structure Matrices*. AFIT/ENS/DS/15S-033. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AFMC.

PACIENCIA, TODD J., *Improving Non-Linear Approaches to Anomaly Detection, Class Separation, and Visualization*. AFIT/ENS/DS/14D-015. Faculty Advisor: Dr. Kenneth W. Bauer, Jr. Sponsor: 711 HPW/RH.

PARSON, CARL R., *Approximate Dynamic Programming for Military Resource Allocation*. AFIT/ENS/DS/14D-016. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AFRL/RW. [COA]

SMALENBERGER, DAVID M., *On Pecuniary Resiliency, Early Warning, and Market Imitation under Unrestricted Warfare*. AFIT/ENS/DS/15S-034. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

5.5.2. MASTER'S THESES

ACAR, MUSTAFA, *Optimization of Turkish Air Force SAR Units' Forward Deployment Points for a Central Based SAR Force Structure*. AFIT/ENS/MS/15M-148. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: TuAF.

ADORNO, WILLIAM, III, *Autonomous Experimentation of Carbon Nanotubes Using Response Surface Methods*. AFIT/ENS/MS/15M-113. Faculty Advisor: Maj Brian B. Stone. Sponsor: AFRL/RX.

ALSHEHRI, ALI A., *Evaluating Opportunities for Improved Processes and Flow Rates in Royal Saudi Air Force F-15 Reparable Items Supply Chain*. AFIT/ENS/MS/15S-031. Faculty Advisors: Dr. Kenneth L. Schultz. Sponsor: AFLCMC.

BOEKESTEIN, BENJAMIN C., *A Predictive Logistic Regression Model of World Conflict Using Open Source Data*. AFIT/ENS/MS/15M-112. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA. [COA]

BURNS, AARON J., *Assessing GPS Constellation Resiliency in an Urban Canyon Environment*. AFIT/ENS/MS/15M-138. Faculty Advisor: Dr. John O. Miller. Sponsor: SMC.

CONNORS, CASEY D., *Agent-Based Modeling Methodology for Analyzing Weapons Systems*. AFIT/ENS/MS/15M-132. Faculty Advisor: Dr. John O. Miller. Sponsor: Lockheed Martin.

- COOPER, ANDREW L., *Antecedents to Organizational Performance: Theoretical and Practical Implications for Aircraft Maintenance Officer Force Development*. AFIT/ENS/MS/15M-129. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: HQ USAF/A4.
- CRAIG, ROBERT R., *The Military Theater Distribution Network Design Problem*. AFIT/ENS/MS/15M-137. Faculty Advisor: LTC Brian J. Lunday. Sponsor: TRADOC.
- D'AGOSTINO, JUSTIN P., *Forecasting Fuels Support Equipment Requisitions*. AFIT/ENS/MS/15M-134. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AFPA.
- DOS SANTOS, LUCIANO A., *The Brazilian Air Force Uniform Distribution Process: Using Lean Thinking, Statistical Process Control and Theory of Constraints to Address Improvement Opportunities*. AFIT/ENS/MS/15M-151. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: Brazilian Armed Forces.
- FORBES, JACOB A., *Restoration and Humanitarian Aid Delivery on Interdependent Transportation and Communication Networks after an Extreme Event*. AFIT/ENS/MS/15M-142. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: N/A.
- FURMAN, THOMAS S., *An Application of Social Network Analysis on Military Strategy, System Networks and the Phases of War*. AFIT/ENS/MS/15M-117. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: USSOCOM.
- GASKI, PAUL T., *Characterizing and Classifying Acoustical Ambient Sound Profiles*. AFIT/ENS/MS/15M-122. Faculty Advisor: Dr. Raymond R. Hill. Sponsors: 711 HPW/RH.
- GILLESPIE, MITCHELL N., *Modeling Attitude Variance in Small Unmanned Aerial Systems for Acoustic Signature Simplification Using Experimental Design in a Hardware-in-the-Loop Simulation*. AFIT/ENS/MS/15M-110. Faculty Advisor: Maj Brian B. Stone. Sponsor: N/A.
- GRATSCH, JOSHUA M., *Analytical Development of the Availability KPP as Applied to Air Force Acquisition Programs*. AFIT/ENS/MS/15S-077. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: N/A.
- HAN, CHAN Y., *A Game Theoretic Model for the Optimal Disposition of Integrated Air Defense System Assets*. AFIT/ENS/MS/15M-123. Faculty Advisor: Lt Col Matthew J. D. Robbins. Sponsor: N/A.
- HERGENRETER, CHRISTOPHER A., *Determining the Most Vital Arcs within a Multi-Mode Communication Network Using Set-Based Measures*. AFIT/ENS/MS/15M-131. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: N/A.
- HERNANDEZ, SANTIAGO, *An Optimization of the Maintenance Assets Distribution Network in the Argentine Air Force*. AFIT/ENS/MS/15M-152. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: Argentine Air Force Materiel General Directorate.
- HILL, RAYMOND J., *Multivariate Indicators of Terrorism Vulnerability in Africa*. AFIT/ENS/MS/15M-125. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: N/A.
- HOECHERL, JOSEPH C., *Approximate Dynamic Programming Algorithms for United States Air Force Officer Sustainment*. AFIT/ENS/MS/15M-126. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: HQ USAF/A1.
- HUGHES, HENRY W., *A Cost-Benefit Analysis of Intercontinental Ballistic Missile Spare Parts Inventory Management*. AFIT/ENS/MS/15M-130. Faculty Advisor: Dr. William A. Cunningham. Sponsor: USSTRATCOM/91 MXG.

ISOM, JOSHUA M., *Overcoming Hurdles Implementing Multi-Skilling Policies*. AFIT/ENS/MS/15M-124. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC/A4.

JOHNSTONE, CHANCELLOR A.J., *A Risk Based Approach to Node Insertion within Social Networks*. AFIT/ENS/MS/15M-136. Faculty Advisor: Maj Jennifer L. Geffre. Sponsor: NASIC.

KAZI, KIPTA, *Addressing Enterprise-Level Information System Deficiencies*. AFIT/ENS/MS/15M-111. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC/A4. [COA]

KRIEVS, DANIEL A., *Integrating Agile Combat Support within Title 10 Wargames*. AFIT/ENS/MS/15M-127. Faculty Advisor: Dr. John O. Miller. Sponsor: AFMC/A4.

MARIOTTI, MICHAEL P., *C-5M Fuel Efficiency through MFOQA Data Analysis*. AFIT/ENS/MS/15M-116. Faculty Advisor: Dr. Jeffery D. Weir. Sponsor: AMC/A9.

MAYO, BENJAMIN R., *Suitability Analysis of Continuous-Use Reliability Growth Projection Models*. AFIT/ENS/MS/15M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: DASD(DT&E). [COA]

MCKENNA, REBEKAH S., *Using Approximate Dynamic Programming to Solve the Military Inventory Routing Problem with Direct Delivery*. AFIT/ENS/MS/15M-140. Faculty Advisor: Dr. Matthew J.D. Robbins. Sponsor: TRADOC.

MORRIS, JESSICA P., *An Application of Multi-Criteria Shortest Path to a Customizable Hex-Map Environment*. AFIT/ENS/MS/15M-118. Faculty Advisor: Dr. James W. Chrissis. Sponsor: AFLCMC.

NYSTROM, JARED K., *A Dynamic Game on Network Topology for Counterinsurgency Applications*. AFIT/ENS/MS/15M-144. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: USSOCOM.

PAINTER, JEFFREY T., *Cascading Effects of Fuel Network Interdiction*. AFIT/ENS/MS/15M-145. Faculty Advisor: Dr. Richard F. Deckro. Sponsor: N/A.

PAUL, NICHOLAS R., *Optimizing the Domestic Chemical, Biological, Radiological, and Nuclear Response Enterprise*. AFIT/ENS/MS/15M-143. Faculty Advisor: LTC Brian L. Lunday. Sponsor: N/A.

RETTKE, AARON J., *An Approximate Dynamic Programming Mode for Optimal MEDEVAC Dispatching*. AFIT/ENS/MS/15M-115. Faculty Advisor: Lt Col Matthew J.D. Robbins. Sponsor: N/A.

SCANLAND, DAVID S., *Value Focused Thinking Applications to Supervised Pattern Classification with Extensions to Hyperspectral Anomaly Detection Algorithms*. AFIT/ENS/MS/15M-121. Faculty Advisor: Dr. Kenneth W. Bauer. Sponsor: N/A.

SCHOFIELD, JILL A., *Non-Rated Air Force Line Officer Attrition Rates Using Survival Analysis*. AFIT/ENS/MS/15M-128. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: HQ USAF/A1.

SCHUMACHER, MICHAEL J., *Active Duty C-17 Aircraft Commander Fuel Efficiency Metrics and Goal Evaluation*. AFIT/ENS/MS/15M-119. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: AMC/A3.

SMITH, BLAKE, *An Inventory and Safety Stock Analysis of Air Force Medical Service Pharmaceuticals*. AFIT/ENS/MS/15M-133. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFMOA. [ANT]

THOMAS, MATTHEW G., *Statistical Observations of Positioning, Navigation, and Timing in a Combat Simulation*. AFIT/ENS/MS/15M-114. Faculty Advisor: Dr. John O. Miller. Sponsor: SMC.

WIDRICK, REBECCA S., *Optimal Policies for the Management of a Plug-In Hybrid Electric Vehicle Swap Station*. AFIT/ENS/MS/15M-135. Faculty Advisor: Dr. Sarah G. Nurre. Sponsor: LANL.

WILLIAMS, JEFFREY, *Acoustic Model Evaluation and Improvement*. AFIT/ENS/MS/15M-139. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD. [ANT]

YOUNG, JONATHAN D., *Development of a Finite State Machine for a Small Unmanned Aircraft System Using Experimental Design*. AFIT/ENS/MS/15M-146. Faculty Advisor: Maj Brian B. Stone. Sponsor: AFRL/RQ.

5.5.3. GRADUATE RESEARCH PAPERS

BEAL, JOSEPH D., *Quantifying C-17 Aircrew Training Priorities*. AFIT/ENS/GRP/15J-021. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AMC. [COA]

BOWMAN, TRACI L., *Global Container Management Process Improvements*. AFIT/ENS/GRP/15J-020. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SDDC. [COA]

BOWYER, BRAD P., *Consolidating AMC's Contingency Response Capabilities: A Delphi Study*. AFIT/ENS/GRP/15J-026. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: USAF EC. [COA]

CLINTON, KYLE M., *Rethinking C-17 Training Requirements: Air Refueling*. AFIT/ENS/GRP/15J-025. Faculty Advisor: Dr. Alan L. Johnson. Sponsor: 62 OG. [COA]

EHMEN, JOSHUA W., *Altering Flight Schedules for Increased Fuel Efficiency*. AFIT/ENS/GRP/15J-016. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: AMC. [COA]

FREEMAN, RAHSUL J., *Mitigating the Erratic Behavior of the Transportation Working Capital Fund through Accurate Forecasting*. AFIT/ENS/GRP/15J-028. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC. [COA]

HUSTED, ALLEN D., *Identifying Knowledge, Skill, and Ability Requirements for Contracting Officer Representatives in Deployed Environments*. AFIT/ENS/GRP/15J-012. Faculty Advisor: Lt Col Christian E. Randall. Sponsor: JCS/J4. [COA]

KELLER, CHRISTOPHER J., *Analysis of Pacific Enroute Structure in Support of C-5M "Super Galaxy"*. AFIT/ENS/GRP/15J-011. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: 60 AMW/OG. [COA]

LAMOTHE, KRISTINA L., *Measuring the Effectiveness of Active Associate TFI Units*. AFIT/ENS/GRP/15J-022. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AMC. [COA]

MACDONALD, CHRISTOPHER R., *Next Generation Tanker: Optimizing Air Refueling Capabilities with a Divested KC-10 Fleet*. AFIT/ENS/GRP/15J-019. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC. [COA]

MOLLISON, ANTHONY R., *Fighting Through a Logistics Cyber Attack*. AFIT/ENS/GRP/15J-027. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AMC. [COA]

PARSONS, KEVIN L., *Leveraging Global Communications Capabilities in the 618 AOC*. AFIT/ENS/GRP/15J-013. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: 618 AOC. [COA]

POSEY, FAITH K., *Enterprise Sustainment Metrics*. AFIT/ENS/GRP/15J-018. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4. [COA]

UHLAND, CHRISTOPHER D., *Optimizing the Weapons Officer in the Mobility Air Forces*.

AFIT/ENS/GRP/15J-023. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: 618 AOC. [COA]

WYFFELS, REBECCA A., *C-21 Fleet: Base Optimization*. AFIT/ENS/GRP/15J-024. Faculty Advisor:

Dr. Darryl K. Ahner. Sponsor: 375 AMW/OG. [COA]

5.5.4. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliations are listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AHNER, DARRYL K.,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date 2010 (AFIT/ENS); Director, Scientific Test and Analysis (STAT) for Test and Evaluation (T&E) Center of Excellence, Appointment Date 2012; BS, Mechanical Engineering, United States Military Academy, 1990; MS, Applied Mathematics, Rensselaer Polytechnic Institute, 1999; MS, Operations Research & Statistics, Rensselaer Polytechnic Institute, 1999; PhD, Systems Engineering, Boston University, 2005. Dr. Ahner's research interests include dynamic programming applications, queueing applications, mathematical control theory and model predictive control of complex systems, missile defense, combat modeling algorithm development, and models for supply chain management. Dr. Ahner is a licensed Professional Engineer in the Commonwealth of Virginia. Dr. Ahner is Vice President-Professional Development, Military Operations Research Society. Tel 937-255-6565 x4708, email: Darryl.Ahner@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"A System of Equations to Capture SSTRO Dynamics." Sponsor: CAA. Funding: \$145,000. [COA]

"AFIT Partnership for Modeling and Simulation." Sponsor: AFMC/A4. Funding: \$125,000 – Ahner 25%, Miller 25%, Ogden 25%, Weir 25%. [COA]

"Methods of Determining Best Mix Options for Directed and Kinetic Energy Weapons." Sponsor: AFRL/RW. Funding: \$100,000. [COA]

"Test and Evaluation Center of Excellence." Sponsor: DASD. Funding: \$1,586,000 – Ahner 75%, Hill 25%. [COA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"COE-S 310 Experimental Design and Analysis I." Sponsor: Navy. Funding: \$13,000.

"SOT 310-Foundations for Design of Experiments Short Course." Sponsor: USMC. Funding: \$12,500.

REFEREED JOURNAL PUBLICATIONS

Ahner, D.K., and Parson, C., "Optimal Multi-stage Allocation of Weapons to Targets Using Adaptive Dynamic Programming," *Optimization Letters*, published online Nov 2014. [COA]

McGuire, R.M., Deckro, R.F., and Ahner, D.K., "The Weighted Key Player Problem for Social Network Analysis," *Military Operational Research Society Journal*, Feb 2015.

Pelmets, R., Hill, R., Ahner, D., and Russell, B., "Capturing Uncertainty in Fatigue Life Data," *International Journal of Reliability and Safety*, Mar 2015. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Hill, R.R., Ahner, D.K., Agree, M.J., "Using Simulation to Examine Live-Fire Test Configurations," *Proceedings of the 2014 Winter Simulation Conference*, ed. A. Talk, S.T. Diallo, I.O. Richey, L. Yilmaz, S. Buckley and J. Miller. IEEE, Piscataway, NJ. X 2311-2318.

Ahner, D. and Parson, C., "Approximate Dynamic Programming for the Dynamic Weapon Target Assignment Problem," *Annual INFORMS Meeting*, 9-12 Nov 2014. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ahner, D. K., "Demand Signal for Test & Evaluation Education and Training," Special Keynote, 31st Annual International Test and Evaluation symposium, Arlington, VA, Oct 2014. [COA]

BAUER, KENNETH W.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, PhD, Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1996 (AFIT/ENS); Director, Sensor Fusion Laboratory; BS, Miami University (Ohio), 1976; MEA, University of Utah, 1980; MS, Air Force Institute of Technology, 1981; PhD, Purdue University, 1987. Dr. Bauer's research interests include pattern recognition, applied multivariate statistics, and statistical aspects of neural networks; all are usually within the specific application area of automatic target recognition and more recently hyper-spectral imaging processing. Tel. 937-255-6565 x4328, email: Kenneth.Bauer@afit.edu

REFEREED JOURNAL PUBLICATIONS

Jablonski, J. A., Bihl, T. J., Bauer, K. W., (2015), "Principal Component Reconstruction Error for Hyperspectral Anomaly Detection," IEEE Transactions on Geoscience and Remote Sensing Letters, 12(8), pp. 1725-1729.

Klimack, W.K., Kloeber, J.M., Jr., Bauer, K.W., Oxley, M.E., (2015), "An Empirical Examination of Multiple Objective Risk Attitudes, Decision Analysis," (Published online in Articles in Advance 17 Apr 2015), <http://dx.doi.org/10.1287/deca.2015.0312>.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Paciencia, T. and Bauer, K.W., "Toward Consistent & Efficient Target Detection in HIS," 83rd MORS Symposium, Alexandria VA, 22-25 Jun 2015.

Paciencia, T. J., Bihl, T. J., and Bauer, K. W., (2014), "Optimizing Hyper-Radial Values to Create Intuitive n-Dimensional Visualizations," MAA Ohio Chapter Meeting, Wittenberg University, Springfield, OH.

CHRISSIS, JAMES W.,

Associate Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1987 (AFIT/ENS); BS, University of Pittsburgh, 1975; MS, Virginia Polytechnic Institute and State University, 1977; PhD, Virginia Polytechnic Institute and State University, 1980. Dr. Chrissis' research interests include mathematical programming, optimization, engineering design optimization, simulation-driven optimization, and integer modeling. Dr. Chrissis has been a member of the faculties of Virginia Tech and the University of South Florida. He is a member of the Institute for Operations Research and Management Sciences (INFORMS), the Military Operations Research Society (MORS), The American Institute for Aeronautics and Astronautics (AIAA), and Sigma Xi. Tel. 937-255-3636 x4606, email: James.Chrissis@afit.edu

CUNNINGHAM, WILLIAM A.,

Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, MS in Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); BS, Business Administration, Missouri Southern State College, 1976; MS, Economics, Oklahoma State University, 1979; PhD, Economics, University of Arkansas, 1986. Dr. Cunningham's research interests include strategic mobility, cost/benefit analysis, econometric modeling, costing, privatization and A-76 studies, modal choice, network analysis, location analysis, supply chain management, and RFID. Tel. (937) 255-6565 x4283, email: William.Cunningham@afit.edu

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Review Board, Journal of Transportation Management.

DECKRO, RICHARD F.,

Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 1994 (AFIT/ENS); Director, Future Operations Investigation Laboratory, BSIE, State University of New York at Buffalo, 1972; MBA & DBA, Decision Sciences, Kent State University, 1976. Dr. Deckro's research, teaching, and consultation interests include the areas of information operations and information assurance, reconstruction and stabilization, measures of effectiveness and assessment, behavioral modeling including social network analysis, counter insurgency and irregular warfare, applied mathematical programming and optimization, project and program management, modeling and analysis, space applications, campaign modeling, technology selection and management, scheduling, network models, advanced manufacturing methods, multi-criteria decision making, and decision analysis. Dr. Deckro is the editor of *Military Operations Research* and a Fellow of the Military Operations Research Society. Tel. 937-255-6565 x4325, email: Richard.Deckro@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"JWAC AFIT Interaction (COA)." Sponsor: JWAC. Funding: \$150,000 – Deckro 40%, Ahner 40%, Sambora 10%, Jennings 10%. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Capt Smalenberger, D.M., Deckro, R.F., and LTC Lunday, B., "Modeling Complex System Behavior Using the SIGMA Distribution and IAF Framework," Military Operations Research Society Symposium 83, Alexandria, VA, Jun 2015.

Maj Kallemyn, B.S., Deckro, R.F., LTC Lunday, B., and Lt Col Robbins, M., "Leveraging All Shortest Paths Information for Rapid Social Network Analysis," Military Operations Research Society Symposium 83, Alexandria, VA, Jun 2015.

Capt Smalenberger, D.M. and Deckro, R.F., "Utilizing Wargaming in Restricted Warfare: Benefits and Limits," INFORMS, San Francisco, CA, Nov 2014.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editor, Military Operations Research.

DOUGLAS, MATTHEW A., Lt Col,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2014 (AFIT/ENS); BS, Mathematics, Angelo State University, 1996; MS, Logistics Management, Air Force Institute of Technology, 2003; PhD, Marketing, University of North Texas, 2009. Lt Col Douglas's research interests include logistics/operations safety, diffusion of innovation, and ethics and decision-making. Tel. 937-255-3636 x4740, email: Matthew.Douglas@afit.edu

REFEREED JOURNAL PUBLICATIONS

Douglas, M.A. and Swartz, S.M., (2015), "Knights of the road: Safety, ethics, and the professional truck driver," Online at *Journal of Business Ethics*, 10 Jul 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Douglas, M. A., Overstreet, R. E., and Hazen, B. T., (2015, Sep), "Art of the possible: A case study of large-scale supply chain management innovation," Presented at the 2015 Council of Supply Chain Management Professionals Educators' Conference, San Diego, CA.

HAZEN, BENJAMIN T., Capt,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT
Appointment Date: 2015 (AFIT/ENS); BS, Business Administration, Colorado Christian University, 2004;
MA, Organizational Leadership, Gonzaga University, 2006; MBA, California State University, 2007; PhD,
Management, Auburn University, 2012. Capt Hazen's research interests include closed loop supply chains,
reverse logistics, remanufacturing, sustainability, innovation, and supply chain management/information
systems interface. Tel. 937-255-3636 x4337, email: Benjamin.Hazen@afit.edu

REFEREED JOURNAL PUBLICATIONS

Hazen, B. T., Overstreet, R. E., and Boone, C. A., "Suggested reporting guidelines for structural equation modeling in supply chain management research," *International Journal of Logistics Management*, Vol. 26, No. 3. (2015)

Hazen, B. T., Overstreet, R. E., Hall, D. J., Huscroft, J. R., and Hanna, J. B., "Antecedents to and outcomes of reverse logistics metrics," *Industrial Marketing Management*, Vol. 46, pp. 160-170. (2015).

Hazen, B. T. and Sankar, C., "Cross-border process innovations: Improving the fit between information processing needs and capabilities," *International Journal of Innovation and Technology Management*, Vol. 12, No. 3. (2015).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Boone, C. A., Skipper, J. B., Hazen, B. T., and Johnstone, D., (2015), "Supply chain flexibility through resource orchestration: An empirical assessment of lateral transshipment strategies," Peer-reviewed paper presented at Southeast Decision Sciences Institute Annual Meeting, Savannah, GA, 25-27 Feb 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Interim Editor-in-Chief, *International Journal of Logistics Management*.

Member of Editorial Advisory Board, *International Journal of Physical Distribution & Logistics Management*.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Ezell, J. D., Hazen, B. T., Hall, D. J., & Jones-Farmer, L. A., "Enhancing data and decision quality with statistical process control," *The Best Thinking in Business Analytics from the Decision Sciences Institute*. M. Warkentin (editor), Upper Saddle River, NJ: Pearson. (2015).

HILL, RAYMOND R., Jr.,

Professor of Operations Research, Department of Operational Sciences; Program Chair, Graduate Test and Evaluation Certificate, Department of Operational Sciences, AFIT Appointment Dates: 1997 (AFIT/ENS); BS, Mathematics, Eastern Connecticut State University, 1983; MS, Operations Research, Air Force Institute of Technology, 1988; PhD, Industrial and Systems Engineering, The Ohio State University, 1996. Dr. Hill's research interests include applied statistics, in particular the application of design of experiments methodologies to test and evaluation; mathematical optimization, in particular the use of heuristic search methods for addressing particularly hard problems; and applied simulation modeling and analysis with particular interests in the area of agent-based modeling and the validation of such models.
Tel. 937-255-6565 x7469, email: Raymond.Hill@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Application Development for Optimizing Patient Placement on the C-17 Airframe." Sponsor: 711 HPW.
Funding: \$75,000. [COA]

“The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise.”
Sponsor: OSD TRMC. Funding: \$400,000 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%. [COA]

REFEREED JOURNAL PUBLICATIONS

Russell, B. D., Hill, R. R., Ahner, D. K. and Penmettsa, R., Mar 2015, “Capturing Uncertainty in Fatigue Life Data,” *International Journal of Reliability and Safety* (IJRS-94197). [COA]

McNabb, M. E., Weir, J. D., Hill, R. R., and Hall, S. A., Nov 2014, “Testing Local Search Move Operators on the Vehicle Routing Problem with Split Deliveries and Time Windows,” *Computers and Operations Research*, Vol. 56, 93-109. DOI: 10.1016/j.cor.2014.11.07.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Craig, R., Lunday, B. and Hill, R., Jun 2015, “The Military Theater Distribution Network Design Problem,” Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

Gaski, P., Hill, R. and Stone, B., Jun 2015, “Characterizing and Classifying Acoustical Ambient Sound Profiles Abstract,” Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

Hill, R. R., Ahner, D., and Garee, M. J. “Using Simulation to Examine Live-Fire Test Configurations,” Proceedings of the 2014 Winter Simulation Conference, ed. A. Tolk, S. T. Diallo, I. O. Ryzhoy, L. Yilmaz, S. Buckley and J. Miller. IEEE, Piscataway, NJ. X 2311-2318.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Craig, R., Lunday, B. and Hill, R., Jun 2015, “The Military Theater Distribution Network Design Problem,” 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

Gaski, P., Hill, R. and Stone, B., Jun 2015, “Characterizing and Classifying Acoustical Ambient Sound Profiles Abstract,” 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

Young, J., Stone, B. and Hill, R., Jun 2015, “Development of a Finite State Machine for a Small Unmanned Aircraft System Using Experimental Design,” 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

Gutman, A., Hill, R., Moulder, R., Stafford, T. and Bush, K., May 2015, “A Simulation Experiment to Improve the F100-229 Product Support Operation,” 2015 Spring Research Conference, Cincinnati, OH.

Hill, R. R. and M. J. Garee., May 2015, “Fragment Capture Simulation for Missile Blast Test Optimization,” 2015 Spring Research Conference, Cincinnati, OH.

Lunday, B.J., Nurre, S.G., Kannon, T.E., and Hill, R.R., “The Aircraft Routing with Refueling,” 2014 INFORMS Annual Conference, San Francisco, CA, Nov 2014.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Military Operations Research.

Associate Editor, Journal of Defense Modeling and Simulation.

Associate Editor, Journal of Simulation.

Associate Editor, Information Age Warfare Quarterly.

Associate Editor, International Journal of Mathematics in Operations Research.

Associate Editor, Naval Research Logistics.

HUSCROFT, JOSEPH R., Lt Col,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Deputy Department Head of Operational Sciences; AFIT Appointment date: 2012 (AFIT/ENS); BS, Behavioral Science, United States Air Force Academy, 1994; Master of Public Administration, Troy State University, 2002; MS, Logistics Management, Air Force Institute of Technology, 2004; PhD, Management, Auburn University, 2010. Lt Col Huscroft's research interests include supply chain management, reverse logistics, reverse logistics metrics, innovation and flexibility in the supply chain, operations management, information systems impact on the supply chain, and transportation and distribution. Tel. 937-255-3636 x 4533, e-mail: Joseph.Huscroft@afit.edu

REFEREED JOURNAL PUBLICATIONS

Hazen, B. T., Overstreet, R. E., Hall, D. J., Huscroft, J. R., & Hanna, J. B. (2015), "Antecedents to and outcomes of reverse logistics metrics," *Industrial Marketing Management*, Vol. 46, pp. 160-170, Apr 2015.

JOHNSON, ALAN W.,

Associate Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, PhD, Logistics, Department of Operational Sciences, AFIT Appointment Date: 2004 (AFIT/ENS); BS, Mechanical Engineering, Montana State University, 1982; MS, Systems Management, Air Force Institute of Technology, 1989; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute and State University, 1996. Dr. Johnson's research interests include space logistics, strategic mobility, discrete-event simulation, logistics management, reliability and maintainability, and discrete optimization and heuristics. Tel. 937-255-3636 x4703, email: Alan.Johnson@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center (Research)." Sponsor: AFMC. Funding: \$350,000. [COA]

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center (Research)." Sponsor: AFMC. Funding: \$90,000. [COA]

REFEREED JOURNAL PUBLICATIONS

Kiyamaz, E., Johnson, A., and Cunningham, W., "Fuel Efficiency Assessment with DEA," *Journal of Defense Modeling and Simulation*, 12(1): 57-66. 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Boehmke, B., Johnson, A., White, A. Weir, J., and Gallagher, M., "A Multilevel Understanding of Tooth-to-Tail," Proceedings of the IIE Industrial and Systems Engineering Research Conference, Nashville, TN, 30 May -2 Jun 2015. [COA]

Jensen, J., Johnson, A., and Ogden, J., "KC-46 Workforce Requirements for Depot Maintenance Activation," Proceedings of the April, 2015 Western Decision Sciences Institute Conference, Maui, HI.

Schwenn, K., Colombi, J., Wu, T., Oyama, K. and Johnson, A. "Toward Agent-Based Modeling of the U.S. Department of Defense Acquisition System," Conference on Systems Engineering Research Hoboken, NJ, Mar 2015.

Sheppard, W., Johnson, A., and Miller, J., “Simulating F-22 Heavy Maintenance and Modifications Workforce Multi-Skilling,” Proceedings of the 2014 Winter Simulation Conference, Savannah, GA, 7-10 Dec 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Boehmke, B., White, E., Weir, J., and Gallagher, M., “The Influence of Front-Line Activities on Enterprise-Wide Indirect Costs: A Multi-Level Modeling Approach,” 83rd MORS Symposium, Alexandria, VA, 22-25 Jun 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, International Journal of Operations Research and Information Systems (IJORIS).

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Boehmke, B., Johnson, A., Weir, J., White, E., and Gallagher, M., “SCM Data Science: A Focus on Strategic Cost Analytics Across the Value Chain.”

KRETSER, MICHAEL P., Capt,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2015 (AFIT/ENS); BS, Computer Science, Limestone College, 2005; MS, Logistics and Supply Chain Management, Air Force Institute of Technology, 2008; PhD, Logistics, Air Force Institute of Technology, 2015. Capt Kretser’s research interests include logistics networks, systems engineering techniques: system-of-systems, design structure matrices and network clustering, social networks, Lean, and business process reengineering. Tel. 937-255-3636 x4728; email: Michael.Kretser@afit.edu

LUNDAY, BRIAN J., LTC,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2013 (AFIT/ENS); BS, Mechanical Engineering, U.S. Military Academy, West Point, 1992; MS, Industrial Engineering, University of Arizona, 2001; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute, 2010. LTC Lunday’s theoretical research interests include math programming, game theoretic models, and algorithmic design for global optimization, whereas his application research interests include network design, network interdiction, network restoration, facility location, and resource allocation/assignment. Tel. 937-255-3636 x4624, email: Brian.Lunday@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Research Support for the Military Theater Distribution Network Design Problem.” Sponsor: NPS. Funding: \$5,650. [COA]

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Craig, R. R., Lunday, B. J., Hill, R. R., & Nesbitt, P. A., (2015), “The Military Theater Distribution Network Design Problem,” Proceedings of the Industrial and Systems Engineering Research Conference (ISERC).

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Kallemyn, B. S., Deckro, R. F., & Lunday, B. J., “Leveraging All Shortest Paths Information for Rapid Social Network Analysis,” Infrastructure Analysis, Protection and Recovery Working Group, 2015 Military Operations Research Society Symposium, Alexandria, VA.

Smalenberger, D. M., Deckro, R. F., & Lunday, B. J., “Considering Modeling Complex System Behavior Using the SIGMA Distribution and IAF Framework,” Modeling & Simulation Working Group, 2015 Military Operations Research Society Symposium, Alexandria, VA.

McKenna, R., Robbins, M.J., Lunday, B. J., & McCormack, I. M., “An Approximate Dynamic Programming Algorithm for the Military Inventory Routing Problem with Direct Delivery,” 2015 INFORMS Computing Society, Richmond, VA.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of Editorial Board, Military Operations Research.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

LTC Brian Lunday and Dr. Sarah Nurre, The Shortest Path Problem with Replenishment, Annual INFORMS Meeting, 9-12 Nov 2014.

LTC Brian Lunday, Dr. Sarah Nurre, Dr. Raymond Hill and Capt Tanya Kannon (HAF/A9) , The Aircraft Network Routing Problem with Aerial Refueling Requirements, Annual INFORMS Meeting, 9-12 Nov 2014.

MILLER, JOHN O.,

Associate Professor of Operations Research, Department of Operational Sciences; Program Chair, AFIT Appointment Date: 2002 (AFIT/ENS); Director, Combat Modeling Laboratory; BS, Biology, United States Air Force Academy, 1980; MBA, University of Missouri at Columbia, 1983; MS, Operations Research, Air Force Institute of Technology, 1987; PhD, Industrial Engineering, The Ohio State University, 1997. Dr. Miller’s research interests include computer simulation, ranking and selection, agent based modeling, combat modeling, network centric warfare, high performance computing, applied statistics, and nonparametric statistics. Tel. 937-255-6565 x4326, email: John.Miller@afit.edu

EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, International Journal of Operations Research.

NURRE, SARAH G.,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2013 (AFIT/ENS); BS, Mathematical Sciences, Rensselaer Polytechnic Institute, 2007; MEng, Industrial and Management Engineering, Rensselaer Polytechnic, 2011; PhD, Decision Sciences and Engineering Systems, Rensselaer Polytechnic Institute, 2013. Dr. Nurre’s research interests include network optimization, scheduling, integer programming, optimization algorithms, heuristics, and applied deterministic optimization.

BOOKS AND CHAPTERS IN BOOKS

Nurre, S.G., and Sharkey, T.C. “Increasing the Resiliency of Local Supply Chain Distribution Networks against Multiple Hazards.” *Supply Chain Management and Logistics: Innovative Strategies and Practical Solutions*. CRC Press, Taylor & Francis Group.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

LTC Brian Lunday and Dr. Sarah Nurre presented their research, The Shortest Path Problem with Replenishment, at the Annual INFORMS Meeting, 9-12 Nov 2014.

LTC Brian Lunday, Dr. Sarah Nurre, Dr. Raymond Hill and Capt Tanya Kannon (HAF/A9) presented their research, The Aircraft Network Routing Problem with Aerial Refueling Requirements at the Annual INFORMS Meeting, 9-12 Nov 2014.

OGDEN, JEFFERY A.,

Associate Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2006 (AFIT/ENS); BS, Accounting, Weber State University, 1998; MBA with emphasis in Supply Chain Management, Arizona State University, 2000; PhD, Business Administration with emphasis in Supply Chain Management, Arizona State University, 2003. Dr. Ogden’s research interests include supply

chain management, supply base reduction, ERP implementation, E-marketplaces, RFID, supply chain quality, purchasing strategies, buyer-supplier relationships, supply chain interoperability, supply chain services, and qualitative research methods. Tel. 937-255-3636 x4653, email: Jeffrey.Ogden@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Jensen, J., Ogden, J.A. and Johnson, A., “KC-46 Workforce Requirements for Depot Maintenance Activation,” Western Decision Sciences Institute Conference, Lahaina, HI, Mar 2015.

Hartman, P., Ogden, J.A. and Wirthlin, J.R., “Buyer Beware – Nearshoring, Reshoring and Insourcing: Moving Beyond the Total Cost of Ownership Discussion,” Western Decision Sciences Institute Conference, Lahaina, HI, Mar 2015.

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Associate Editor's Board, Supply Chain Forum: An International Journal.

Member of the Editorial Review Board, Journal of Business Logistics.

OVERSTREET, ROBERT E., Lt Col,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Division Chief, Logistics Division, Department of Operational Sciences, AFIT Appointment Date: 2012 (AFIT/ENS); BBA, General Business, Campbell University, 1998; MS, Logistics, Air Force Institute of Technology, 2002; PhD, Management, Auburn University, 2012. Lt Col Overstreet's research interests include leadership in the supply chain, organizational innovativeness, lean and agile logistics, transportation, and humanitarian logistics, continuous process improvement, and human capital. Tel. 937-255-3636 x4590, email: Robert.Overstreet@afit.edu

REFEREED JOURNAL PUBLICATIONS

Hazen, B. T., Overstreet, R. E., Hall, D. J., and Hanna, J. B., (2015), “Antecedents to and outcomes of reverse logistics metrics programs: A comparison of perspectives,” *Industrial Marketing Management*. 46, 160–170.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Douglas, M. A., Overstreet, R. E., Hazen, B. T., (2015), “Art of the possible: A case study of large-scale supply chain management innovation,” CSCMP Supply Chain Management Educators Conference, San Diego, CA.

PIGNATIELLO, JOSEPH J., Jr.,

Professor of Operations Research, Department of Operational Sciences; Head, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENV), 2011 (AFIT/ENS); BS, Mathematics, University of Massachusetts; MS, Industrial and Systems Engineering, The Ohio State University, 1979; PhD, Industrial and Systems Engineering, The Ohio State University, 1982. Dr. Pignatiello serves on the editorial review boards of Quality Engineering, IIE Transactions, and the International Journal of Lean Six Sigma. He is a Fellow of both the American Society for Quality and the Institute of Industrial Engineers. Tel. 937-255-3636 x4311, email: Joseph.Pignatiello@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Orndorff, Mark, Becvarik, Rachel, Chicken, Eric and Pignatiello, Joseph J., Jr., “Changepoint Detection in Nonstationary Density Estimation,” Proceedings of the Industrial and System Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Girimurugan, Senthil Balaji, Hillebrandt, Katheryn, Chicken, Eric and Pignatiello, Joseph J., Jr., “Nonparametric Detection of Profile Treatment Differences,” Proceedings of the Industrial and Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Geneus, Vladimir, Chicken, E., Cuevas, Jordan and Pignatiello, Joseph J., Jr., “Changepoint Detection for Profile Variance,” Proceedings of the Industrial and Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

“Change-point Detection for Profile Variance,” Industrial and Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

RANDALL, CHRISTIAN E., Maj,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, Master of Science in Logistics (ASAM) and Program Chair, Master of Science in Logistics (IDE), Department of Operational Sciences, AFIT Appointment date: 2012 (AFIT/ENS); BS, Business Administration, University of Phoenix, 1997; MS, Logistics Management, Air Force Institute of Technology, 2004; PhD, Business Administration (Logistics), The Ohio State University, 2013. Maj Randall’s research interests include social network impacts on supply chain management, resilience, and impacts of technology on logistics performance. Tel. 937-255-3636 x4337, email: Christian.Randall@afit.edu

REIMAN, ADAM D., Lt Col,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT Appointment Date: 2014 (AFIT/ENS); BS, Astronautical Engineering, US Air Force Academy, 1995; MBA, Military Management, Touro University International, 2006; MS, Logistics Management, Air Force Institute of Technology, 2009; PhD Logistics, Air Force Institute of Technology, 2014. Lt Col Reiman’s research interests include airlift metrics, routing, scheduling, and fuel efficiency; energy efficiency, supply and demand; value-focused thinking, and heuristic search algorithms. Tel. 937-255-3636 x6104, email: Adam.Reiman@afit.edu

ROBBINS, MATTHEW J., Lt Col,

Assistant Professor of Operations Research, Department of Operational Sciences; Division Chief, Operations Research Division, Department of Operational Sciences, AFIT Appointment Date: 2010 (AFIT/ENS); BS, Computer Systems Engineering, University of Arkansas, 1999; MS, Operations Research, Air Force Institute of Technology, 2005; PhD, Industrial Engineering, University of Illinois at Urbana-Champaign, 2010. Lt Col Robbins’ basic research interests include applied statistics, approximate dynamic programming, decision analysis, game theory, Markov decision processes, and simulation. His applied research interests involve problems related to defense, to include MEDEVAC dispatching, military inventory routing, and the control and disposition of integrated air defense system assets. Problems related to public health are also of interest, with a particular emphasis on vaccine economics. Tel. 937-255-3636 x4539, email: Matthew.Robbins@afit.edu

REFEREED JOURNAL PUBLICATIONS

Behzad, B., Jacobson, S.H., and Robbins, M.J., 2015, “A Symmetric Capacity-Constrained Differentiated Oligopoly Model for the United States Pediatric Vaccine Market with Linear Demand,” *IIE Transactions*.

Robbins, M.J. and Jacobson, S.H., 2015, “Analytics for Vaccine Economics and Pricing: Insights and Observations,” *Expert Review of Vaccines*, 14 (4), 605-616.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

McNabb, M.E., Weir, J.D., and Robbins, M.J., 2015, “Application of Techniques from the Vehicle Routing Problem with Split Deliveries and Time Windows to the Military Inventory Routing Problem with Multiple-Customer Routes,” Proceedings of the 44th Annual Meeting of the Western Decision Sciences Institute.

Dansereau, M.R., Colombi, J.M., Miller, M.E., and Robbins, M.J., 2015, "A Design Evaluation Framework for Helmet Mounted Displays in Fighter Aircraft," Proceedings of the Industrial and Systems Engineering Conference.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hoecherl, J.C., Robbins, M.J., Hill, R.R., and Ahner, D.K. "An Approximate Dynamic Programming Algorithm for United States Air Force Officer Sustainment," 83rd Military Operations Research Society Symposium, 22-25 Jun 2015, Alexandria, VA.

Dansereau, M.R., Colombi, J.M., Miller, M.E., and Robbins, M.J. "A Design Evaluation Framework for Helmet Mounted Displays in Fighter Aircraft," 2015 IIE Annual Conference (Industrial and Systems Engineering Conference), 30 May-2 Jun 2015, Nashville, TN.

McNabb, M.E., Weir, J.D., and Robbins, M.J. "Application of Techniques from the Vehicle Routing Problem with Split Deliveries and Time Windows to the Military Inventory Routing Problem with Multiple-Customer Routes," 44th Annual Meeting of the Western Decision Sciences Institute, Maui, HI, 31 Mar-3 Apr 2015.

McKenna, R.S., Robbins, M.J., McCormack, I.M., and Lunday, B.L. "An Approximate Dynamic Programming Algorithm for the Military Inventory Routing Problem with Direct Delivery," Air Force Institute of Technology, Department of Operational Sciences Seminar, WPAFB, OH, 10 Mar 2015.

Hoecherl, J.C., Robbins, M.J., and Hill, R.R. "An Approximate Dynamic Programming Algorithm for United States Air Force Officer Sustainment," 2015 INFORMS Computing Society Meeting, Richmond, VA, 11-13 Jan 2015.

McKenna, R.S., Robbins, M.J., McCormack, I.M., and Lunday, B.L. "An Approximate Dynamic Programming Algorithm for the Military Inventory Routing Problem with Direct Delivery," 2015 INFORMS Computing Society Meeting, Richmond, VA, 11-13 Jan 2015.

Widrick, R.S., Nurre, S.G., and Robbins, M.J., "Optimal Policies for the Management of a Plug-In Hybrid Electric Vehicle Swap Station," 2015 INFORMS Computing Society Meeting, Richmond, VA, 11-13 Jan 2015.

Keneally, S.K., Robbins, M.J., and Lunday, B.J., "A Markov Decision Process Model for the Optimal Dispatch of Military Medical Evacuation Assets," 2014 INFORMS National Meeting, San Francisco, CA, 9-12 Nov 2014.

Parson, C.R., Ahner, D.K., and Robbins, M.J., "Dynamic Weapon Targeting Problem," 2014 INFORMS National Meeting, San Francisco, CA, 9-12 Nov 2014. [COA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, Military Operations Research.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Lt Col J.D. Robbins, LTC Brian Lunday and MAJ Sean Keneally presented their research, A Markov Decision Process Model for the Optimal Dispatch of Military Medical Evacuation Assets at the Annual INFORMS Meeting, 9-12 Nov 2014.

SCHULTZ, KENNETH L.,

Associate Professor of Logistics and Supply Chain Management, Department of Operational Sciences, AFIT
Appointment Date: 2011 (AFIT/ENS); BS, Economics, University of Pennsylvania, 1980; PhD, Operations Management, Cornell University, 1997. Dr. Schultz's research interests include improving operations

management models by including the consideration of behavior issues, including motivation and peer pressure, in production systems and process flows. Tel. 937-255-3636 x4725, email: Kenneth.Schultz@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Dr. Schultz presented his research, The Influence of Load on Service Times, at Iowa State University (Nov 2014).

Dr. Ken Schultz (AFIT/ENS) with Drs. Mahammad Delasay, Armann Ingolfsson, and Bora Kolfal of the University of Alberta presented their research, A General Framework for the Influence of Load on Service Time, at the Annual INFORMS Meeting, 9-12 Nov 2015.

Dr. Ken Schultz with Drs. Reidar Hagtvedt and Sarah Forgie of the University of Alberta presented their research, Further Empirical Evidence for Hand-Hygiene as a Habitual Citizenship Behavior at the Annual INFORMS Meeting, 9-12 Nov 2015.

STONE, BRIAN B., Maj,

Assistant Professor of Operations Research, Department of Operational Sciences, AFIT Appointment Date: 2013 (AFIT/ENS); BS, Mathematics, Truman State University, 1999; MS, Operations Research, Air Force Institute of Technology, 2008; PhD, Industrial Engineering, Arizona State University, 2013. Maj Stone's research interests include design of experiments, response surface methodology, statistical quality control, and regression analysis. He is a member of the Institute for Operations Research and Management Science (INFORMS), the Military Operations Research Society (MORS), and the American Society for Quality (ASQ). Tel. 937-255-3636 x4510, email: Brian.Stone@afit.edu

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Wade, David F., Rusnock, Christina F., Oyama, Kyle F., and Stone, Brian B., "Influence of Continuity-of-Care on Cost and Availability in Military Healthcare," Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN, 2 Jun 2015.

Gaski, P., Hill, Raymond R., and Stone, Brian B., "Characterizing and Classifying Acoustical Ambient Sound Profiles," Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN, 31 May 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Young, Jonathan D., Stone, Brian B., and Hill, Raymond R., "Development and Testing of State Machine Logic for SUAS Navigation," 2015 Industrial and Systems Engineering Research Conference, Nashville, TN, 31 May 2015.

Adorno, William, Stone, Brian B., Hill, Raymond R., "Autonomous Experimentation of Carbon Nanotube Growth Using Response Surface Methods," 2015 Spring Research Conference, Cincinnati, OH, 21 May 2015.

Stone, Brian B., Montgomery, Douglas C., Silvestrini, Rachel T., Jones, Bradley, "No-confounding Designs of 20 and 24 Runs - Alternatives to Resolution IV Screening Designs," 2014 Fall Technical Conference, Richmond, VA, 3 Oct 2014.

STRAKOS, JOSHUA K., Lt Col,

Assistant Professor of Logistics and Supply Chain Management, Department of Operational Sciences; Program Chair, Graduate Supply Chain Management Certificate, Department of Operational Sciences, AFIT Appointment Date: 2013 (AFIT/ENS); BS, Occupational Education (Human Services), Wayland Baptist University, 1999; MBA, Business Administration (Petroleum Management), University of Kansas, 2006; PhD, Operations Management, University of Houston, 2013. Maj Strakos' research interests include government and non-government related energy topics, disaster relief supply chain management, and

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WEIR, JEFFERY D.,

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SPONSOR FUNDED RESEARCH PROJECTS

"JDPAC and AFIT Distribution Research Proposal (LOC)." Sponsor: USTRANSCOM. Funding: \$95,000. [COA]

"Research, Analysis and Transitional Support to the Simulation and Analysis Facility (SIMAF)." Sponsor: AFLCMC. Funding: \$150,000 – Weir 75%, Chrissis 25%. [COA]

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McNabb, M, Weir, J D, Hill, R R, Hall, S N, "Testing Local Search Move Operators on the Vehicle Routing Problem with Split Deliveries and Time Windows," *Computers and Operations Research*, Vol. 56, pp. 93-109, 2015.

Weir, J.D., Gutman, A., and Hendrix, J., "The Triage Method: Screening Alternatives over Time with Multiobjective Decision Analysis," *International Journal of Multicriteria Decision Making*, Vol. 4, No. 4, pp. 311-331, 2014.

Hu, M., Weir, J. D., Wu, T., "An Augmented Multi-objective Particle Swarm Optimizer for Building Cluster Operation Decisions," *Applied Soft Computing*, Vol. 25, Dec 2014, Pages 347-359.

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Cui, C; Wu, T; Hu, M; Weir, JD; Chu, X, "Accuracy vs. Robustness: Bi-criteria Optimized Ensemble of Metamodels," Winter Simulation Conference, 2014, IEEE Press Pages 616-627.

5.6. DEPARTMENT OF SYSTEMS ENGINEERING AND MANAGEMENT

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5.6.1. DOCTORAL DISSERTATIONS

CLARK, JASON B., *Functionality, Complexity, and Approaches to Assessment of Resilience under Constrained Energy and Information*. AFIT/ENV/DS/15M-159. Faculty Advisor: Dr. David R. Jacques. Sponsor: ODASD.

MAILLOUX, LOGAN O., *A Performance and Security Analysis of Decoy Enabled Quantum Key Distribution Systems*. AFIT/ENV/DS/15S-041. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS. [CCR]

MASTERNAK, TADEUSZ J., *Multi-Objective Trajectory Optimization of a Hypersonic Reconnaissance Vehicle with Temperature Constraints*. AFIT/ENV/DS/14D-021. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RQ.

THOMPSON, ROBERT E., *A Methodology for the Optimization of Disaggregated Space System Conceptual Designs*. AFIT/ENV/DS/15J-062. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

5.6.2. MASTER'S THESES

ALLEN, COURTNEY, *Evaluation of Control Inputs on the Spin Recovery of the 8KCAB Super Decathlon*. AFIT/ENV/MS/15S-035. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

ALTENHOFEN, JASON A., *A Methodology to Determine the Influence of Requirements Change to Support System Design*. AFIT/ENV/MS/15M-172. Faculty Advisor: Lt Col Kyle F. Oyama. Sponsor: AFRL/RW.

AMADDIO, KELLY M., *The Cognition of Multi-Aircraft Control (MAC): Cognitive Ability Predictors, Working Memory, Interference, and Attention Control in Radio Communication*. AFIT/ENV/MS/15M-205. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]

BASELEY, DANIEL R., *Hyperspectral Imagery for Large Area Survey of Organophosphate Pesticides*. AFIT/ENV/MS/15M-203. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

BOEKE, DANIELLE K., *Exploring Individual Differences in Workload Assessment*. AFIT/ENV/MS/14D-031. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH. [ANT]

BOWDEN, JAMES R., *Influences of Display Design and Task Management Strategy on Situation Awareness, Performance, and Workload in Process Control Environments*. AFIT/ENV/MS/14D-029. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: AFRL/RQ.

BRIDGEFORTH, SHEDRICK M., *Using Earned Value Data to Forecast the Duration of Department of Defense (DOD) Space Acquisition Programs*. AFIT/ENV/MS/15M-177. Faculty Advisor: Lt Col Jonathan D. Ritschel. Sponsor: AFCAA.

BROWN, ADAM B., *A Case Study of Requirements Development in a Satellite Adjunct Payload*. AFIT/ENV/MS/14D-040. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

BUCKLE, LYNDSEY D., *Binary Integer Assignment Program to Determine the Optimal Launch Manifest for Heterogeneous Disaggregated Satellite Constellations*. AFIT/ENV/MS/15J-059. Faculty Advisor: Dr. John M. Colombi. Sponsor: SMC.

CORPUZ, MICHAEL Q., *A Process Improvement Study on a Military System of Clinics to Manage Patient Demand and Resource Utilization Using Discrete-Event Simulation, Sensitivity Analysis, and Cost-Benefit Analysis*. AFIT/ENV/MS/15M-199. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH.

- DANSEREAU, MATTHEW R., *A Decision Analysis Framework for Evaluation of Helmet Mounted Display Alternatives for Fighter Aircraft*. AFIT/ENV/MS/14D-045. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.
- DEIFEL, JUSTIN H., & PENA, ALBERT J., *An Analysis of CONUS Based Deployment of Pseudolites for Positioning, Navigation and Timing (PNT) Systems*. AFIT/ENV/MS/15S-37. Faculty Advisor: Dr. David R. Jacques. Sponsor: SMC.
- DROSTE, DANIEL J., *A System Dynamics Approach to the Efficacy of Oxime Therapy in Sub Lethal Exposure to Sarin Gas*. AFIT/ENV/MS/15J-053. Faculty Advisor: Dr. Michael L. Shelley. Sponsor: 711 HPW/RH.
- ENGLE, RYAN D., *Modeling, Simulation, and Analysis of a Decoy State Enabled Quantum Key Distribution System*. AFIT/ENV/MS/15M-181. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS. [CCR]
- FLEMINGS, WILLIAM D., *Detection and Characterization of Malathion Adherence to Piping Materials Used in Water Distribution Systems*. AFIT/ENV/MS/15M-096. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.
- FOLZ, ANDREW S., *The Role of Social Support on the Relationship between Gender and Career Progression in STEM Academia*. AFIT/ENV/MS/15M-204. Faculty Advisor: Dr. John J. Elshaw. Sponsor: Dayton LEADER Consortium.
- GARDNER, NICHOLAS R., *Forecasting Foreign Currency Exchange Rates for Air Force Budgeting*. AFIT/ENV/MS/15M-178. Faculty Advisor: Lt Col Jonathan D. Ritschel. Sponsor: SAF.
- GARTLAND, DANIEL H., *Test and Evaluation of Ultrasonic Additive Manufacturing (UAM) for a Large Aircraft Maintenance Shelter (LAMS) Baseplate*. AFIT/ENV/MS/15M-158. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.
- GRANDSAERT, PATRICK J., *Integrating Pavement Crack Detection and Analysis Using Autonomous Unmanned Aerial Vehicle Imagery*. AFIT/ENV/MS/15M-195. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.
- HANSEN, JOEL N., *The Impact of United States Investment for Civil Infrastructure in Developing Countries*. AFIT/ENV/MS/15M-175. Faculty Advisor: Lt Col Peter P. Feng. Sponsor: ACC/12 AF.
- HARDY, STEFAN L., *Implementing Cooperative Behavior & Control Using Open Source Technology across Heterogeneous Vehicles*. AFIT/ENV/MS/15M-180. Faculty Advisor: Dr. David R. Jacques. Sponsor: AFRL/RW.
- HOFF, RYAN M., *Analysis of Air Force Wartime Contracted Construction Project Performance*. AFIT/ENV/MS/15M-174. Faculty Advisor: Maj Gregory D. Hammond. Sponsor: AFCEC.
- JEWELL, BENJAMIN A., *Applying Model-Based Systems Engineering to CubeSats: A Tailored Approach for a Reusable State Analysis Tool*. AFIT/ENV/MS/15M-194. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A. [CSRA]
- JONES, TREVOR G., *A Method to Predict Compressor Stall in the TF34-100 Turbofan Engine Utilizing Real-Time Performance Data*. AFIT/ENV/MS/15J-036. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A. [ANT]

KATREIN, STEPHEN P., *The Effect of Stages and Levels of Automation and Reliability on Workload and Performance for Remotely Piloted Aircraft Operations*. AFIT/ENV/MS/15M-201. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH. [ANT]

LEE, WALTER R., *The Fate of Malathion on Copper and Iron Piping within a Water Distribution System*. AFIT/ENV/MS/15M-164. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

LI, SHUXIANG A., *A Method To Predict Compressor Stall in the TF34-100 Turbofan Engine Utilizing Real-Time Performance Data*. AFIT/ENV/MS/15J-036. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A.

LOGAN, SAMUEL W., *Predicting Citizen Satisfaction with Government Services in Belize*. AFIT/ENV/MS/15M-190. Faculty Advisor: Lt Col Peter P. Feng. Sponsor: ACC/12 AF.

LOGUE, JONATHAN E., *Mission Architecture Development for Geosynchronous Space Situational Awareness*. AFIT/ENV/MS/14D-028. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

LOPEZ, CHARLES A., *Assessing Development Test Utilizing Data Links*. AFIT/ENV/MS/15J-038. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A.

MARONEY, MICHAEL J., *An Assessment of the Effectiveness of Air Force Risk Management Practices in Program Acquisition Using Survey Instrument Analysis*. AFIT/ENV/MS/15J-041. Faculty Advisor: Lt Col Erin T. Ryan. Sponsor: N/A.

MARTIN, SETH K., *Effect of Malathion on the Microbial Ecology of Activated Sludge*. AFIT/ENV/MS/15M-095. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

MOLLE, DEREK P., *Parametric Estimation of Load for Air Force Datacenters*. AFIT/ENV/MS/15M-170. Faculty Advisor: Dr. John M. Colombi. Sponsor: AFSPC/38ES.

MOORE, JUSTIN R., *A Comparative Study of Learning Curve Models in Defense Airframe Cost Estimating*. AFIT/ENV/MS/15M-182. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AFLCMC.

MUDIMBI, PATRICK M., *Pulsed Ultraviolet Light Emitting Diodes for Advanced Oxidation of Tartrazine*. AFIT/ ENV/MS/15M-202. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

NATION, ANDREW P., *Pragmatic Divestment of KC-135 Navigators in the Special Operations Air Refueling Mission*. AFIT/ENV/MS/15M-255. Faculty Advisor: Dr. John J. Elshaw. Sponsor: AMC.

NICHOLS, MATTHEW J., *A Delphi Study Using Value-Focused Thinking for United States Air Force Mission Dependency Index Values*. AFIT/ENV/MS/15M-192. Faculty Advisor: Dr. Alfred E. Thal, Jr. Sponsor: AFCEC.

OCAMPO, SABRINA, *Does Training and Official Roles and Responsibilities of USAF Remotely Piloted Aircraft (RPA) Sensor Operators Match Their Day-to-Day Tasks?* AFIT/ENV/MS/14D-042. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH.

OLSEN, CHRISTOPHER C., *Characterizing and Managing Intrusion Detection System (IDS) Alerts with Multi-Server/Multi-Priority Queuing Theory*. AFIT/ENV/MS/14D-024. Faculty Advisor: Dr. John M. Colombi. Sponsor: N/A.

PALUCH, SARAJO, *Ethical Behavior and Ajzen's Theory of Planned Behavior Applied to the Decision to Obtain Professional Credentials*. AFIT/ENV/MS/15M-191. Faculty Advisor: Dr. John J. Elshaw. Sponsor: N/A.

PENA, ALBERTJ., See DEIFEL, JUSTIN H.

POULSEN, SETH N., *A Delphi Study of Additive Manufacturing Applicability for United States Air Force Civil Engineer Contingency Operations*. AFIT/ENV/MS/15M-161. Faculty Advisor: Maj Vhance V. Valencia. Sponsor: AFCEC.

RAUGLAS, ERIK G., *The Effect of Malathion on the Activity and Performance of Activated Sludge*. AFIT/ENV/MS/15M-197. Faculty Advisor: Dr. Willie F. Harper, Jr. Sponsor: EPA/NHSRC.

SALVADOR, VICTOR A., *Low Earth Orbit Satellite Tracking Telescope Network: Collaborative Optical Tracking for Enhanced Space Situational Awareness*. AFIT/ENV/MS/15M-200. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV. [CSRA]

SCOTT, ROBERT W., *The Use of Ultra-Violet (UV) Light Emitting Diodes (LEDs) in an Advanced Oxidation Process (AOP) with Brilliant Blue FCF as an Indicator*. AFIT/ENV/MS/15M-198. Faculty Advisor: Dr. Michael E. Miller. Sponsor: EPA/NHSRC.

TEKE, CHRISTOPHER L., *Impacts of Severe Weather, Climate Zone, and Energy Factors on Base Realignment and Closure (BRAC)*. AFIT/ENV/MS/15M-186. Faculty Advisor: Dr. John J. Elshaw. Sponsor: SAF/IE.

THOMAS, CHRISTOPHER M., *Flexible Architecture and Its Impact on the Life Cycle Cost of Air to Surface Munitions*. AFIT/ENV/MS/15M-171. Faculty Advisor: Lt Col Erin T. Ryan. Sponsor: AFRL/RW.

VASQUEZ, ELLIOT B., *Analysis of the Effectiveness of the F-15E Risk Management during Peacetime Operations*. AFIT/ENV/MS/15J-060. Faculty Advisor: Lt Col Brent T. Langhals. Sponsor: USAFE/494 FS.

VUKCEVIC, ALEXANDER M., *Army Information Technology Procurement: A Business Process Analysis*. AFIT/ENV/MS/15M-207. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: CIO. [CCR]

WADE, DAVID F., *Using Data Mining to Determine the Impact Continuity of Care Has on the Air Force's Healthcare System*. AFIT/ENV/MS/14D-044. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH.

5.6.3. FACULTY BIOGRAPHIES & RESEARCH OUTPUT

Notes: Research Center affiliation is listed in [] if applicable. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BADIRU, ADEDEJI B.,

Dean, Graduate School of Engineering and Management, AFIT Appointment Date: 2013 (AFIT/EN); BS, Tennessee Technological University, 1979; MS, Tennessee Technological University, 1981; PhD, Industrial Engineering, University of Central Florida, 1984. Dr. Badiru's research interests include Project Modeling, Analysis, Management and Control, Mathematical Modeling, Computer Simulation, Information Systems, and Economic Analysis. He is the author of several books and technical journals. Tel. 937-255-3636 x4799, email: Adedeji.Badiru@afit.edu

REFEREED JOURNAL PUBLICATIONS

Badiru, A.B. and Maloney, A.E. (2015), "Quality Insights: Measurement and Quality Rationing: An Analytical Approach," *International Journal of Quality Engineering and Technology (IJQET)*, Vol. 5, No. 2, 2015, pp. 178-188.

Moore, J.R., Elshaw, J.J., Badiru, A.J., and Ritschel, J.D. (2015), "Acquisition Challenge: The Importance of Incompressibility in Comparing Learning Curve Models," *Defense ARJ (Defense Acquisition Research Journal)*, Vol. 22, No. 4, pp. 416-449.

Badiru, A.B. (2015), "A Systems Model for Global Engineering Education: The 15 Grand Challenges," *Engineering Education Letters*, Vol. 1, Issue 1, Open Access Link: 2015:3.

Badiru, A. B. (2015), "Quality Insights: Learning, forgetting, and relearning quality: a half-life learning curve modeling approach," *International Journal of Quality Engineering and Technology*, Vol. 5, No. 1, pp. 79-100.

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Badiru, A. B. and Maloney, A.E. (2015), "An Integrative Systems Engineering Model For Product Design And Development," *Proceedings of the 2015 NDIA Ground Vehicle Systems Engineering and Technology Symposium (GVSETS)*, Systems Engineering Technical Session, Novi, MI, 4-6 Aug 2015.

BOOKS AND CHAPTERS IN BOOKS

Badiru, A. B. and Raczy, L. (2016), *Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*, Taylor & Francis CRC Press, Boca Raton, FL.

Badiru, A. B. (2016), *Global Manufacturing Technology Transfer: Africa-USA Strategies, Adaptations, and Management*, Taylor & Francis CRC Press, Boca Raton, FL

EDITORSHIPS IN PROFESSIONAL JOURNALS

Founder and Editor, *Journal of the Association of Military Industrial Engineers*.

COLOMBI, JOHN M.,

Associate Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Civilian Appointment Date: 2008 (AFIT/ENV); BSEE, University of Lowell, 1982; MSEE, Air Force Institute of Technology, 1992; PhD, Electrical Engineering, Air Force Institute of Technology, 1996. Dr. Colombi's research interests within the growing discipline of Systems Engineering include: systems architecture, systems of systems analysis, complex adaptive systems and human systems integration. Tel. 937-255-3636 x3347, email: John.Colombi@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“ISR Ops in Highly Contested and Denied Environments: MBSE Architectural Analysis.” Sponsor: AFRL/RQ. Funding: \$22,000 – Colombi 60%, Jacques 40%.

REFEREED JOURNAL PUBLICATIONS

Colombi, J., Robbins, M., Burger, J., and Weber, Y., “Interface evaluation for open system architectures using multiobjective decision analysis.” *Military Operations Research (MOR) Journal* 20(2):55-69.2015.

Mailloux, L.O., Morris, J.D., Grimaila, M.R., Hodson, D.D., Jacques, D., Colombi, J.M., McLaughlin, C.V., and Holes, J.A., (2015). A Modeling Framework for Studying Quantum Key Distribution System Implementation Non-Idealities. *IEEE Access* 3: pp 110-130. 2015.

Valencia, V. V., Thal Jr., A. E., Colombi, J. M. and Sitzabee, W. E., “Infrastructure decay modeling with the input-output inoperability model (IIM),” *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems: Journal of Structure and Infrastructure Engineering* 1(1) pp 011006-1 - 011006-7, 2015.

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Schwenn, K., Colombi, J., Wu, T., Oyama, K., and Johnson, A., “Toward Agent-Based Modeling of the U.S. Department of Defense Acquisition System,” 2015 Conference on Systems Engineering Research (CSER), Hoboken, NJ, Mar 2015.

Thompson, R., Colombi, J., Black J., and B. Ayres, “Disaggregated Space System Conceptual Design Optimization – Stochastic Analysis Methods,” IEEE Aerospace Conference, Big Sky, MT, 2015. [CSRA]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Member of the Editorial Board, Defense Acquisition Review Journal (DARJ).

ELSHAW, JOHN J.,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management; AFIT Civilian Appointment Date: 2013 (AFIT/ENV); BS, Accounting, University of Akron, 1991; MBA, Regis University, 1996, PhD, Krannert School of Management, Purdue University, 2010. Dr. Elshaw’s research interests include organizational behavior, trust, leadership, human resource management, organizational causes of high-consequence errors, technology impact on individual and group behavior, social network analysis, cognition and emotions, organizational climate and culture, psychological influences on foreign audiences, cross-cultural leadership and communication, and hierarchical linear modeling.

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REFEREED JOURNAL PUBLICATIONS

Moore, J.R., Elshaw, J.J., Badiru, A.B., and Ritschel, J.D., (2015), "Acquisition Challenge: The Importance of Incompressibility in Comparing Learning Curve Models," *Defense Acquisition Research Journal*, Oct 2015, Vol. 22 No.4: 416-449.

BOOKS AND CHAPTERS IN BOOKS

Elshaw, J. J., "Social Science Measurement," *Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*, Badiru editions, Taylor and Francis, 2015.

ENINGER, ROBERT M., Lt Col,

Assistant Professor of Industrial Hygiene, AFIT Military Appointment Date: 2015 (AFIT/ENV); BS, Civil and Environmental Engineering, United States Air Force Academy, 1995; MS, Civil Engineering, University of Texas-San Antonio, 2000; MS, Health Science, Purdue University, 2002; PhD, Environmental Health, University of Cincinnati, 2008. Lt Col Eninger's research interests include aerosol science, exposure assessment, and respiratory protective devices. Tel. 937-255-3636 x4511, email Robert.Eninger@afit.edu

REFEREED JOURNAL PUBLICATIONS

Eninger, R.M., and Johnson, R.L., "Unmanned Aerial Systems in Occupational Hygiene—Learning from Allied Disciplines," *Annals of Occupational Hygiene* (2015) 59 (8): 949-958, doi:10.1093/annhyg/mev041.

FASS, ROBERT D.,

Assistant Professor of Systems Integration and Cost Analysis, Department of Systems Engineering and Management, AFIT Civilian Appointment Date: 2015 (AFIT/ENV); BA Economics, University of New Mexico, 1989; MBA, University of New Mexico, 1993, PhD, Business Administration and Management, New Mexico State University, 2008. Dr. Fass's research interests include cost analysis, decision analysis, risk analysis, operations research, behavioral economics, organizational behavior, organizational change, and government acquisition policy. Tel. 937-255-3636 x4388, email: Robert.Fass@afit.edu

FELKER, DANIEL L.,

Chemist GS-11, Department of Systems Engineering and Management, Appointment Date: 2006 (AFIT/ENV); PhD. Analytical Chemistry, Kansas State University, 2005, served in the United States Army from Dec 1986 to Aug 1997. Current research interests include: X-ray photoelectron spectroscopy of thin film surfaces with a focus on the surface absorption organophosphates; modeling the absorbent properties of nano-particles for remediation of toxic compounds; the mechanism of thermo deactivation of Bacillus Anthracis Spores; electrochemical biosensors for the detection of organophosphates; and environmental chemistry of wetlands. Tel. 937-255-3636 x7410, email: Daniel.Felker@afit.edu

FORD, THOMAS C., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Military Appointment Date: 2014 (AFIT/ENV); BS Electrical Engineering, Brigham Young University, 1994; BA Chinese, Brigham Young University, 1994; MS Engineering, Wright State University, 1998; PhD, Systems Engineering, Air Force Institute of Technology, 2008. Lt Col Ford's research interests include interoperability, resiliency, and system architecting. Tel. 937-255-3636 x4747, email: Thomas.Ford@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Multi-Domain Modeling & Simulation." Sponsor: AFMC. Funding: \$103,000 – Ford 60%, Sambora 25%, Colombi 15%. [CSRA]

BOOKS AND CHAPTERS IN BOOKS

Ford, T.C., "Systems Interoperability Measurement," *Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*, Boca Raton, FL, A. Badiru and L. Racz, eds., CRC Press, 2015, Chapter 11, pp. 217-238.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Ford, T.C., “Space Superiority Through Computational Capability,” Faculty Research Council, Air Force Institute of Technology, Wright-Patterson AFB, OH, Aug 2015.

Ford, T.C., “Space Modeling Tool Comparison and Analysis,” Joint Warfare Analysis Center, Naval Support Facility Dahlgren, Dahlgren, VA, Aug 2015.

Ford, T.C., “A Method of Assessing Time-Variant Value of Multi-Domain Architectures,” Air Force Life Cycle Management Center Program Development and Integration Directorate, Wright-Patterson AFB, OH, Sep 2015.

FREELS, JASON K., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Auburn University, 2000; MS, Air Force Institute of Technology, 2006; PhD, Systems Engineering, Air Force Institute of Technology, 2013. Maj Freels’ research interests include reliability growth testing, accelerated life testing, accelerated degradation testing, and competing risk analysis. Tel. 937-255-3636 x4676, email: Jason.Freels@afit.edu

REFEREED JOURNAL PUBLICATIONS

Freels, J. K., Pignatiello, J. J., Warr, R. L., and Hill, R. R., (2015), “Bridging the Gap between Quantitative and Qualitative Accelerated Life Tests,” *Qual. Reliab. Engng. Int.*, 31: 789–800. doi: [10.1002/qre.1636](https://doi.org/10.1002/qre.1636).

GOLTZ, MARK N.,

Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 1996 (AFIT/ENV); BS, Cornell University, 1972; MS, University of California, Berkeley, 1973; PhD, Environmental Engineering and Science, Stanford University, 1986. Dr. Goltz specializes in modeling the physical, chemical, and biological processes that affect the fate and transport of contaminants in the subsurface. He is also interested in the environmental fate and transport of nanomaterials, as well as the use of nanomaterials to remediate water contamination.

REFEREED JOURNAL PUBLICATIONS

Huang, J., Christ, J.A., Goltz, M.N., and Demond, A.H., “Modeling NAPL Dissolution from Pendular Rings in Idealized Porous Media,” *Water Resources Research*, 51, doi:10.1002/2015WR016924, 2015.

Huang, J. and Goltz, M.N., “Semi-Analytical Solutions for Transport in Aquifer and Fractured Clay Matrix System,” *Water Resources Research*, 51, 7218-7237, doi: 10.1002/2014WR 016073, 2015.

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Kanel, S.R., Manning, B.A., Brittle, S.W., Pavel-Sizemore, I.E., Felker, D., Kempisty, D., Goltz, M.N., “Spectroscopic and Microscopic Investigation of Soil Mineral and Natural Organic Matter-treated Silver

Nanoparticles,” 249th American Chemical Society National Meeting & Exhibition, Denver, CO, 22-26 Mar 2015.

Kanel, S.R., Doane, B., Misak, H., Mall, S., Brittle, S.W., Pavel-Sizemore, I., Ebrahimian, T., Kempisty, D., Goltz, M.N., “Application of Carbon Nanotube Yarn as a Filter Media to Treat Nitroaromatic-contaminated Water,” 249th American Chemical Society National Meeting & Exhibition, Denver, CO, 22-26 Mar 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Goltz, M.N., “Contaminated Groundwater Research: Chemical Engineering in the Subsurface,” Department of Chemical and Environmental Engineering Seminar, University of Toledo, Toledo, OH, 16 Apr 2015.

GRMAILA, MICHAEL R.,

Professor and Head, Department of Systems Engineering and Management, AFIT Appointment Date: 2004 (AFIT/ENV); BS, Texas A&M University, 1993; MS, Texas A&M University, 1995; PhD, Computer Engineering, Texas A&M University, 1999. Dr. Grimaila’s research interests include modeling and simulation, mission assurance, network management and security, quantum cryptography, and systems engineering. He is a member of the ACM, a Senior Member of the IEEE, a Fellow of the ISSA, and serves as an advisor to the Prince of Wales Fellows/Prince Edward Fellows at MIT and Harvard.

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SPONSOR FUNDED RESEARCH PROJECTS

“Communication Systems Security.” Sponsor: NSA. Funding: \$110,000 – Grimaila 50%, Hodson 50%. [CCR]

“Unmanned Aerial Vehicle Telemetry Data Analytics.” Sponsor: AFLCMC. Funding: \$30,000.

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Tran, T., Racz, L., Grimaila, M.R., Miller, M., and Harper, W.F., “Comparison of continuous versus pulsed ultraviolet light emitting diode use for the inactivation of *Bacillus globigii* spores,” *Water Science and Technology*, doi: 10.2166/wst.2014.395, 70(9), 2014, pp. 1473-1480.

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Mailloux, L.O., Morris, J.D., Grimaila, M.R., Hodson, D.D., Jacques, D.R., Colombi, J.M., McLaughlin, C.V., and Holes, J.A., “A Flexible Modeling Framework for Studying Quantum Key Distribution System Implementation Non-Idealities,” *IEEE Access*, Vol. 3, Jan 2015, pp. 110–130. [CCR]

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Holes, J., Mailloux, L., Grimaila, M.R., and Hodson, D., “An Efficient Testing Process for a Quantum Key Distribution System Modeling Framework,” *Proceedings of the 13th International Conference on Scientific Computing (CSC15)*, Las Vegas, NV, 27-30 Jul 2015. [CCR]

EDITORSHIPS IN PROFESSIONAL JOURNALS

Editorial Board Member - Information System Security Association Journal.

HAAS, MICHAEL W.,

Associate Professor, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Wright State University, 1977; MS, University of Utah, 1985; PhD, Engineering and Applied Science, University of Southampton, England, 1996. Dr. Haas’ research interests include human factors and human systems integration. He serves on numerous IEEE committees and is the founding chair of the Man & Cybernetics Society and Engineering in Medicine & Biology Society.

HAMMOND, GREGORY D., Maj,

Assistant Professor, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Brigham Young University, 2002; MS, Air Force Institute of Technology, 2009; PhD, Industrial and Systems Engineering, University of Wisconsin-Madison, 2013. Maj Hammond’s research interests include emergency management uncertainty and decision making, evacuation planning, engineering management, risk analysis, and civil engineering. Tel. 937-255-3636 x7101, email: Gregory.Hammond@afit.edu

REFEREED JOURNAL PUBLICATIONS

Hammond, G.D. and Bier, V.M., (2015). “Alternative evacuation strategies for nuclear power plants,” *Reliability Engineering and System Safety*, Vol. 135 No. 1, pp. 9-14.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Roh, C., Bier, V. M., Corradini, M., Liu, S., Youngblood, R., and Hammond, G., “Development of a Societal-Risk Goal for Nuclear Power Safety,” Presented at the 16th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), Chicago, 31 Aug-3 Sep 2015.

HARPER, WILLIE F.,

Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2012 (AFIT/ENV); BS, Civil Engineering, University of California, Los Angeles, 1992; MS, Civil and Environmental Engineering, Cornell University, 1993; PhD, Civil and Environmental Engineering, University of California, Berkeley, 2002. Dr. Harper's research interests include environmental biotechnology, advanced oxidation, sensing, and water quality. Tel. 937-255-3636 x4528, email: Willie.Harper@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Predicting the Biotransformation of Jet Fuel Hydrocarbons with Frontier Electron Density-Based Theory.”
Sponsor: AFRL/RQ. Funding: \$20,000.

REFEREED JOURNAL PUBLICATIONS

Harper, Jr., W.F., Takeuchi, T., Riya, S., Hosomi, M., and Terada, A., (2015). “Novel abiotic reactions increase nitrous oxide production during partial nitrification: Modeling and experiments,” *Chemical Engineering Journal*, Vol. 281, pp 1017-1023.

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EDITORSHIPS IN PROFESSIONAL JOURNALS

Associate Editor, Water Science and Technology.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Harper, Jr., W.F. “Change! and other ideas from an environmental engineering professor,” Department of Civil and Environmental Engineering, California State University, Fullerton, CA, Oct 2015.

HEMINGER, ALAN R.,

Associate Professor, Department of Systems Engineering and Management, AFIT Appointment Date: 1994 (AFIT/ENV); BA, Philosophy, University of Michigan, 1966; MS, Educational Psychology, California State University at Hayward, 1978; PhD, Management Information Systems, University of Arizona, 1988. Dr. Heminger’s research interests include information integration, strategic information management, computer supported group problem-solving, reengineering, and long-term access to information.

JACQUES, DAVID R.,

Associate Professor of Aerospace Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 1999 (AFIT/ENV); BS, Mechanical Engineering, Lehigh University, 1983; MS, Aeronautical Engineering, AFIT, 1989; PhD, Aeronautical Engineering, AFIT, 1995. Dr. Jacques’ research interests include development planning, architecture based evaluation, multi-objective or constrained optimal design, and cooperative behavior and control of autonomous vehicles. Tel. 937-255-3636 x3329, email: David.Jacques@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Ilities’ Tradespace and Affordability Program (ITAP) – Phase IV.” Sponsor: OSD. Funding: \$37,000 – Jacques 60%, Oyama 20%, Ryan 20%.

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Vandawaker, R.M., Jacques, D.R., Freels, J.K., “Impact of Prognostic Uncertainty in System Health Monitoring,” *International Journal of Prognostic Health Management*, ISSN 2153-2648, 2015 011, May 2015.

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Altenhofen, J.A., Oyama, K.F., and Jacques, D.R., "A Methodology to Determine the Influence of Requirements Change to Support System Design," *Proceedings of the 2015 Industrial and Systems Engineering Research Conference*, Nashville, TN, Jun 2015.

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Suplisson, A., Cobb, R., Baker, W., and Jacques, D., "An Optimal Control Approach to Aircraft Automatic Ground Collision Avoidance," *AIAA-2015-1316, SciTech 2015*, Kissimmee, FL, 5-9 Jan 2015. [ANT]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Clark, J.B., Jacques, D.R., Colombi, J.M.F and Baker, W.P.F, "Measurement of System Functionality at Multiple Scales," *Presented at the 2015 Industrial and Systems Engineering Research Conference*, Nashville, TN, Jun 2015.

KEMPISTY, DAVID M., Lt Col,

Assistant Professor of Environmental Engineering and Science, AFIT Appointment Date: 2014 (AFIT/ENV); BS, Environmental Engineering, Michigan Technological University, 1996; MS, Environmental Engineering and Science, Air Force Institute of Technology, 2006; PhD, Civil Engineering, University of Colorado Boulder, 2014. Lt Col Kempisty's research interests include water quality issues, specifically using advanced and conventional adsorbents and UV-LED photocatalyst technologies. Perfluorinated compounds and their environmental toxicity, fate, and transport is also an active research area. Tel. 937-255-3636 x4711, email: David.Kempisty@afit.edu

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Kempisty, D., Brown, C., Dickenson, E., Summers, R.S., Reinert, A., Edeback, V., Knappe, D., "Full-scale, pilot-scale and rapid small-scale: A comparison of PFAS adsorption," *Fluoros 2015 – International Symposium on Fluorinated Organics in the Environment*, Golden CO, 12-14 Jul 2015.

KOSCHNICK, CLAY M., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, United States Air Force Academy, 1998; MS, Georgia Institute of

Technology, 2007; PhD, University of Florida, 2012. Lt Col Koschnick's research interests include engineering economy, dynamic programming, and econometrics. Tel 937-255-3636 x4638, email: Clay.Koschnick@afit.edu

LANGHALS, BRENT T., Lt Col,

Assistant Professor of Engineering Systems, Department of Systems Engineering and Management, AFIT Appointment Date: 2011 (AFIT/ENV); BS, United States Air Force Academy, 1995; MS, Air Force Institute of Technology, 2001; PhD, University of Arizona, 2011. Lt Col Langhals' research interests include Human-Computer Interfaces, Systems Engineering, Vigilance, and Psychophysiological Cue Detection. Tel 937-255-3636 x4352, email: Brent.Langhals@afit.edu

LUCAS, BRANDON M., Lt Col,

Assistant Professor of Cost Analysis, AFIT Appointment Date: 2015 (AFIT/ENV); BA, University of Texas at Austin, 1998; ME & MA, University of Oklahoma, 2002; MS, Air Force Institute of Technology, 2004; PhD, Economics, George Mason University, 2011. Lt Col Lucas' research interests: incentive structures, profit motives, coordination issues, and the economics of public choice & the law. Tel. 937-255-3636 x4441, email: Brandon.Lucas@afit.edu

MBONIMPA, ERIC G.,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and Management, AFIT Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, Kigali Institute of Science and Technology, 2004; MS, Environmental Engineering, University of Missouri-Columbia, 2007; PhD, Environmental Engineering, Purdue University, 2010. Dr. Mbonimpa's research interests include environmental sustainability, life cycle assessment, and water quality. Tel: 937-255-3636 x7405, email: Eric.Mbonimpa@afit.edu

SPONSOR FUNDED EDUCATIONAL PROJECTS

"Regional Feedstock Partnership-Herbacious Energy." Sponsor: DOE. Funding: \$8,000.

REFEREED JOURNAL PUBLICATIONS

Mbonimpa, E. G., Kumar, S., Owens, V., Chintala, R., Sieverding, H., and Stone, J., "Nitrogen rate and landscape impacts on life cycle energy use and emissions from switchgrass-derived ethanol," *GCB Bioenergy*, 2015.

Mbonimpa, E., Gautam, S., Lai, L., Bonta, J., and Wang, X., "Combined PEST and Trial-Error (CPTE) Approach to Improve APEX Calibration," *Computers and Electronics in Agriculture* 114, 296-303, 2015.

Y. Yuan, Jiang, Y., Taguas, E., Mbonimpa, E., and Hu, W., "Sediment loss and its cause in Puerto Rico watersheds," *SoilD* 2, 477-504, 2015.

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MILLER, MICHAEL E.,

Assistant Professor of Systems Integration, Department of Systems Engineering and Management, AFIT Appointment Date: 2010 (AFIT/ENV); BS, Ohio University, 1987; MS, Ohio University, 1989; PhD, Industrial and Systems Engineering, Virginia Polytechnic Institute and State University, 1993. Dr. Miller's research interests include Human Systems Integration, Application of Human Vision to Display, and Lighting Design and Systems Design for Light Emitting Diodes. Tel. 937-255-3636 x4651, email: Michael.Miller@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Workload-Adaptive Human Interface to Aid Robust Decision Making.” Sponsor: AFOSR. Funding: \$43,936 – Miller 50%, Langhals 25%, Peterson 25%.

REFEREED JOURNAL PUBLICATIONS

Parr, J., Miller, M.E., Schubert Kabban, C.M., Pelletiere, J.A., and Perry, C.E., (2014). “Development of an Updated Air Force Tensile Neck Injury Criterion,” *Aviation, Space and Environmental Medicine*, 85(10), 1026-1032.

Tran, T., Racz, L., Grimaila, M.R., Miller, M., and Harper, Jr., W.F. (2014). “Comparison of continuous versus pulsed ultraviolet light emitting diode use for the inactivation of *Bacillus globigii* spores,” *Water Science and Technology* 70(9), 1473-1480.

Tung, K.A., Miller, M.E., Colombi, J.M., Uribe, D.J., and Smith, S.D. (2014). “Effect of Vibration on Eye, Head and Helmet Movements While Wearing a Helmet-Mounted Display,” *Journal of the Society for Information Display*, 22(10), 493-544. doi: 10.1002/jsid.286.

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Colombi, J.M., Miller, M.E., Bohren, J.S., and Howard, J.K. (2015). “Conceptual design using executable architectures for a planned mission to mars,” *IEEE Systems Journal*, 9(2), 495-507. Doi: 10.1109/JSYST.2014.2314793.

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Bindewald, J.M., Peterson, G.L. and Miller, M.E. (2015). “Trajectory Generation with Player Modeling.” Proceedings of AI 2015 – Canadian Artificial Intelligence Conference. Halifax, Nova Scotia, CA. [ANT]

Dansereau, M.R., Colombi, J.M., Miller, M.E. and Robbins, M.J. (2015). “A Design Evaluation Framework for Helmet Mounted Displays in Fighter Aircraft.” Proceedings of the 2015 Industrial and Systems Engineering Conference, Nashville, TN.

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Amadio, K.M., Miller, M.E., Elshaw, J., Finnmore, V. (2015) “The Cognition of Multi-Aircraft Control (MAC): Proactive Interference and Working Memory Capacity.” Proceedings of the International Symposium on Aviation Psychology, Dayton, OH.

OYAMA, KYLE, F., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2013 (AFIT/ENV); BS, Northwestern University, 1998; MS, Air Force Institute of
Technology, 2010; PhD, Systems Engineering, University of Virginia, 2013. Lt Col Oyama's research
interests include New Product Development, Decision Analysis, Risk Analysis, Complex Adaptive Systems,
and studying how organizations make decisions. Tel. 937-255-3636 x4352, email: Kyle.Oyama@afit.edu

REFEREED JOURNAL PUBLICATIONS

Oyama, K., et al (2015). "Applying complexity science to new product development: Modeling
considerations, extensions, and implications," Vol. 35, Jan-Mar 2015, pp. 1-24. *Journal of Engineering and
Technology Management*. doi:10.1016/j.jengtecman.2014.07.003

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Missions," *Proceedings of the 45th Annual International Symposium of the Society of Flight Test
Engineers*, Aug 2014. Best of Session Award.

Altenhofen, J., Oyama, K., and Jacques, D., "A Methodology to Determine the Influence of Requirements
Change to Support System Design," *Proceedings of the 2015 Industrial and Systems Engineering Research
Conference*, Jun 2015.

Wade, D., Rusnock, C., Oyama, K., and Stone, B., "Influence of Continuity-of-Care on Cost and Availability
in Military Healthcare," *Proceedings of the 2015 Industrial and Systems Engineering Research
Conference*, Jun 2015.

Corpuz, M., Rusnock, C., Valencia, V., and Oyama, K., "Reducing Wait-Time of a System of Clinics Using
Discrete-Event Simulation," *Proceedings of the 2015 Industrial and Systems Engineering Research
Conference*, Jun 2015.

PARR, JEFFREY C., Lt Col,

Assistant Professor of Engineering and Environmental Management, Department of Systems Engineering and
Management. AFIT Military Appointment Date: 2014 (AFIT/ENV); BS, Civil Engineering, US Air Force
Academy, 1998; MS, Environmental Engineering, AFIT 2002; PhD, Systems Engineering, AFIT, 2014.
Research Interest: Human Systems, Injury Criteria, Ejection System Requirements. Tel: 937-255-3636 x4709,
email: Jeffrey.Parr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Parr, J., Miller, M.E., Schubert Kabban, C.M., Pellettiere, J.A., and Perry, C.E. (2014). "Development of an
Updated Air Force Tensile Neck Injury Criterion." *Aviation, Space and Environmental Medicine*, 85(10).

Parr, J., Miller, M.E., and Colombi, J.M. (2015). "Human Systems Integration Analysis of Helmet Mounted
Displays." *SAFE Journal*.

Parr, J., Miller, M.E., Schubert Kabban, C.M., Pellettiere, J.A., and Colombi, J.M. (2015). "Development of
a side impact (Gy) neck injury criterion for use in ejection system safety evaluation." *IIE Transactions on
Occupational Ergonomics and Human Factors*.

RACZ, LEEANN, Lt Col,

Assistant Professor of Environmental Science and Engineering, Department of Systems Engineering and
Management, AFIT Appointment Date: 2010 (AFIT/ENV); BS, Environmental Engineering, California
Polytechnic State University, 1996; MS, Biological and Agricultural Engineering, University of Idaho, 2004;
PhD, Civil and Environmental Engineering, University of Utah, 2010. Lt Col Racz specializes in wastewater
treatment of pollutants of emerging concern, the fate of chemical warfare agents in the environment,
nitrifying mixed cultures, and environmental microbiology analyses.

REFEREED JOURNAL PUBLICATIONS

Duckworth, K., Spencer, M. Bates, C., Almquist, C., Grimaila, M., Magnuson, M., Willison, S., Phillips, R. Racz, L., and Miller, M., “Advanced oxidation degradation kinetics as a function of ultraviolet LED duty cycle,” *Water Science and Technology*, 71(9):1375-1381, 2015.

Tran, T., Racz, L., Grimaila, M.R., Miller, M., and Harper, W.F. Jr., “Comparison of continuous versus pulsed ultraviolet light emitting diode use for the inactivation of *Bacillus globigii* spores,” *Water Science and Technology*, 70(9):1473-1480, 2014.

BOOKS AND CHAPTERS IN BOOKS

Badiru, A.B. and Racz, L., *Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*. Boca Raton, FL: CRC Press.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Helene, T.R., Yamamoto, D.P., Felker, D.L., Racz, L., and Rubenstein, M.H., Field Evaluation of Solvent-Free Isocyanate Sampling (Podium Presentation and Poster, 2nd place winner in Health Risk Assessment: General category), Team Aerospace Operational Solutions Symposium, Tempe, AZ, 31 Aug-2 Sep 2015.

Williams, S., McDonough, V., and Racz, L., “Modeling Work Effectiveness of Firefighters with Varying Shift Schedules” (podium presentation), American Industrial Hygiene Conference and Exposition (AIHce 2015), Salt Lake City, UT, 30 May-4 Jun 2015.

Spencer, M.J., Miller, M.E., Richwine, J. Duckworth, K.L., Racz, L., Grimaila, M.R., Magnuson, M., Willison, S., and Phillips, R., Pulsed and Continuous UV LED Reactor for Water Treatment, International Ultraviolet Association Americas Regional Conference, White Plains, NY, 26-28 Oct 2014.

RITSCHEL, JONATHAN D., Lt Col,

Assistant Professor of Cost Analysis, Department of Systems Engineering and Management, AFIT
Appointment Date: 2011 (AFIT/ENV); BBA, Accountancy, University of Notre Dame, 1997; MS, Cost Analysis, Air Force Institute of Technology, Wright-Patterson AFB, OH, 2003; PhD, Economics, George Mason University, VA, 2011. Lt Col Ritschel’s research interests include public choice, the effects of acquisition reforms on cost growth in DOD weapon systems, research and development cost estimation, and economic institutional analysis. Tel. 937-255-3636 x4441, email: Jonathan.Ritschel@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Contingency Waste Disposal and Energy Conversion Cost-Benefit Analysis.” Sponsor: USMC. Funding: \$95,900 – Ritschel 40%, Thal 30%, White 30%.

REFEREED JOURNAL PUBLICATIONS

DeNeve, A.J., Ryan, E.T., Ritschel, J.D. and Schubert Kabban, C. (2015). “Taming the Hurricane of Acquisition Cost Growth – Or At Least Predicting It,” *Defense Acquisition Review Journal*, 22(1): 84-105.

Petter, J.L., Ritschel, J.D. and White, E.D. (2015). “Stability Properties in Department of Defense Contracts: Answering the Controversy,” *Journal of Public Procurement*, 15(3): pg: 341-364.

Heron, R.A., White, T., Ritschel J.D., and Keaton, G., “Forecasting DOD Mid-Acquisition Space Program EACs Using WBS Level 2 and 3 Data,” *The Measurable News*, Issue 3, Jul 2015.

Bridgeforth, S., Ritschel, J.D., White, E.D., and Keaton, G., “Using Earned Value Data to Forecast the Duration of Department of Defense Space Acquisition Programs,” *Journal of Cost Analysis and Parametrics*, Vol. 8, Issue 2, Sep 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

“Air Force Institute of Technology News,” *ICEAA World*, Spring (1) 2015: 31.

“AFIT Showcases Research at SAF/FM Visit,” *SAF/FM Newsletter*, Jan 2015 (4).

Ritschel, J.D. “Air Force Institute of Technology Update,” *ICEAA World*, Autumn 2014 (3) 2014:20.

RUSNOCK, CHRISTINA, F., Maj,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT
Appointment Date: 2013 (AFIT/ENV); BA, Economics-Government, Claremont McKenna College, 2004;
MS, Research and Development Management, Air Force Institute of Technology, 2008; MS, Industrial
Engineering-Systems Engineering, University of Central Florida, 2011; PhD, Industrial Engineering-Human
Factors, University of Central Florida, 2013. Maj Rusnock’s research interests include cognitive workload
modeling, human performance modeling, human-systems integration, and discrete event simulation.
Tel. 937-255-3636 x4611, email: Christina.Rusnock@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

“Integrating HSI into Model-Based Systems Engineering (MBSE) Methods and Tools.” Sponsor: USARL.
Funding: \$57,225 – Rusnock 30%, Colombi 30%, Miller 20%, Parr 20%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Rusnock, C.F. and White III, E.D., (2015). Predicting Cost Growth for Military and Civil Space Systems.
*Proceedings of the 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research
Conference*, Nashville, TN, 30 May-2 Jun 2015.

Wade, D., Rusnock, C.F., Stone, B., and Oyama, K., (2015). Influence of Continuity-of-Care on Cost and
Availability in DOD Healthcare. *Proceedings of the 2015 Institute of Industrial Engineers (IIE) Industrial
& Systems Engineering Research Conference*, Nashville, TN, May 30-Jun 2 2015.

Corpuz, M.Q., Rusnock, C.F., Valencia, V.V., and Oyama, K. (2015). Reducing Wait-Time of a System of
Clinics Using Discrete-Event Simulation. *Proceedings of the 2015 Institute of Industrial Engineers (IIE)
Industrial & Systems Engineering Research Conference*, Nashville, TN, May 30-Jun 2 2015.

Bowden, J. and Rusnock, C.F., (2015). Impact of Display Design Individual Preferences on Process Control
Performance. *Proceedings of the 2015 Institute of Industrial Engineers (IIE) Industrial & Systems
Engineering Research Conference*, Nashville, TN, May 30-Jun 2 2015.

Boeke, D.K., Miller, M.E., Rusnock, C.F., and Borghetti, B.J. Exploring Individualized Objective Workload
Prediction with Feedback for Adaptive Automation. *Proceedings of the 2015 Institute of Industrial
Engineers (IIE) Industrial & Systems Engineering Research Conference*, Nashville, TN, May 30-Jun 2
2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Rusnock, C.F., Borghetti, B.J., and McQuaid, I.W. (2015). Objective-Analytical Measures of Workload – the
Third Pillar of Workload Triangulation. *Foundations of Augmented Cognition*. 9th International Conference
on Augmented Cognition, held as part of the 17th International Conference on Human-Computer
Interaction, Los Angeles, CA, 2-7 Aug 2015. [CCR]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Rusnock, C.F., Borghetti, B.J., and McQuaid, I.W. Objective-Analytical Measures of Workload – the Third
Pillar of Workload Triangulation. *Foundations of Augmented Cognition*. 9th International Conference on

Augmented Cognition, held as part of the 17th International Conference on Human-Computer Interaction, Los Angeles, CA, 2-7 Aug 2015.

Rusnock, C.F. and White III, E.D. Predicting Cost Growth for Military and Civil Space Systems. 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Wade, D., Rusnock, C.F., Stone, B., and Oyama, K. Influence of Continuity-of-Care on Cost and Availability in DOD Healthcare, 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Corpuz, M.Q., Rusnock, C.F., Valencia, V.V., and Oyama, K. Reducing Wait-Time of a System of Clinics Using Discrete-Event Simulation. 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Bowden, J. and Rusnock, C.F., Impact of Display Design Individual Preferences on Process Control Performance. 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Boeke, D., Miller, M.E., Rusnock, C.F., and Borghetti, B. Exploring Individualized Objective Workload Prediction with Feedback for Adaptive Automation. 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Watson, M. and Rusnock, C.F. "Improving MBSE Models Using Human Performance Simulation," Graduate School of Engineering and Management, Air Force Institute of Technology Poster Session, Wright-Patterson AFB, OH, 3 Sep 2015.

Maxheimer, E.W. and Rusnock, C.F. "Modeling Mental Workload of Healthcare Providers," Graduate School of Engineering and Management, Air Force Institute of Technology Poster Session, Wright-Patterson AFB, OH, 3 Sep 2015.

Boubin, J., Rusnock, C., and Miller, M.E. "Eliciting an Algorithm to Replicate Human Trust in Automation in the Domain of Compliance," Southwestern Ohio Council for Higher Education (SOCHE) Air Force Institute of Technology Summer Intern Poster Session, Wright-Patterson AFB, OH, 29 Jul 2015.

Bowden, J. and Rusnock, C.F. Improving Situation Awareness and Performance of Process Control Operations through Visual Display Design. 10th Annual Dayton Engineering Sciences Symposium (DESS), Wright State University, Dayton, OH, 28 Oct 2014.

RYAN, ERIN T., Lt Col,

Assistant Professor of Systems Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 2012 (AFIT/ENV); BS, University of Washington, 1998; MA, New Mexico State University, 2008; PhD, Systems Engineering, Air Force Institute of Technology, 2012. Lt Col Ryan's research interests include cost estimating methodologies and cost-based decision tools for valuing system design options.

SHELLEY, MICHAEL L.,

Professor of Environmental Science and Engineering, Department of Systems Engineering and Management, AFIT Appointment Date: 1996 (AFIT/ENV); BCE (Civil Engineering), Auburn University, 1974; MS (Environmental Engineering), Virginia Tech, 1975; PhD, Environmental Science and Engineering, University of North Carolina, 1985. Dr. Shelley focuses on system dynamics modeling in analyzing long-term management strategies. His research interests include abiotic and biochemical contaminant fate and transport, physiologically-based pharmacokinetic modeling, and ecological engineering design to optimize mission activity with environmental constraints. Tel. 937-255-3636 x7387, email: Michael.Shelley@afit.edu

STOPPEL, CHRISTOPHER M., Lt Col,

Assistant Professor of Engineering Management, AFIT Appointment Date: 2015 (AFIT/ENV); BS, United States Air Force Academy, 1996; MS, Air Force Institute of Technology, 2001; PhD, University of Texas at Austin, 2013. Lt Col Stoppel's research interests include sustainability, building energy performance, and project delivery evaluation. Tel: 937-255-3636 x4645, email: Christopher.Stoppel@afit.edu

THAL, ALFRED E., Jr.,

Assistant Professor of Engineering Management, Department of Systems Engineering and Management, AFIT Appointment Date: 1998 (AFIT/ENV); BS, Civil Engineering, Texas Tech University, 1981; MS, Engineering Management, AFIT, 1985; PhD, Environmental Engineering, University of Oklahoma, 1999. Dr. Thal's research interests include engineering and environmental management, groundwater flow and remediation technologies, facility and infrastructure management, product development, sustainability, and project management. Tel. 937-255-3636 x7401, email: Al.Thal@afit.edu

REFEREED JOURNAL PUBLICATIONS

Valencia, V.V., Thal, Jr., A.E., Colombi, J.M., and Sitzabee, W.E., "Infrastructure Decay Modeling With the Input-Output Inoperability Model," *Journal of Risk and Uncertainty in Engineering Systems*, 1(1): 010201-010201-5. doi:10.1115/1.4026400, Mar 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Myers, A.R., and Thal, Jr., A.E., "Strategic Sourcing: Don't Lose Sight of the Forest," Western Decision Sciences Institute Annual Meeting, Maui, HI, 31 Mar-3 Apr 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Valencia, V.V., Colombi, J.M., and Thal, Jr., A.E., "Modeling Interdependent Infrastructures and the Effects of Aging Systems for use in Infrastructure Asset Management," 2015 Critical Infrastructure Symposium, Baltimore, MD, 21-22 Apr 2015.

VALENCIA, VHANCE V., Maj,

Assistant Professor, Department of Systems Engineering and Management, AFIT Appointment Date: 2013 (AFIT/ENV); BS, Mechanical Engineering, San Diego State University, 2001; MS Engineering Management, Air Force Institute of Technology, 2007; PhD, Systems Engineering, Air Force Institute of Technology, 2013. Maj Valencia's primary interest is in infrastructure asset management and systems engineering as applied to infrastructure. Research topics include civil engineering applications for additive manufacturing technologies, autonomous systems for assessing infrastructure, and infrastructure applications for geographic information systems. Tel. 937-255-3636 x4826, email: Vhance.Valencia@afit.edu

SPONSOR FUNDED RESEARCH PROJECTS

"Civil Engineering Applications for Direct Digital Manufacturing." Sponsor: AFCEC. Funding: \$78,305 – Valencia 50%, Oyama 25%, Freels 25%.

"Cost Estimating Models for Advanced Composite Aircrafts Using Additive Manufacturing." Sponsor: NPS. Funding: \$119,843 – Valencia 25%, Badiru 25%, Thal 25%, Liu 25%.

REFEREED JOURNAL PUBLICATIONS

Valencia, V., Thal, A., and Colombi, J., (2015). "Infrastructure Decay Modeling with the Input-Output Inoperability Model." *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, 1(1), 011006 (7 pages), 10.1115/1.4029314.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Corpuz, M.Q., Rusnock, C.F., Valencia, V.V., and Oyama, K., “Reducing Wait-Time of a System of Clinics Using Discrete-Event Simulation.” 2015 Institute of Industrial Engineers (IIE) Industrial & Systems Engineering Research Conference, Nashville, TN, 30 May-2 Jun 2015.

Valencia, V., Thal, A., and Colombi, J., “Modeling Interdependent Infrastructures and Effects of Aging Systems for Use in Infrastructure Asset Management.” Paper presented at the 2015 Critical Infrastructure Symposium and Infrastructure Challenge, Baltimore, MD, 20-21 Apr 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Shields, B., Meeks, M., and Valencia, V. (2015). 3D Printing Makes Explosive Headway. *Air Force Civil Engineer*, 23(1), pp. 34-5.

Valencia, V. (2015). Assessments from the Air. *The Military Engineer*, 107(697), pp. 42-43.

Meeks, T., Shields, B., Holm, E., and Valencia, V. Additive Manufacturing Applications for Explosive Ordnance Disposal (EOD) Units. Poster session presented at the Air Force Institute of Technology Engineer’s Week, Wright-Patterson AFB, OH, 23 Feb 2015.

Poulsen, S. & Valencia, V. A Delphi Study of Additive Manufacturing Applicability for US Air Force Civil Engineer Contingency Operations. Poster session presented at the Air Force Institute of Technology Engineer’s Week, Wright-Patterson AFB, OH, 23 Feb 2015.

YAMAMOTO, DIRK P., Lt Col,

Assistant Professor, Department of Systems Engineering and Management, AFIT Appointment Date: 2010 (AFIT/ENV); BS, Electrical Engineering, University of Minnesota, 1992; MS, Engineering Systems Management, St Mary's University, 1995; MS, Public Health (Industrial Hygiene emphasis), University of Utah, 2003; PhD, Systems Engineering, Air Force Institute of Technology, 2010. Lt Col Yamamoto's research interests include deployed military waste/burn pit emissions and pharmacokinetic modeling of nanoparticle exposures. Other research interests include bioaerosol sampling, advanced composite material exposure assessment, and geospatial/plume dispersion modeling.

BOOKS AND CHAPTERS IN BOOKS

Racz, L. and Yamamoto, D., *Measuring Environmental Health* (Chapter). *Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*. Boca Raton, FL: CRC Press, 18 Nov 2015.

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Problem Definition Study: Airborne Pollution Hazards in the Deployed Environment, by Lt Col Dirk Yamamoto and Maj Chris Edwards. A technical report to AF Medical Support Agency/Force Health Protection (AFMSA/SG5I). Jan 2015.

6. RESEARCH CENTER PUBLICATIONS AND FUNDING INFORMATION

The contents of this section are duplicated data, grouped by center. The information is previously listed within each project's specific academic department.

6.1. AUTONOMY AND NAVIGATION TECHNOLOGY CENTER

Autonomy and Navigation Technology (ANT) Center

Director 255-3636 x4580

Executive Administrator 255-3636 x4583

Laboratory Manager 255-3636 x4911

Homepage: <http://www.afit.edu/ANT>

6.1.1. DOCTORAL DISSERTATIONS

BINDEWALD, JASON M., *Adaptive Automation Design and Implementation*. AFIT/ENG/DS/15S-007.

Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFOSR.

PIERCE, SCOTT J., *Modeling Navigation System Performance of a Satellite-Observing Star Tracker Tightly Integrated with an Inertial Measurement Unit*. AFIT/ENG/DS/15M-260. Faculty Advisor:

Dr. John F. Raquet. Sponsor: USNO.

SMITH, NATHAN E., *Optimal Collision Avoidance Trajectories for Unmanned/Remotely Piloted Aircraft*.

AFIT/ENY/DS/14D-034. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

6.1.2. MASTER'S THESES

ALBEE, TRAVIS A., *Unique Two-Way Field Probe Concept Utilizing a Geodesic Sphere and Quad-Roto*.

AFIT/ENG/MS/15M-007. Faculty Advisor: Dr. Peter J. Collins. Sponsor: 96 TG/NRTF.

ALIX, DANIEL C., *Error Characterization of Flight Trajectories Reconstructed Using Structure from Motion*. AFIT/ENY/MS/15M-214. Faculty Advisor: Col Karl C. Walli. Sponsor: AFRL.

AMADDIO, KELLY M., *The Cognition of Multi-Aircraft Control (MAC): Cognitive Ability Predictors, Working Memory, Interference, and Attention Control in Radio Communication*. AFIT/ENV/MS/15M-205.

Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH.

BAILEY, ERIC J., *Single Platform Geolocation of Radio Frequency Emitters*. AFIT/ENG/MS/15M-028.

Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV.

BOEKE, DANIELLE K., *Exploring Individual Differences in Workload Assessment*. AFIT/ENV/MS/

14D-031. Faculty Advisor: Dr. Michael E. Miller. Sponsor: 711 HPW/RH.

CHRISTMAN, JOSHUA R., *Leveraging Human Insights by Combining Multi-Objective Optimization with Interactive Evolution*. AFIT/ENG/MS/15M-060. Faculty Advisor: Maj Brian G. Woolley. Sponsor:

MIT/LL.

FILLMORE, CASEY E., *Computational Electromagnetic Studies for Low-Frequency Compensation of the Reflector Impulse-Radiating Antenna*. AFIT/ENG/MS/15M-011. Faculty Advisor: Dr. Peter J. Collins.

Sponsor: 96 TG/NRTF.

GALDEEN, MATTHEW T., *Modeling and Simulation of an Impedance Loaded Bow Tie Antenna*.

AFIT/ENG/MS/15M-036. Faculty Advisor: Dr. Peter J. Collins. Sponsor: N/A.

GUTIERREZ, ALYSSA N., *Cloud-Induced Uncertainty for Visual Navigation*. AFIT/ENG/MS/14D-043.

Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/RV.

HUTCHINSON, SCOTT A., *Distributed Kernelized Locality-Sensitive Hashing for Faster Image Based Navigation*. AFIT/ENG/MS/15M-070. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/R.Y.

JONES, DAVID W., *Theoretical Limits of Lunar Vision Aided Navigation with Inertial Navigation System*. AFIT/ENG/MS/15M-020. Faculty Advisor: Dr. Kyle J. Kauffman. Sponsor: N/A.

JONES, TREVOR G., *A Method to Predict Compressor Stall in the TF34-100 Turbofan Engine Utilizing Real-Time Performance Data*. AFIT/ENV/MS/15J-036. Faculty Advisor: Maj Jason K. Freels. Sponsor: N/A.

KATREIN, STEPHEN P., *The Effect of Stages and Levels of Automation and Reliability on Workload and Performance for Remotely Piloted Aircraft Operations*. AFIT/ENV/MS/15M-201. Faculty Advisor: Maj Christina F. Rusnock. Sponsor: 711 HPW/RH.

KAWECKI, JAMES E.C., *Initial Implementation and Testing Of a Tightly-Coupled IMU/Pseudolite System*. AFIT/ENG/MS/15M-025. Faculty Advisor: Dr. John F. Raquet. Sponsor: 746 TS.

KIM, NAMKYU, *Optimized Flight Path for Localization Using Line of Bearing*. AFIT/ENY/MS/15M-246. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RQ.

LEINES, MATTHEW T., *Terrain Referenced Navigation Using SIFT Features in LiDAR Range-Based Data*. AFIT/ENG/MS/14D-047. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y.

MIRABILE, ANTHONY T., *Pilot Assisted Inertial Navigation System Aiding Using Bearings-Only Measurements Taken Over Time*. AFIT/ENG/MS/15M-015. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFRL/R.Y.

NINE, JULIANA J., *(U) Detection, Classification, and Mitigation of Inauthentic GPS Signals Using Radio Frequency Distinct Native Attributes and Direction of Arrival Estimation*. AFIT/ENG/MS/15M-065. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: AFRL/R.Y.

NISHIDA, JEFFREY K., *Estimating Single and Multiple Target Locations Using K-Means Clustering with Radio Tomographic Imaging in Wireless Sensor Networks*. AFIT/ENG/MS/15M-038. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR.

POSTON, HOWARD E., *Generation of Strategies for Environmental Deception in Two-Player Normal-Form Games*. AFIT/ENG/MS/15J-004. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

RICKS, DONOVAN L., *A Novel Analysis of Performance Classification and Workload Prediction Using Electroencephalography (EEG) Frequency Data*. AFIT/ENG/MS/15M-012. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH.

ROADRUCK, BRIAN J., *Counter Weapon Control*. AFIT/ENG/MS/15M-056. Faculty Advisor: Dr. Meir Pachter. Sponsor: AFOSR.

ROHDE, JOHNATHAN L., *Urban Environment Navigation with Real-Time Data Utilizing Computer Vision, Inertial, and GPS Sensors*. AFIT/ENG/MS/15M-037. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFRL/R.Y.

SMITH, ANDREW M., *Robust Models for Operator Workload Estimation*. AFIT/ENG/MS/15M-064. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH.

SMITH, BLAKE, *An Inventory and Safety Stock Analysis of Air Force Medical Service Pharmaceuticals*. AFIT/ENS/MS/15M-133. Faculty Advisor: Dr. William A. Cunningham. Sponsor: AFMOA.

SMITH, NATHAN C., *Examining the Return on Investment of Test and Evaluation*. AFIT/ENC/MS/15M-183. Faculty Advisor: Dr. Edward D. White. Sponsor: OSD.

STEENMAN, MATTHEW B., *Reverse Radio Frequency Fingerprinting for Remote Indoor Localization*. AFIT/ENY/MS/15M-225. Faculty Advisor: Dr. John F. Raquet. Sponsor: AFTPS.

THARP, JUSTIN S., *On the Integration of Medium Wave Infrared Cameras for Vision-Based Navigation*. AFIT/ENG/MS/15M-063. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RV.

VAN, TAN, *Characterizing Multiple Wireless Sensor Networks for Large-Scale Radio Tomography*. AFIT/ENG/MS/15M-057. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR.

WERNER, KYLE P., *Precision Relative Positioning for Automated Aerial Refueling from a Stereo Imaging System*. AFIT/ENG/MS/15M-048. Faculty Advisor: Maj Brian G. Woolley. Sponsor: AFRL/RQ.

WILLIAMS, ANTHONY S., *Expected Position Error for an Onboard Satellite GPS Receiver*. AFIT/ENG/MS/15M-029. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A.

WILLIAMS, KELLEY J., *Evidence for the Inhibition of Dengue Virus Binding in the Presence of Silver Nanoparticles*. AFIT/ENP/MS/15M-089. Faculty Advisor: LTC Douglas R. Lewis. Sponsor: 711 HPW/RH.

WILLIAMS, JEFFREY, *Acoustic Model Evaluation and Improvement*. AFIT/ENS/MS/15M-139. Faculty Advisor: Dr. Raymond R. Hill. Sponsor: OSD.

WILLINGER, COREY T., *Effects of Data Replication on Data Exfiltration in Mobile Ad Hoc Networks Utilizing Reactive Protocols*. AFIT/ENG/MS/15M-035. Faculty Advisor: Maj Brian G. Woolley. Sponsor: MIT/LL.

6.1.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BINDEWALD, JASON R., Capt, Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Bindewald, J.M., Miller, M.E., and Peterson, G.L., "A Function-to-Task Process Model for Adaptive Automation System Design," *International Journal of Human-Computer Studies*, Vol. 72, No. 12, pp. 822-834, Dec 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J.M., Peterson, G.L., and Miller, M.E., "Trajectory Generation with Player Modeling," *Advances in Artificial Intelligence: 28th Canadian Conference on Artificial Intelligence (Canadian AI 2015)*, 2-5 Jun 2015, Halifax, Nova Scotia, Canada, pp. 42-49.

BLACK, JONATHAN T., Department of Aeronautics and Astronautics

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

CLINTON, JUSTIN A., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“Automatic Ground Collision Avoidance System Trajectory Optimization - Flight Tests.” Sponsor: AFRL/RQ. Funding: \$12,000.

“Trajectory Optimization Applications for Loyal Wingman and Missile Avoidance.” Sponsor: AFRL/RQ. Funding: \$30,000.

COLLINS, PETER J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Unmanned Air Vehicle (UAV) and Payload Systems Technology (UPST).” Sponsor: Undisclosed. Funding: \$57,300.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Timing Testbed.” Sponsor: Undisclosed. Funding: \$150,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J. Nine and P. Corbell, “Application of RF Distinct Native Attributes (RF-DNA) and Direction of Arrival (DoA) to Detect, Classify, and Mitigate Inauthentic GPS Signals,” Institute of Navigation Joint Navigation Conference, Orlando, FL, 22-25 Jun 2015.

P. Corbell and A. Lemmenes, “On the Performance of GPS Timing Receivers in response to RF Interference,” Institute of Navigation Joint Navigation Conference, Orlando, FL, 22-25 Jun 2015.

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“GNSS Laboratory Compute Cluster.” Sponsor: AFRL/RQ. Funding: \$70,000.

“Multi-Element Adaptive Aided Antenna (MA3) for Robust Low SWaP-C Military GNSS Applications.” Sponsor: AFRL/RQ. Funding: \$75,000 – Gunawardena 90%, Raquet 10%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Sanjeev Gunawardena, John Raquet, Frank van Graas, “Chip Transition-Edge Based Signal Tracking for Ultra-Precise GNSS Monitoring Applications,” Proceedings of the ION 2015 Pacific PNT Meeting, Honolulu, HI, Apr 2015, pp. 100-106.

Sanjeev Gunawardena, Frank van Graas, “GPS-SPS Inter-PRN Pseudorange Biases Compared for Transversal SAW and LC Filters Using Live Sky Data and ChipShape Software Receiver Processing,” Proceedings of the 2015 International Technical Meeting of The Institute of Navigation, Dana Point, CA, Jan 2015, pp. 393-403.

Sanjeev Gunawardena, Thomas Pany, “Follow-On Report of Activities of the GNSS SDR Metadata Standard Working Group,” Proceedings of the 2015 International Technical Meeting of The Institute of Navigation, Dana Point, CA, Jan 2015, pp. 517-520.

Sanjeev Gunawardena, Frank van Graas, “Analysis of GPS-SPS Inter-PRN Pseudorange Biases due to Receiver Front-End Components,” Proceedings of the 27th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2014), Tampa, FL, Sep 2014, pp. 2611-2624.

Sanjeev Gunawardena, Thomas Pany, “Initial Report of Activities of the GNSS SDR Metadata Standard Working Group,” Proceedings of the 27th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2014), Tampa, FL, Sep 2014, pp. 1426-1432.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Sanjeev Gunawardena, Mark Carroll, John Raquet, “GNSS Threat Detection using Nominal Chip-Shape Monitoring: Feasibility Study using Live Sky Data,” Proceedings of 2015 Joint Navigation Conference, Orlando, FL, 24 Jun 2015.

Sanjeev Gunawardena, Thomas Pany, “ION GNSS SDR Metadata Standard Working Group Report,” Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015), Tampa, FL, Sep 2015.

Sanjeev Gunawardena, Mark Carroll, John Raquet, “High-Fidelity Signal Deformation Analysis of Live Sky Galileo E1 Signals using a ChipShape Software GNSS Receiver,” Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015), Tampa, FL, Sep 2015.

John Macdonald, Sanjeev Gunawardena, “Using Average Chip Shape to Authenticate GNSS Transmissions,” Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015), Tampa, FL, Sep 2015.

Frank van Graas, Curtis Cohenour, Eric Vinande, Sanjeev Gunawardena, “GNSS Signal Characterization and Monitoring Using High Gain Antennas,” Proceedings of the 28th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2015), Tampa, FL, Sep 2015.

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Support of AFNES/RIPR Autonomy Effort.” Sponsor: AFRL/RQ. Funding: \$30,000 – Hodson 50%, Peterson 50%.

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

JACKSON, JULIE A., Department of Electrical and Computer Engineering

JACQUES, DAVID R., Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Rohde, J, J. Png, J. Raquet, and D. Jacques, “Urban Environment Navigation with Real Time Data Utilizing, Inertial, and GPS,” *Proceedings of Pacific PNT*, Honolulu, HI, Apr 2015.

Humphreys, C.J., Cobb, R.G., Jacques, D.R., and Reeger, J., “Optimal Mission Paths for the Uninhabited Loyal Wingman,” *Proceedings of the 2015 AIAA Aviation and Aeronautics Conference*, Dallas, TX, Jun 2015.

Suplisson, A., Cobb, R., Baker, W., and Jacques, D., “An Optimal Control Approach to Aircraft Automatic Ground Collision Avoidance,” *AIAA-2015-1316, SciTech 2015*, Kissimmee, FL, 5-9 Jan 2015.

KAUFFMAN, KYLE J., Department of Electrical and Computer Engineering

LAMONT, GARY B., Department of Electrical and Computer Engineering

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Information Integrity for Autonomous Systems.” Sponsor: AFRL/RQ. Funding: \$36,000 – Martin 90%, Raquet 10%.

MILLER, MICHAEL E., Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Bindewald, J.M., Peterson, G.L. and Miller, M.E. (2015). “Trajectory Generation with Player Modeling.” Proceedings of AI 2015 – Canadian Artificial Intelligence Conference. Halifax, Nova Scotia, CA.

Boeke, D.K., Miller, M.E., Rusnock, C.F. and Borghetti, B.J. (2015). “Exploring Individualized Objective Workload Prediction with Feedback for Adaptive Automation.” Proceedings of the 2015 Industrial and Systems Engineering Research Conference, Nashville, TN.

NYKL, SCOTT L., Department of Electrical and Computer Engineering

OXLEY, MARK E., Department of Mathematics and Statistics

PACHTER, MEIR, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Autonomous Control and Navigation.” Sponsor: AFRL/RQ. Funding: \$20,000.

“Control & Estimation in the Presence of Adversarial Action and Uncertainty.” Sponsor: AFOSR. Funding: \$46,104.

“Decision Support Techniques.” Sponsor: AFRL/RD. Funding: \$6,002.

“Self-Defense Missile Guidance.” Sponsor: AFRL/RW. Funding: \$25,000.

REFEREED JOURNAL PUBLICATIONS

E. Garcia, D. Cosbeer and M. Pachter, “Cooperative Strategies for Optimal Aircraft Defense from an Attacking Missile,” Journal of Guidance, Control, and Dynamics, Vol. 30 No. 8, Aug 2015, pp 1510-1520.

I. Exarchos, P. Tsiotras and M. Pachter, “On the Suicidal Pedestrian Differential Game,” Dynamic Games and Applications, Vol. 5 No. 3 pp 297-317, 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

M. Pachter, E. Garcia and D. Casbeer: “Active Target Defense Differential Game” 52nd Allerton Conference on Communication, Control and Computing, Monticello, IL, 1-3 Oct 2014, pp. 46-53. Also chaired the session WeA3: Dynamic Games and Decision Theory.

D. Casbeer, K. Kalyanam, P. Chandler and M. Pachter, “Moving Ground Target Isolation by a UAV Using Predicted Observations,” Conference on Decision and Control, Los Angeles, CA, 15-17 Dec 2014, Paper TuC12.4.

- E. Garcia, D. Casbeer, K. Pham and M. Pachter, “Cooperative Aircraft Defense from an Attacking Missile,” Conference on Decision and Control, Los Angeles, CA, 15-17 Dec 2014, Paper TuA18.3.
- K. Kalyanam, M. Pachter and P. Chandler, “Maximizing the Efficiency of a UAV on Perimeter Patrol,” SciTech Conference, Orlando, FL, 5-9 Jan 2015, Paper AIAA 2015-0854.
- E. Garcia, D. Casbeer, K. Pham and M. Pachter, “Cooperative Aircraft Defense from an Attacking Missile Using Proportional Navigation,” SciTech Conference, Orlando, FL, 5-9 Jan 2015, Paper AIAA 2015-0337.
- Mirabile and M. Pachter, “Operator-Assisted INS Aiding Using Bearings-Only Measurements,” Proceedings of the 55th Israel Annual Conference on Aerospace Sciences, Tel-Aviv & Haifa, Israel, 25-26 Feb 2015.
- K. Krishnamoorthy, D. Casbeer and M. Pachter, “Minimum Time UAV Pursuit of a Moving Ground Target Using Partial Information,” 2015 International Conference on Unmanned Aircraft Systems, 9-12 Jun 2015, Denver, CO.
- K. Krishnamoorthy, D. Casbeer and M. Pachter, “Pursuit on a Graph Using Partial Information,” 2015 American Control Conference, 1-3 Jul 2015, Chicago, IL.
- E. Garcia, D. Casbeer and M. Pachter, “Active Target Defense Differential Game with a Fast Defender,” American Control Conference, 1-3 Jul 2015, Chicago, IL.

BOOKS AND CHAPTERS IN BOOKS

- Khanh D. Pham and Meir Pachter, “A Risk-Averse Differential Game Approach to Multi-Agent Tracking and Synchronization with Stochastic Objects and Command Generators,” Dynamics of Information Systems – Computational and Mathematical Challenges, Vol. VIII, C. Vogiatzis, J. Walteros and P. Pardalos, Eds., pp. 21-44, Springer 2014, ISBN 978-3-319 10045-6.
- M. Pachter and K. Pham, “Informational Issues in Decentralized Control,” Dynamics of Information Systems – Computational And Mathematical Challenges, Vol. VIII, C. Vogiatzis, J. Walteros and P. Pardalos, Eds., pp. 45-76, Springer, 2014.
- A Relyea and M. Pachter, “A Covariance Analysis of Vision-Aided Inertial Navigation: 3-D Free Fall Case,” Advances in Estimation, Navigation, and Spacecraft Control, D. Choukroun, Editor, pp. 309-328, Springer, 2015, ISBN 978-3-662-44784-0.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

- Bindewald, J.M., Miller, M.E. and Peterson, G.L., “A Function-to-Task Process Model for Adaptive Automation System Design,” International Journal of Human-Computer Studies, Vol. 72, No. 12, 2014, pp. 822-834.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- Bindewald, J.M., Peterson, G.L. and Miller, M.E., “Trajectory Generation with Player Modeling,” Proceedings of the Twenty-Eighth Canadian Conference on Artificial Intelligence, 2015, pp. 42-49.

PIERCE, SCOTT, Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

- “Star Tracker Integration Modeling for UAV Flight Profiles.” Sponsor: AFRL/RW. Funding: \$25,000 – Pierce 80%, Raquet 20%.

REFEREED JOURNAL PUBLICATIONS

Nathan E. Smith, Richard G. Cobb, Scott J. Pierce, and Vincent M. Raska. "Uncertainty Corridors for Three-Dimensional Collision Avoidance," Journal of Guidance, Control, and Dynamics, Vol. 38, No. 6 (2015), pp. 1156-1162.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Pierce, S., J. Raquet, G. Hennessy, "Satellite Observations Tightly-Integrated with Inertial Measurement Units for Navigation in GPS-Denied Environments," ION Joint Navigation Conference, Orlando, FL, Jun 2015.

RAQUET, JOHN F., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Absolute Positioning Using Earth Fields." Sponsor: DARPA. Funding: \$260,000 – Raquet 60%, Kauffman 40%.

"ANT Center and Laboratory Support per Attachment 6 of the MOA between AFIT and AFRL." Sponsor: AFRL/RV. Funding: \$250,000 – Raquet 50%, Haker 50%.

"Development of Electronic Warfare (EW) Trainer." Sponsor: AFRL/FY. Funding: \$120,000.

"GNSS Testbed Development." Sponsor: AFRL/RV. Funding: \$297,245 – Raquet 10%, Gunawardena 90%.

"GPS/Inertial/Vision Integrated Navigation System (GIVINS) Development." Sponsor: AFRL/RW. Funding: \$265,000 – Raquet 50%, Woolley 25%, Jacques 25%.

"Multi-Sensor Navigation Demonstration." Sponsor: USA CERDEC. Funding: \$30,000.

"Project Management Support for Autonomous Aerial Vehicle Competition." Sponsor: AFRL/RV. Funding: \$5,000.

"Star Trackers for Non-GPS Navigation." Sponsor: Draper Lab. Funding: \$20,000 – Raquet 90%, Woolley 10%.

"Support for Alternative Navigation Research." Sponsor: DARPA. Funding: \$50,000 – Raquet 80%, Pierce 20%.

REFEREED JOURNAL PUBLICATIONS

Shockley, J. and J. Raquet, "Navigation of Ground Vehicles Using Magnetic Field Variations," Navigation, Vol. 61 No. 4, pp. 237-252, Winter (Dec) 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Gunawardena, S., J. Raquet, F. van Graas, "Chip Transition-Edge Based Signal Tracking for Ultra-Precise GNSS Monitoring Applications," Proceedings of Pacific PNT, Honolulu, HI, Apr 2015.

Calhoun, S. and J. Raquet, "Vision-Aided Integrity Monitor for Precision Relative Navigation Systems," Proceedings of 2015 ION International Technical Meeting, Dana Point, CA, Jan 2015.

Leines M. and J. Raquet, "Terrain Reference Navigation Using SIFT Features in LiDAR Range Data," Proceedings of 2015 ION International Technical Meeting, Dana Point, CA, Jan 2015.

Canciani A. and J. Raquet, “Absolute Positioning Using the Earth's Magnetic Anomaly Field,” Proceedings of 2015 ION International Technical Meeting, Dana Point, CA, Jan 2015.

Soeder, J. and J. Raquet, “Image-Aided Navigation Using Cooperative Binocular Stereopsis,” Proceedings of ION GNSS+ 2014, Tampa, FL, Sep 2014.

Pierce, S., J. Raquet, B. Dorland, and G. Hennessey, “A Performance Model of an Integrated Navigation Solution Using Satellite Observations from Star Trackers,” Proceedings of ION GNSS+ 2014, Tampa, FL, Sep 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Pierce, S., J. Raquet, G. Hennessey, “Satellite Observations Tightly-Integrated with Inertial Measurement Units for Navigation in GPS-Denied Environments,” ION Joint Navigation Conference, Orlando, FL, Jun 2015.

Marietta, D., M. Smearcheck, and J. Raquet, “SPIDER and FLY: Navigation Data Simulation and Post-Processing Software Suite,” ION Joint Navigation Conference, Orlando, FL, Jun 2015.

Venable, D., J. Campbell, K. Kauffman, J. Raquet, M. Smearcheck, D. Marietta, J. Kresge, “Unmanned Aerial System Vision Aided Navigation (UVAN) Rapid Reaction Effort,” ION Joint Navigation Conference, Orlando, FL, Jun 2015.

Gunawardena, S., M. Carroll, J. Raquet, “GNSS Threat Detection Using Nominal Chip-Shape Monitoring: Feasibility Study Using Live Sky Data,” ION Joint Navigation Conference, Orlando, FL, Jun 2015.

PATENTS

Haker, J. and J. Raquet, “Global Navigation Satellite System Signal Decomposition and Parameterization Algorithm,” US Patent No. 9,025,640. Issued 5 May 2015.

RUSNOCK, CHRISTINA, F., Maj, Department of Systems Engineering and Management

SEAL, MICHAEL D., Maj, Department of Electrical and Computer Engineering

SWENSON, ERIC D., Department of Aeronautics and Astronautics

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

WOOD, AIHUA W., Department of Mathematics and Statistics

WOOLLEY, BRIAN G., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Automated Aerial Refueling: Precise Relative Navigation from Stereo Vision.” Sponsor: AFRL/RQ. Funding: \$94,455 – Woolley 50%, Raquet 25%, Pecarina 25%.

“Machine Learning Algorithms for Anomaly Detection in Persistent Infrared Systems.” Sponsor: NASIC. Funding: \$35,000.

“Unmanned Air Vehicle (UAV) and Payload Systems Technology (UPST).” Sponsor: Undisclosed. Funding: \$96,800 – Woolley 51%, Jacques 49%.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Justin S. Tharp and Brian G. Woolley, "Structure from Motion Based Vision-Aided Navigation," In Proceedings of the 9th annual information meeting of the Consortium of Ohio Universities on Navigation and Timekeeping (COUNT'15).

Kyle S. Werner and Brian G. Woolley, "Toward Automated Aerial Refueling: Relative navigation from Stereo Vision," In Proceedings of the 9th annual information meeting of the Consortium of Ohio Universities on Navigation and Timekeeping (COUNT'15), 7-8 Apr 15, Columbus, OH, USA.

6.2. CENTER FOR CYBERSPACE RESEARCH

Center for Cyberspace Research (CCR)

Director 255-6565 x4690

Executive Program Coordinator 255-3636 x4602

Homepage: <http://www.afit.edu/CCR>

6.2.1. DOCTORAL DISSERTATIONS

BINDEWALD, JASON M., *Adaptive Automation Design and Implementation*. AFIT/ENG/DS/15S-007.
Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFOSR.

CARBINO, TIMOTHY J., *Exploitation of Unintentional Ethernet Cable Emissions Using Constellation Based-Distinct Native Attribute (CB-DNA) Fingerprints to Enhance Network Security*. AFIT/ENG/DS/15S-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV.

CLARK, MICHAEL R., *The Theory and Application of Privacy-Preserving Computation*.
AFIT/ENG/DS/15M-013. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFRL/RI.

LIN, ALAN C., *Network Analysis with Stochastic Grammars*. AFIT/ENG/DS/15S-014. Faculty Advisor:
Dr. Gilbert L. Peterson. Sponsor: N/A.

MAILLOUX, LOGAN O., *A Performance and Security Analysis of Decoy Enabled Quantum Key Distribution Systems*. AFIT/ENV/DS/15S-041. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS.

STEWART, KYLE E., *Novel Techniques for Secure Use of Public Cloud Computing Resources*.
AFIT/ENG/DS/15S-018. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

6.2.2. MASTER'S THESES

AUNG, RONALD M., *Operational Implementation Impact on RF-DNA Fingerprinting Performance*.
AFIT/ENG/MS/15M-008. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/RV.

BAILEY, ERIC J., *Single Platform Geolocation of Radio Frequency Emitters*. AFIT/ENG/MS/15M-028.
Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFRL/RV.

BOYTER, DEVLIN T., *Identifying Image Manipulation Software from Image Features*.
AFIT/ENG/MS/15M-051. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/RI.

CERNERA, ROBERT C., *A System-Level Throughput Model for Quantum Key Distribution*. AFIT/ENG/MS/15S-069. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: LTS.

CORVIN, CHARITO M., *A Feasibility Study on the Application of the ScriptGenE Framework as an Anomaly Detection System in Industrial Control Systems*. AFIT/ENG/MS/15S-010. Faculty Advisor:
Dr. Barry E. Mullins. Sponsor: DHS.

DYE, GREGORY W., *Using IMPRINT to Guide Experimental Design with Simulated Task Environments*.
AFIT/ENG/MS/15J-052. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: 711 HPW/RH.

ENGLE, RYAN D., *Modeling, Simulation, and Analysis of a Decoy State Enabled Quantum Key Distribution System*. AFIT/ENV/MS/15M-181. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: LTS.

GONZALES, RAMIRO N., Jr., *Application of Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting to Power Substation Emissions*. AFIT/ENG/MS/15M-034. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.

HERUSKA, BENJAMIN N., *Design and Characterization of a Secure Automatic Dependent Surveillance-Broadcast Prototype*. AFIT/ENG/MS/15M-041. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/R.Y.

HUTCHINSON, SCOTT A., *Distributed Kernelized Locality-Sensitive Hashing for Faster Image Based Navigation*. AFIT/ENG/MS/15M-070. Faculty Advisor: Dr. Gilbert L. Peterson. Sponsor: AFRL/R.Y.

KAMRUD, ALEXANDER J., *Unified Behavior Framework for Discrete Event Simulation Systems*. AFIT/ENG/MS/15M-017. Faculty Advisor: Dr. Douglas D. Hodson. Sponsor: AFRL/R.Q.

LOWDER, WILLIAM M., *Real-Time RF-DNA Fingerprinting of ZigBee Devices Using a Software-Defined Radio with FPGA Processing*. AFIT/ENG/MS/15M-054. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.

NAGY, JOHN E., *Entity Recognition via Multimodal Sensor Fusion with Smart Phones*. AFIT/ENG/MS/15M-023. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

NINE, JULIANA J., *(U) Detection, Classification, and Mitigation of Inauthentic GPS Signals Using Radio Frequency Distinct Native Attributes and Direction of Arrival Estimation*. AFIT/ENG/MS/15M-065. Faculty Advisor: Lt Col Phillip M. Corbell. Sponsor: AFRL/R.Y.

PALTZER, NICHOLAS J., *Network Routing Using the Network Tasking Order, a Chron Approach*. AFIT/ENG/MS/15M-059. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: AFOSR.

PAUL, BRADLY S., *Airborne Network Optimization with Dynamic Network Update*. AFIT/ENG/MS/15M-030. Faculty Advisor: Maj Thomas E. Dube. Sponsor: AFOSR.

POSTON, HOWARD E., *Generation of Strategies for Environmental Deception in Two-Player Normal-Form Games*. AFIT/ENG/MS/15J-004. Faculty Advisor: Dr. Brett J. Borghetti. Sponsor: N/A.

RICH, MICHAEL D., *Evaluating Machine Learning Classifiers for Hybrid Network Intrusion Detection Systems*. AFIT/ENG/MS/15M-046. Faculty Advisor: Dr. Robert F. Mills. Sponsor: AFRL/R.Y. & AF CyTCoE.

SHIREY, RUSSELL G., *Git as an Encrypted Distributed Version Control System*. AFIT/ENG/MS/15M-022. Faculty Advisor: Dr. Kenneth M. Hopkinson. Sponsor: N/A.

TAO, ALBERT B., *Radio Frequency Distinct Native Attribute (RF-DNA) Fingerprinting Applied to SatCom Short Burst Data Modems Using a Software-Defined Radio*. AFIT/ENG/MS/15M-043. Faculty Advisor: Dr. Michael A. Temple. Sponsor: AFRL/R.Y.

VAN, TAN, *Characterizing Multiple Wireless Sensor Networks for Large-Scale Radio Tomography*. AFIT/ENG/MS/15M-057. Faculty Advisor: Dr. Richard K. Martin. Sponsor: AFOSR.

VUKCEVIC, ALEXANDER M., *Army Information Technology Procurement: A Business Process Analysis*. AFIT/ENV/MS/15M-207. Faculty Advisor: Dr. Michael R. Grimaila. Sponsor: CIO.

WARNER, PHILLIP C., *Automatic Configuration of Programmable Logic Controller Emulators*. AFIT/ENG/MS/15M-024. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: DHS.

WINN, MICHAEL M., *Constructing Cost-Effective and Targetable ICS Honeypots Suited for Production Networks*. AFIT/ENG/MS/15M-045. Faculty Advisor: LTC Mason J. Rice. Sponsor: DHS.

YAXLEY, KATE J., *Communication and Jamming BDA of OFDMA Communication Systems Using the Software Defined Radio Platform WARP*. AFIT/ENG/MS/15M-073. Faculty Advisor: Dr. Richard K. Martin. Sponsor: N/A.

ZEITLIN, ZACHARY J., *Fingerprinting Software Defined Networks and Controllers*. AFIT/ENG/MS/15M-067. Faculty Advisor: Dr. Barry E. Mullins. Sponsor: N/A.

6.2.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BINDEWALD, JASON R., Capt, Department of Electrical and Computer Engineering

BORGHETTI, BRETT J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Developing a Cyber Multi-Attribute Task Battery and Cognitive Model for Human Performance Evaluation in Cyber Operations.” Sponsor: AFOSR. Funding: \$34,099 – Borghetti 50%, Rusnock 50%.

“Support to NSF Scholarship for Service Program.” Sponsor: AFRL/RV. Funding: \$12,247.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Shirey, R.G., Hopkinson, K.M., Stewart, K.E., Hodson, D.D. and Borghetti, B.J., “Analysis of Implementations to Secure Git for Use as an Encrypted Distributed Version Control System,” 48th IEEE Hawaii International Conference on System Sciences, Kauai, HI, 5-8 Jan 15, pp 1530-1605.
<http://conferences.computer.org/hicss/2015/papers/7367f310.pdf>.

CARBINO, TIMOTHY J., Capt, Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Carbino, T. J., Temple, M., & Bihl, T. J. “Ethernet Card Discrimination using Unintentional cable Emissions and Constellation-Based Fingerprinting”. In Int’l Conf on Computing, Networking and Communications (ICNC), 2015 (pp. 369-373). IEEE.

BOOKS AND CHAPTERS IN BOOKS

Carbino, T. J., Temple, M. A., and Lopez Jr, J. “A Comparison of PHY-Based Fingerprinting Methods Used to Enhance Network Access Control,” In ICT Systems Security and Privacy Protection, Springer International Publishing, pp. 204-217, May 2015.

COLLINS, PETER J., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

M. W. Lukacs, P. J. Collins, and M. A. Temple, “Classification Performance using RF-DNA Fingerprinting of Ultra-Wideband Noise Waveforms,” IET Electronic Letters, Vol. 51, No. 10, pp. 787-789, May 2015.

M. W. Lukacs, A. J. Zeqolari, P. J. Collins, and M. A. Temple, “RF-DNA Fingerprinting for Antenna Classification,” IEEE Antennas and Wireless Propagation Letters, Vol. PP, No. 99, Mar 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

M. W Lukacs, P. J. Collins, and M. A. Temple, "Device Classification Performance Modeling Using UWB Stimulated RF-DNA Fingerprinting," 2015 IEEE AP-S Symposium on Antennas and Propagation and URSI CNC/USNC Joint Meeting, Vancouver, BC, Accepted, to be presented 19-25 Jul 2015.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"RFI Mitigation Support." Sponsor: AFRL/RV. Funding: \$40,000.

COUTU, RONALD, A., Jr., Department of Electrical and Computer Engineering

GRMAILA, MICHAEL R., Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

"Communication Systems Security." Sponsor: NSA. Funding: \$110,000 – Grmaila 50%, Hodson 50%.

REFEREED JOURNAL PUBLICATIONS

Morris, J.D., Grmaila, M.R., Hodson, D., McLaughlin, C., and Jacques, D., "Using the Discrete Event System Specification to Model Quantum Key Distribution System Components," *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, Sage Press, DOI: 10.1177/1548512914554404, Oct 17, 2014, pp 1-24.

Ramsey, B., Mullins, B., Temple, M., and Grmaila, M.R., "Wireless Intrusion Detection and Device Fingerprinting through Preamble Manipulation," *IEEE Transactions on Dependable and Secure Computing*, pp(99), DOI: 10.1109/TDSC.2014.2366455, Nov 2014, pp. 1-14.

Mailloux, L.O., Morris, J.D., Grmaila, M.R., Hodson, D.D., Jacques, D.R., Colombi, J.M., McLaughlin, C.V., and Holes, J.A., "A Flexible Modeling Framework for Studying Quantum Key Distribution System Implementation Non-Idealities," *IEEE Access*, Vol. 3, Jan 2015, pp. 110–130.

Mailloux, L.O., Grmaila, M.R., Hodson, D.D., Baumgartner, G., and McLaughlin, C., "Performance Evaluations of Quantum Key Distribution System Architectures," *IEEE Security and Privacy*, 13(1), Jan-Feb 2015, pp. 30-40.

Sorensen, N.T. and Grmaila, M.R., "Discrete Event Simulation of the quantum channel within a Quantum Key Distribution system," *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, Sage Press, DOI: 10.1177/1548512915569743, Feb 2015, pp. 1-8.

Mailloux, L.O., Engle, R.D., Grmaila, M.R., Hodson, D., Colombi, J.M., and McLaughlin, C., "Modeling Decoy State Quantum Key Distribution Systems," *Journal of Defense Modeling and Simulation: Applications, Methodology, Technology*, DOI: 10.1177/1548512915588572, Jun 2015, pp. 1-18.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Holes, J., Mailloux, L., Grmaila, M.R., and Hodson, D., "An Efficient Testing Process for a Quantum Key Distribution System Modeling Framework," *Proceedings of the 13th International Conference on Scientific Computing (CSC15)*, Las Vegas, NV, 27-30 Jul 2015.

GUNAWARDENA, SANJEEV, Department of Electrical and Computer Engineering

HODSON, DOUGLAS D., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

- L.O. Mailloux, R.D. Engle, M.R. Grimaila, D.D. Hodson, J.M. Colombi, and C.V. McLaughlin, “Modeling Decoy State Enabled Quantum Key Distribution Systems,” The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, Accepted for Publication Apr 2015.
- L.O. Mailloux, M.R. Grimaila, D.D. Hodson, G. Baumgartner, and C. McLaughlin, “Performance Evaluations of Quantum Key Distribution System Architectures,” IEEE Security and Privacy, Jan/Feb 2015, pp. 30-40. DOI: [10.1109/MSP.2015.11](https://doi.org/10.1109/MSP.2015.11)
- L.O. Mailloux, J.D. Morris, M.R. Grimaila, D.D. Hodson, D.R. Jacques, J.M. Colombi, C.V. McLaughlin, and J.A. Holes, “A Modeling Framework for Studying Quantum Key Distribution System Implementation Non-Idealities,” IEEE Access, Jan 2015. DOI: [10.1109/ACCESS.2015.2399101](https://doi.org/10.1109/ACCESS.2015.2399101)
- J.D. Morris, M.R. Grimaila, D. Hodson, C. McLaughlin, and D. Jacques, “Using the Discrete Event System Specification to Model Quantum Key Distribution System Components,” The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, 17 Oct 2014, pp. 1-24, DOI: [10.1177/1548512914554404](https://doi.org/10.1177/1548512914554404)

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- L.O. Mailloux, R.D. Engle, M.R. Grimaila, D.D. Hodson, J.M. Colombi, and C.V. McLaughlin, “Modeling Decoy State Enabled Quantum Key Distribution Systems,” The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, Accepted for Publication Apr 2015.
- L.O. Mailloux, M.R. Grimaila, D.D. Hodson, G. Baumgartner, and C. McLaughlin, “Performance Evaluations of Quantum Key Distribution System Architectures,” IEEE Security and Privacy, Jan/Feb 2015, pp. 30-40. DOI: [10.1109/MSP.2015.11](https://doi.org/10.1109/MSP.2015.11)
- L.O. Mailloux, J.D. Morris, M.R. Grimaila, D.D. Hodson, D.R. Jacques, J.M. Colombi, C.V. McLaughlin, and J.A. Holes, “A Modeling Framework for Studying Quantum Key Distribution System Implementation Non-Idealities,” IEEE Access, Jan 2015. DOI: [10.1109/ACCESS.2015.2399101](https://doi.org/10.1109/ACCESS.2015.2399101)
- J.D. Morris, M.R. Grimaila, D. Hodson, C. McLaughlin, and D. Jacques, “Using the Discrete Event System Specification to Model Quantum Key Distribution System Components,” The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology, 17 Oct 2014, pp. 1-24, , DOI: [10.1177/1548512914554404](https://doi.org/10.1177/1548512914554404)

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

- “A Cognitive and Context Aware Approach to Networking in Mobile Environments.” Sponsor: AFOSR. Funding: \$42,169.
- “Cognitive and Mobile Networks.” Sponsor: AFRL/RI. Funding: \$120,000.
- “Enhancing Satellite Security (New).” Sponsor: Undisclosed. Funding: \$55,000.
- “Using Cognitive Radios to Enhance Communications Capabilities.” Sponsor: Undisclosed. Funding: \$45,000 – Hopkinson 51%, Silvius 49%.
- “Using Cognitive Radios to Enhance Communication Capabilities (Continuation).” Sponsor: Undisclosed. Funding: \$55,000.

REFEREED JOURNAL PUBLICATIONS

Shipman, C.M., Hopkinson, K.M., Lopez, J., Con-Resistant Trust for Improved Reliability in a Smart Grid Special Protection System, IEEE Transactions on Power Delivery, Vol. 30, Issue 1, Feb 2015, pp. 455-462.

Clark, M.R., Hopkinson, K.M., Transferable Multiparty Computation with Applications to the Smart Grid, IEEE Transactions on Information Forensics and Security, Vol. 9, Issue 9, Sep 2014, pp. 1356-1366.

Fadul, J.E., Hopkinson, K.M., Andel, T.R., *Sheffield, C.A., A Trust Management Toolkit for Smart Grid Protection Systems, IEEE Transactions on Power Delivery, Vol. 29, Issue 4, Aug 2014, pp. 1768-1779.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Shirey, R.G., Hopkinson, K.M., Stewart, K., Hodson, D.D., Borghetti, B.J., Securing Git for Use as an Efficient and Productive Wide-Scale Collaboration Version Control System (VCS) Hosted on an Unsecure Environment, 48th Annual Hawaii International Conference on System Sciences (HICSS), 5-8 Jan 2015, Kauai, HI, USA, pp. 5310-5319.

Bodnar, T., Tucker, C., Hopkinson, K., Bilen, S.G., Increasing the Veracity of Event Detection on Social Media Networks Through User Trust Modeling, IEEE International Conference on Big Data (IEEE BigData 2014), 27-30 Oct 2014, Washington DC, USA, pp. 636-643.

MAGNUS, AMY L., Department of Engineering Physics

MARTIN, RICHARD K., Department of Electrical and Computer Engineering

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Development Support for Hardware Assurance.” Sponsor: AFRL/RV. Funding: \$73,851.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Abraham, R. K. Martin, and K. Mathews, “Combining Image Processing with Signal Processing to Improve Radio Position Estimation,” in Proc. IEEE Vehicular Technology Conf. 2015-Spring, Glasgow, Scotland, May 2015, 4 pgs.

MENDENHALL, MICHAEL J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Analytic Cloud-Based Outage Prediction.” Sponsor: NSA. Funding: \$91,116 – Mendenhall 33%, Lin 33%, Peterson 33%.

“Phase I Support: DISA Critical Infrastructure Protection.” Sponsor: DISA. Funding: \$30,000.

MILLS, ROBERT F., Department of Electrical and Computer Engineering

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Vaughan, S.L., Mills, R.F., Grimaila, M.R., Peterson, G.L., Oxley, M.E., Dube, T.E., and Rogers, S.K., “QuEST for Malware Type-Classification,” SPIE Defense+ Security. International Society for Optics and Photonics, Baltimore MD, 17-21 Apr 2015.

BOOKS AND CHAPTERS IN BOOKS

Steven K. Rogers, Robert Mills, Michael D. Rich, Jared L. Culbertson, Ronald Hartung, Michael Young, and Andres F. Rodriguez, "Situation Consciousness for Autonomy in Cyber?," to appear in *Evolution of Cyber Technologies and Operations to 2035: The Rise of Disruptive Innovation*, ed: M. Blowers, Springer. 2015.

MULLINS, BARRY E., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Development and Implementation of a Testbed for Research and Analysis of Malware." Sponsor: DHS. Funding: \$225,000 – Mullins 20%, Humpheries 20%, Butts 20%, Robinson 20%.

"Software Defined Networking Research Support." Sponsor: NSA. Funding: \$120,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

"IASP Tuition and Resource Support for the AFIT Center for Cyberspace Research (CCR)." Sponsor: NSA. Funding: \$130,308.

REFEREED JOURNAL PUBLICATIONS

M. M. Winn, M. J. Rice, S. Dunlap, J. Lopez, B. E. Mullins, "Constructing Cost-Effective And Targetable Industrial Control System Honeypots For Production Networks," *International Journal of Critical Infrastructure Protection*, 1 May 2015, Elsevier, DOI: <http://dx.doi.org/10.1016/j.ijcip.2015.04.002>, pp. 1-12.

B.W. Ramsey, T. D. Stubbs, B. E. Mullins, M. A. Temple, and M. A. Buchner, "Wireless critical infrastructure protection using low-cost RF fingerprinting receivers," *International Journal of Critical Infrastructure Protection*, 11 Dec 2014, Elsevier, DOI: 10.1016/j.ijcip.2014.11.002, pp. 1-20.

J. T. Hagen and B. E. Mullins, "Network Vulnerability Analysis of the Player Command and Control Protocol," *International Journal of Security and Networks (IJSN)*, Inderscience Publishers, Vol. 9, No. 3, 2014, pp. 154-166.

N. J. Kulesza, B. W. Ramsey, and B. E. Mullins, "Radio Frequency Fingerprinting through Preamble Manipulation," *The Journal of Information Warfare*, Peregrine Technical Solutions, Vol. 13, No. 2, 2014, pp. 23-32.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

B.W. Ramsey, B. E. Mullins, W. M. Lowder, and R. M. Speers, "Sharpening the Stinger: Tuning KillerBee for Critical Infrastructure Warwalking," *IEEE Military Communications Conference 2014 (MILCOM 2014)*, Baltimore MD, 6-8 Oct 14, pp. 104-109.

PACHTER, MEIR, Department of Electrical and Computer Engineering

PECARINA, JOHN M, Maj, Department of Electrical and Computer Engineering

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

REFEREED JOURNAL PUBLICATIONS

Bindewald, J.M., Miller, M.E. and Peterson, G.L., "A Function-to-Task Process Model for Adaptive Automation System Design," *International Journal of Human-Computer Studies*, Vol. 72, No. 12, 2014, pp. 822-834.

RAMSEY, BENJAMIN W. P., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Combined Effects Analysis.” Sponsor: AFRL/RV. Funding: \$35,000.

“Wireless Network Research Support.” Sponsor: NSA. Funding: \$100,000.

REFEREED JOURNAL PUBLICATIONS

B. Ramsey, T. D. Stubbs, B. E. Mullins, M. A. Temple, “Wireless Critical Infrastructure Protection using Low-Cost RF Fingerprinting Receivers,” *Int’l Journal of Critical Infrastructure Protection*, Dec 2014, doi: 10.1016/j.ijcip.2014.11.002.

B. Ramsey, B. Mullins, M. Temple, and M. Grimaila, “Wireless Intrusion Detection and Device Fingerprinting through Preamble Manipulation,” in *IEEE Transactions on Dependable and Secure Computing*, Vol. 12, No. 5, pp. 585-596, Sep-Oct. 2015, doi: 10.1109/TDSC.2014.2366455

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B. Ramsey, B. Mullins, W. Lowder, and M. Temple, “Sharpening the Stinger: Tuning KillerBee for Critical Infrastructure Warwalking,” *Military Communications Conference 2014 (MILCOM 2014)*, Baltimore, MD, 6-8 Oct 2014, pp. 104-109.

C. Badenhop, J. Fuller, J. Hall, B. Ramsey and M. Rice, “Evaluating ITU-T G.9959 wireless systems in the critical infrastructure,” *9th Annual IFIP WG 11.10 International Conference on Critical Infrastructure Protection*, Arlington, VA, 16-18 Mar 2015.

H. Patel, M. Temple, and B. Ramsey, “Comparison of High-end and Low-end Receivers for RF-DNA Fingerprinting,” *Military Communications Conference 2014 (MILCOM 2014)*, Baltimore, MD, 6-8 Oct 2014, pp. 24-29.

RICE, MASON J., LTC, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“MUTC Integrated SCADA Testbed (MISTB) Development.” Sponsor: AFSPC. Funding: \$15,026.

RUSNOCK, CHRISTINA, F., Maj, Department of Systems Engineering and Management

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Rusnock, C.F., Borghetti, B.J., and McQuaid, I.W. (2015). Objective-Analytical Measures of Workload – the Third Pillar of Workload Triangulation. *Foundations of Augmented Cognition*. 9th International Conference on Augmented Cognition, held as part of the 17th International Conference on Human-Computer Interaction, Los Angeles, CA, 2-7 Aug 2015.

STONE, SAMUEL J., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“Phase I Support RF-Based Characterization of Systems.” Sponsor: AFRL/RV. Funding: \$45,000.

REFEREED JOURNAL PUBLICATIONS

S. Stone, M. Temple, "Detecting anomalous programmable logic controller behavior using RF-based Hilbert transform features and a correlation-based verification process," International Journal of Critical Infrastructure Protection, Vol. 9, pp. 41-51, Jun 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

B. Stone, S. Stone, "Radio Frequency Based Reverse Engineering of Microcontroller Program Execution," NAECON OIS Conference, 17-19 Jun 2015 University of Dayton's River Campus, Dayton, OH.

J. Wylie, S. Stone, "Detecting Anomalous Behavior in Microcontrollers Using Unintentional Radio Frequency (RF) Emissions," NAECON OIS Conference, 17-19 Jun 2015 University of Dayton's River Campus, Dayton, OH.

TEMPLE, MICHAEL A., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"MUTC MISTB Development." Sponsor: USA/Camp Atterbury. Funding: \$174,250 – Temple 50%, Hill 50%.

"MUTC RFINT Research, Development and Demonstration." Sponsor: 2MSOB. Funding: \$28,252 – Temple 50%, Rice 50%.

"MUTC RFINT Research, Development and Demonstration." Sponsor: USASOC. Funding: \$12,208 – Temple 50%, Rice 50%.

"RFINT for Commercial Communications (Continuation)." Sponsor: Undisclosed. Funding: \$153,523.

REFEREED JOURNAL PUBLICATIONS

Riesing, Temple and Jackson, "Authorized and Rogue Device Discrimination Using Dimensionally Reduced RF-DNA Fingerprints," IEEE Trans on Info Forensics and Security, Vol. 10, Issue. 6, pp. 1180-1192, Jun 2015.

Stone, Temple, Baldwin, "Detecting Anomalous PLC Behavior Using RF-Based Hilbert Transform Features and a Correlation-Based Verification Process," Int'l Jour Critical Infrastructure Protection, Vol. 9, pp. 41-51, Jun 2015.

Lukacs, Collins, Temple, "Classification Performance using "RF-DNA" Fingerprinting of Ultra-Wideband Noise Waveforms," IET Electronic Letters, Vol. 51, Issue. 10, pp. 787-789, May 2015.

Patel, Temple, Baldwin, Ramsey, "Introduction of a Random Forest Classifier to ZigBee Device Network Authentication Using RF-DNA Fingerprinting," Jour of Information Warfare (JIW), Vol. 13, Issue: 3, pp. 33-45, Aug 2014.

Patel, Temple, Baldwin, "Improving ZigBee Device Network Authentication Using Ensemble Decision Tree Classifiers with RF-DNA Fingerprinting," IEEE Trans on Reliability, Vol. 64, No. 1, pp. 221-233, Mar 2015.

Ramsey, Stubbs, Mullins, Temple, Buckner, "Wireless Critical Infrastructure Protection Using Low-Cost RF Fingerprinting Receivers," Int'l Jour of Critical Infrastructure Protection (IJCIP), Vol. 8, pp. 27-39, Jan 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Lukacs, Collins, Temple, Device Classification Performance Modeling Using UWB Stimulated “RF-DNA” Finger-printing 2015 Int’l Sym on Antennas & Propagation (APS/URSI), Vancouver, BC, Canada, Jul 2015.

Carbino, Temple, Lopez, “A Comparison of PHY-Based Fingerprinting Methods to Enhance Network Access,” 2015 Int’l Conf on Sys Security and Privacy (IFIP-SEC), Hamburg, GE, pp. 204-217, May 2015, 22% Accept Rate.

Carbino, Temple, “Ethernet Card Discrimination Using Unintentional Cable Emissions and CB-DNA Fingerprinting,” 2015 Int’l Conf on Comp, Net, and Comm (ICNC15-CNC), Anaheim, CA, pp. 369-373, Feb 2015, 30% Accept Rate.

Patel, Temple, Ramsey, “Assessment of RF-DNA Fingerprinting Using Random Forest Classification With Features From High-Cost and Low-Cost Receivers,” 2014 Military Comm Conf (MILCOM14), pp. 24-29, Oct 2014.

Lopez, Temple, “Inferring Field Device Identity and Operating State Using Physical Features of HART Signals,” 2014 Int’l Conf on Critical Info Infrastructures Security (CRITIS14), Limassol, Cyprus, Oct 2014.

PATENTS

Cobb, Temple, Baldwin, Garcia, Laspe, U.S. Patent, “Intrinsic Physical Layer Authentication of Integrated Circuits,” No. 9,036,891, 19 May 2015.

6.3. CENTER FOR DIRECTED ENERGY

Center for Directed Energy (CDE)

Director 255-3636 x4506

Executive Administrator 255-3636 x4551

Homepage: <http://www.afit.edu/CDE>

6.3.1. DOCTORAL DISSERTATION

BENSON, MICHAEL R., *Identifying the Experimental and Theoretical Effective Characteristics of Nonaligned Anisotropic Metamaterials*. AFIT/ENP/DS/15J-008. Faculty Advisor:

Dr. Michael A. Marciniak. Sponsor: N/A.

BUTLER, SAMUEL D., *Experimental and Theoretical Basis for a Closed-Form Spectral BRDF Model*.

AFIT/ENP/DS/15S-021. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/R.Y.

MILLER, WOODY S., *Temperature Dependent Rubidium-Helium Line Shapes and Fine Structure Mixing Rates*. AFIT/ENP/DS/15S-027. Faculty Advisor: Dr. Glen P. Perram. Sponsor: MDA.

STEINBOCK, MICHAEL J., *Adaptive Optics for Strong Turbulence Compensation*. AFIT/ENG/DS/15S-017. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD.

6.3.2. MASTER'S THESES

ANDERSON, GREGORY M., *Development of a Standard Maritime C2N Profile Using Satellite Measurements*. AFIT/ENP/MS/15M-141. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO.

LEMIEUX, JAMES A., *Experimental Verification of the Enhanced Interferometric Phased Array Laser System*. AFIT/ENG/MS/15M-010. Faculty Advisor: Maj Milo W. Hyde. Sponsor: AFRL/RD.

ROSENTHAL, JAMES M., *Absorption Spectroscopy of Rubidium in an Alkali Metal Dispenser Cell and Bleached Wave Analysis*. AFIT/ENP/MS/15M-102. Faculty Advisor: Dr. Glen P. Perram. Sponsor: HELJTO.

STOYANOV, DIMITAR, *Investigating of Field-Collected Data Using Diffuse and Specular, Forward and Reverse Radiative Transfer Models*. AFIT/ENP/MS/15M-100. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/R.Y.

VAN ZANDT, NOAH R., *Modeled and Measured Partially Coherent Illumination Speckle Effects from Sloped Surfaces for Tactical Tracking*. AFIT/ENP/MS/15M-257. Faculty Advisor: Dr. Steven T. Fiorino. Sponsor: HELJTO.

6.3.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BAILEY, WILLIAM F., Department of Engineering Physics

BUTLER, SAMUEL D., Maj, Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. "Experimental analysis of bidirectional reflectance distribution function cross section conversion term in direction cosine space," *Optics Letters*, 40: 2445–2448 (2015). (Impact Factor: 3.292)

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. "Comparison of microfacet BRDF model elements to diffraction BRDF model elements," *Proc. SPIE*, 94720C (2015).

Butler, S. D., S. E. Nauyoks, and M. A. Marciniak. "Experimental measurement and analysis of wavelength-dependent properties of the BRDF," *Proc. SPIE*, 96110G (2015).

COBB, RICHARD G., Department of Aeronautics and Astronautics

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

"2015 AFIT Center for Directed Energy HPC Internship Program (HIP)." Sponsor: USACE. Funding: \$48,000.

"2015 AFIT Center for Directed Energy Summer Intern (DESI) Program." Sponsor: AFRL/RD. Funding: \$50,000 – Fiorino 90%, Perram 5%, Marciniak 5%.

"Additions to AFIT Atmospheric Effects Software Code for AFRL/RD." Sponsor: AFRL/RD. Funding: \$126,250.

"Airborne Aero-optics Lab Beam Control Collection and Evaluation." Sponsor: HELJTO. Funding: \$133,842.

"Atmospheric Characterization for Directed Energy Applications (Phase II SBIR)." Sponsor: MDA. Funding: \$40,000.

"CDE Model Integration with Deconfliction Project." Sponsor: AFLCMC. Funding: \$17,205.

"CY2015 HELJTO M&S TAWG Product Development." Sponsor: HELJTO. Funding: \$350,000.

"CY2015 HELJTO AP TAWG Research and Analysis." Sponsor: HELJTO. Funding: \$370,000.

"Modification of AFIT Atmospheric Software Code for AFRL/RD." Sponsor: Undisclosed. Funding: \$107,000.

"Support to AFRL Directed Energy High Performance Computing Application Software Initiative." Sponsor: AFRL. Funding: \$120,000.

"Wave Optics of Deep Atmospheric Turbulence: From Underlying Physics towards Predictive Modeling, Mitigation and Exploitation." Sponsor: AFOSR. Funding: \$270,000 – Fiorino 55%, Cusumano 45%.

REFEREED JOURNAL PUBLICATIONS

He, P., C.G. Nunalee, S. Basu, J. Minet, M.A. Vorontsov and S.T. Fiorino, 2015: "Influence of Heterogeneous Refractivity on Optical Wave Propagation in Coastal Environments" *Meteorology & Atmospheric Physics*, DOI: 10.1007/s00703-015-0391-3.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Fiorino S.T., S. Shirey, A. DeMarco, P. He, and S. Basu, "Capturing realistic boundary layer aerosol and turbulence effects in WRF and other numerical weather models" Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015.

Burchett, L.R. and S.T. Fiorino, "Vertical Scaling of Cn2 in Volumetric Weather Radar Measurements" Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015.

Meier, D.C. and S.T. Fiorino, "Comparison of Index of Refraction Structure Function (Cn2) Profiles Derived from Polar-orbiting Satellite Data and Numerical Weather Prediction Models" Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015.

Basu, S.i, J.E. McCrae, Z. Pollock, P. He, C. Nunalee, S. Basu, D.G. Voelz and S. T. Fiorino, "Comparison of atmospheric refractive index gradient variations derived from time-lapse imagery and mesoscale modeling" Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015.

McCrae, J.E. and S.T. Fiorino, "Simulation of Atmospheric Compensation for a Laser Phased Array in the Presence of Target Speckle," 2015 IEEE Aerospace Conference Big Sky, MT. (1-6 Mar 2015)

Voelz, D., X. Xiao, I. Dragulin, J. Barraza, S. Basu, J.E. McCrae, Z. Pollock and S.T. Fiorino, "Low Cost Digital Photography Approach to Monitoring Optical Bending and Guiding in the Atmosphere," 2015 IEEE Aerospace Conference Big Sky, MT, 1-6 Mar 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S.T., D.C. Meier, L.R. Burchett, M.F. Via, C.A. Rice, B.J. Elmore, and K.J. Keefer, "Using Satellite, NWP, and Atmospheric Refraction Assessments to Enhance Radiative Transfer Characterizations for Remote Sensing and Directed Energy Applications," (Poster), 19th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans and Land Surface (IOAS-AOLS), 95th Annual American Meteorological Society Meeting, Phoenix, AZ. (Jan 2015)

GREENDYKE, ROBERT B., Department of Aeronautics and Astronautics

HENGHOLD, ROBERT L., Department of Engineering Physics

HYDE, MILO W., Maj, Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Beam Control for Optical Phased Array Weapons." Sponsor: AFOSR. Funding: \$24,107 – Hyde 95%, Fiorino 5%.

REFEREED JOURNAL PUBLICATIONS

- M. W. Hyde IV, S. Basu, X. Xiao, and D. G. Voelz, "Producing any desired far-field mean irradiance pattern using a partially-coherent Schell-model source," *Journal of Optics*, Vol. 17, No. 5, 055607 (6 pp.), May 2015, doi: 10.1088/2040-8978/17/5/055607. JIF: 2.010
- Milo W. Hyde IV, "Physical optics solution for the scattering of a partially-coherent wave from a circular cylinder," *Optics Communications*, Vol. 338, pp. 233-239, Mar 2015, doi: 10.1016/j.optcom.2014.10.052. JIF: 1.542
- Milo W. Hyde IV, Santasri Basu, and Jason D. Schmidt, "Two-dimensional simulation of optical wave propagation through atmospheric turbulence," *Optics Letters*, Vol. 40, No. 2, pp. 233-236, Jan 2015, doi: 10.1364/OL.40.000233. JIF: 3.179
- Santasri Basu, Milo W. Hyde IV, Xifeng Xiao, David G. Voelz, and Olga Korotkova, "Computational approaches for generating electromagnetic Gaussian Schell-model sources," *Optics Express*, Vol. 22, No. 26, pp. 31691-31707, Dec 2014, doi: 10.1364/OE.22.031691. JIF: 3.525
- Michael J. Steinbock, Jason D. Schmidt, Milo W. Hyde IV, "Laser beam control takes advantage of advanced wavefront sensing," *Laser Focus World*, Vol. 50, No. 11, pp. 41-44, Nov 2014. JIF: 0.260
- Milo W. Hyde IV, Santasri Basu, David G. Voelz, and Xifeng Xiao, "Experimentally generating any desired partially-coherent Schell-model source using phase-only control," *Journal of Applied Physics*, Vol. 118, No. 9, 093102 (10 pp.), Sep. 2015, doi: 10.1063/1.4929811. JIF: 2.183

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

- M. W. Hyde IV, S. Basu, X. Xiao, and D. G. Voelz, "Producing any desired far-field mean irradiance pattern using a partially-coherent Schell-model source and phase-only control," *Imaging and Applied Optics: Optics and Photonics Congress (OPC)*, PW3E.2 (3 pp.), Arlington, VA, Jun 2015.
- David Voelz, Xifeng Xiao, Santasri Basu, Milo W. Hyde IV, Olga Korotkova, "Modeling the electromagnetic Gaussian Schell-model source," *Imaging and Applied Optics: Optics and Photonics Congress (OPC)*, PW3E.1 (3 pp.), Arlington, VA, Jun 2015.
- Michael J. Steinbock, Milo W. Hyde IV, and Jason D. Schmidt, "LSPV+7, a branch-point-tolerant reconstructor for strong turbulence adaptive optics," *Imaging and Applied Optics: Optics and Photonics Congress (OPC)*, PTu3E.3 (3 pp.), Seattle, WA, Jul 2014.
- Matthew J. Gridley*, Milo W. Hyde IV, Mark F. Spencer, and Santasri Basu, "Experimental method of generating electromagnetic Gaussian Schell-model beams," *Proceedings of SPIE (SPIE Optics and Photonics)*, Vol. 9617, 16 pp., San Diego, CA, Aug 2015

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Michael J. Steinbock, Jack E. McCrae, and Milo W. Hyde, "A novel approach to augmenting SRI wavefront measurements with Hartmann gradient measurements in strong turbulence," *Directed Energy Professional Society (DEPS) Annual Directed Energy Symposium*, pg. 10, Anaheim, CA, Mar 2015.
- Michael J. Steinbock, Jack E. McCrae, and Milo W. Hyde, "WaveProp based simulation framework for detailed target-in-the-loop HEL system modeling," *Directed Energy Professional Society (DEPS) Annual Directed Energy Symposium*, pg. 23, Anaheim, CA, Mar 2015.

JACQUES, DAVID R., Department of Systems Engineering and Management

MARCINIAK, MICHAEL A., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Dynamic Data-Driven Focusing of Light Scattered from Diffuse Reflectors using Phase Modulation.”
Sponsor: AFOSR. Funding: \$90,060.

“Radiometrically Accurate BRDF’s in the Infrared.” Sponsor: Undisclosed. Funding: \$100,000.

“Understanding the Spectral Dependence of the BRDF.” Sponsor: AFRL/RV. Funding: \$70,000.

REFEREED JOURNAL PUBLICATIONS

Nauyoks, S. E. and Marciniak, M. A., “Effects of a measurement floor on Mueller matrix measurements in a DRR BSDF system,” *Applied Optics*, Vol. 54, No. 18, pp. 5668-5674, Jun 2015

Butler, S. D., Nauyoks, S. E., and Marciniak, M. A., “Experimental analysis of BRDF cross section conversion term in direction cosine space,” *Optics Letters*, Vol. 40, No. 11, pp. 2445-2448, Jun 2015

Benson, M. R., Kinsley, A. G., Marciniak, M. A., Seal, M. D., and Urbas, A. M., “Permittivity and permeability tensor extraction technique for arbitrary anisotropy materials,” *IEEE Photonics Journal*, Vol. 7, Issue 3, Jun 2015

Baumann, S. M., Hurst, B. E., Marciniak, M. A., Perram, G. P., “Fiber laser heating and penetration of aluminum in shear flow,” *Optical Engineering*, Vol. 53, No. 12, pp. 122510(1-7), Dec 2014

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Stoyanov, D. M., Marciniak, M. A., and Meola, J., “Comparative study of spectral diffuse-only and diffuse-specular radiative transfer models and field-collected data in the LWIR,” *Proceedings of SPIE*, Vol. 9611, Sep 2015

Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Experimental measurement and analysis of wavelength-dependent properties of BRDF” *Proceedings of SPIE*, Vol. 9611, Sep 2015

Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Comparison of microfacet BRDF model elements to diffraction BRDF model elements,” *Proceedings of SPIE*, Vol. 9472, May 2015

Baumann, S. M., Keenan, C., Marciniak, M. A., and Perram, G. P., “Spectral and temperature-dependent infrared emissivity measurements of painted metals for improved temperature estimation during laser damage testing,” *Proceedings of SPIE*, Vol. 92337, Oct 2014

PATENTS

“Remote sensing of hidden objects,” M. G. Hoelscher and M. A. Marciniak, US Patent No. 8,976,256 B2, 10 Mar 2015

MCCRAE, JACK E., Jr., Department of Engineering Physics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Santasri Basu, J.E. McCrae, Z. Pollock, P. He, C. Nunalee, S. Basu, D.G. Voelz and S. T. Fiorino, “Comparison of atmospheric refractive index gradient variations derived from time-lapse imagery and mesoscale modeling,” Propagation through and Characterization of Distributed Volume Turbulence (pcDVT), Imaging and Applied Optics Conference, Arlington VA, 7-11 Jun 2015.

- S. Basu, J. E. McCrae and S. T. Fiorino, “Estimation of the path-averaged atmospheric refractive index structure constant from time-lapse imagery,” *Proceedings of SPIE*, Vol. 9465, 94650T, May 2015.
- J. E. McCrae, and S.T. Fiorino, “Simulation of Atmospheric Compensation for a Laser Phased Array in the Presence of Target Speckle,” 2015 IEEE Aerospace Conference Big Sky, MT. (1-6 Mar 2015)
- D. Voelz, X. Xiao, I. Dragulin, J. Barraza, S. Basu, J.E. McCrae, Z. Pollock and S.T. Fiorino, “Low Cost Digital Photography Approach to Monitoring Optical Bending and Guiding in the Atmosphere,” 2015 IEEE Aerospace Conference Big Sky, MT, 1-6 Mar 2015.
- S. Basu, M. W. Hyde IV, J. E. McCrae, Jr., M. F. Spencer, and S. T. Fiorino, “Examining the validity of using a Gaussian Schell Model for modeling an extended beacon on a rough perfectly reflecting surface,” *Proceedings of SPIE*, Vol. 9224, 92240L, Oct 2014.

NAUYOKS, STEPHEN E., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

- Nauyoks, S. E. and Marciniak, M. A., “Effects of a measurement floor on Mueller matrix measurements in a DRR BSDF system,” *Applied Optics*, Vol. 54, No. 18, pp. 5668-5674, Jun 2015
- Butler, S. D., Nauyoks, S. E., and Marciniak, M. A., “Experimental analysis of BRDF cross section conversion term in direction cosine space,” *Optics Letters*, Vol. 40, No. 11, pp. 2445-2448, Jun 2015

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

- Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Experimental measurement and analysis of wavelength-dependent properties of BRDF” *Proceedings of SPIE*, Vol. 9611, Sep 2015
- Butler, S. D., Nauyoks, S. N., and Marciniak, M. A., “Comparison of microfacet BRDF model elements to diffraction BRDF model elements,” *Proceedings of SPIE*, Vol. 9472, May 2015

PERRAM, GLEN P., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

- “Diode Pumped Rare Gas Lasers.” Sponsor: HELJTO. Funding: \$378,531.
- “In-Process Monitoring of Additive Manufacturing.” Sponsor: NASA. Funding: \$63,082.
- “Merging Hyperspectral Imagery and Multi-Scale Modeling for Laser Lethality.” Sponsor: HELJTO. Funding: \$158,024 – Perram 80%, Marciniak 20%.
- “Rubidium Vapor Circulation System: Optical Diagnostics (Phase II).” Sponsor: MDA. Funding: \$112,230.

REFEREED JOURNAL PUBLICATIONS

- Edward J. Hurd, Jeremy C. Holtgrave, and Glen P. Perram, “*Intensity scaling of an optically pumped potassium laser*” *Optics Communications*, **357**, 63-33, Dec 2015.
- Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Combustion kinetics of laser irradiate porous graphite from imaging Fourier transform spectroscopy*,” accepted for *Combustion and Flame*, 2015.
- Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Thermal degradation of poly(methyl methacrylate) with a 1.064 μm Nd:YAG laser in buoyant flow*” *Polymer Degradation and Stability*, **121**, 78-89, Nov 2015.

Sean M. Baumann, Benjamin E. Hurst, Michael A. Marciniak, and Glen P. Perram, “*Fiber laser heating and penetration of aluminum in shear flow*” *Optical Engineering* **53**(12), 122510, Dec 2014.

Gordon D. Hager, Gordon E. Lott, Aaron J. Archibald, L. Blank, David E. Weeks, and Glen P. Perram, “*High pressure line shapes for Cs D1 and D2 lines and empirically informed interaction potentials*” *Journal of Quantitative Spectroscopy and Radiative Transfer*, **147**, 261-273, Nov 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Sean M. Baumann, Michael A. Marciniak and Glen P. Perram, “Spectral and temperature-dependent infrared emissivity measurements of painted metals for improved temperature estimation during laser damage testing” SPIE 2014 Laser Damage Conference, **SPIE Proc 9237**, 923713, Oct 2014.

WEEKS, DAVID E., Department of Engineering Physics

6.4. CENTER FOR OPERATIONAL ANALYSIS

Center for Operational Analysis (COA)

Director 255-6565 x4708

Projects Director 255-6565 x4251

Homepage: <http://www.afit.edu/COA>

6.4.1. DOCTORAL DISSERTATIONS

BOEHMKE, BRADLEY C., *Grabbing the Air Force by the Tail: Applying Strategic Cost Analytics to Understand and Manage Indirect Cost Behavior*. AFIT/ENS/DS/15S-076. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC & HQ USAF/A4.

PARSON, CARL R., *Approximate Dynamic Programming for Military Resource Allocation*. AFIT/ENS/DS/14D-016. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AFRL/RW.

6.4.2. MASTER'S THESES

BOEKESTEIN, BENJAMIN C., *A Predictive Logistic Regression Model of World Conflict Using Open Source Data*. AFIT/ENS/MS/15M-112. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: CAA.

KAZI, KIPTA, *Addressing Enterprise-Level Information System Deficiencies*. AFIT/ENS/MS/15M-111. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AFMC/A4.

MAYO, BENJAMIN R., *Suitability Analysis of Continuous-Use Reliability Growth Projection Models*. AFIT/ENS/MS/15M-120. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: DASD(DT&E).

6.4.3. GRADUATE RESEACH PAPERS

BEAL, JOSEPH D., *Quantifying C-17 Aircrew Training Priorities*. AFIT/ENS/GRP/15J-021. Faculty Advisor: Dr. Alan W. Johnson. Sponsor: AMC.

BOWMAN, TRACI L., *Global Container Management Process Improvements*. AFIT/ENS/GRP/15J-020. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: SDDC.

BOWYER, BRAD P., *Consolidating AMC's Contingency Response Capabilities: A Delphi Study*. AFIT/ENS/GRP/15J-026. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: USAF EC.

CLINTON, KYLE M., *Rethinking C-17 Training Requirements: Air Refueling*. AFIT/ENS/GRP/15J-025. Faculty Advisor: Dr. Alan L. Johnson. Sponsor: 62 OG.

EHMEN, JOSHUA W., *Altering Flight Schedules for Increased Fuel Efficiency*. AFIT/ENS/GRP/15J-016. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: AMC.

FREEMAN, RAHSUL J., *Mitigating the Erratic Behavior of the Transportation Working Capital Fund through Accurate Forecasting*. AFIT/ENS/GRP/15J-028. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC.

HUSTED, ALLEN D., *Identifying Knowledge, Skill, and Ability Requirements for Contracting Officer Representatives in Deployed Environments*. AFIT/ENS/GRP/15J-012. Faculty Advisor: Lt Col Christian E. Randall. Sponsor: JCS/J4.

KELLER, CHRISTOPHER J., *Analysis of Pacific Enroute Structure in Support of C-5M “Super Galaxy.”* AFIT/ENS/GRP/15J-011. Faculty Advisor: Lt Col Adam D. Reiman. Sponsor: 60 AMW/OG.

LAMOTHE, KRISTINA L., *Measuring the Effectiveness of Active Associate TFI Units.* AFIT/ENS/GRP/15J-022. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: AMC.

MACDONALD, CHRISTOPHER R., *Next Generation Tanker: Optimizing Air Refueling Capabilities with a Divested KC-10 Fleet.* AFIT/ENS/GRP/15J-019. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: AMC.

MOLLISON, ANTHONY R., *Fighting Through a Logistics Cyber Attack.* AFIT/ENS/GRP/15J-027. Faculty Advisor: Dr. Jeffrey A. Ogden. Sponsor: AMC.

PARSONS, KEVIN L., *Leveraging Global Communications Capabilities in the 618 AOC.* AFIT/ENS/GRP/15J-013. Faculty Advisor: Lt Col Matthew A. Douglas. Sponsor: 618 AOC.

POSEY, FAITH K., *Enterprise Sustainment Metrics.* AFIT/ENS/GRP/15J-018. Faculty Advisor: Dr. Kenneth L. Schultz. Sponsor: HQ USAF/A4.

UHLAND, CHRISTOPHER D., *Optimizing the Weapons Officer in the Mobility Air Forces.* AFIT/ENS/GRP/15J-023. Faculty Advisor: Lt Col Joseph R. Huscroft. Sponsor: 618 AOC.

WYFFELS, REBECCA A., *C-21 Fleet: Base Optimization.* AFIT/ENS/GRP/15J-024. Faculty Advisor: Dr. Darryl K. Ahner. Sponsor: 375 AMW/OG.

6.4.4. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AHNER, DARRYL K., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“A System of Equations to Capture SSTRO Dynamics.” Sponsor: CAA. Funding: \$145,000.

“AFIT Partnership for Modeling and Simulation.” Sponsor: AFMC/A4. Funding: \$125,000 – Ahner 25%, Miller 25%, Ogden 25%, Weir 25%.

“Methods of Determining Best Mix Options for Directed and Kinetic Energy Weapons.” Sponsor: AFRL/RW. Funding: \$100,000.

“Test and Evaluation Center of Excellence.” Sponsor: DASD. Funding: \$1,586,000 – Ahner 75%, Hill 25%.

REFEREED JOURNAL PUBLICATIONS

Ahner, D.K., and Parson, C., “Optimal Multi-stage Allocation of Weapons to Targets Using Adaptive Dynamic Programming,” *Optimization Letters*, published online Nov 2014.

Pelmets, R., Hill, R., Ahner, D., and Russell, B., “Capturing Uncertainty in Fatigue Life Data,” *International Journal of Reliability and Safety*, Mar 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Ahner, D. and Parson, C., “Approximate Dynamic Programming for the Dynamic Weapon Target Assignment Problem,” Annual INFORMS Meeting, 9-12 Nov 2014.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Ahner, D. K., “Demand Signal for Test & Evaluation Education and Training,” Special Keynote, 31st Annual International Test and Evaluation symposium, Arlington, VA, Oct 2014.

BAUER, KENNETH W., Department of Operational Sciences

CHRISSIS, JAMES W., Department of Operational Sciences

CUNNINGHAM, WILLIAM A., Department of Operational Sciences

DECKRO, RICHARD F., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“JWAC AFIT Interaction (COA).” Sponsor: JWAC. Funding: \$150,000 – Deckro 40%, Ahner 40%, Sambora 10%, Jennings 10%.

DOUGLAS, MATTHEW A., Lt Col, Department of Operational Sciences

HILL, RAYMOND R., Jr., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Application Development for Optimizing Patient Placement on the C-17 Airframe.” Sponsor: 711 HPW. Funding: \$75,000.

“The Science of Test: Advanced Test and Evaluation in Support of the DOD Test and Evaluation Enterprise.” Sponsor: OSD TRMC. Funding: \$400,000 – Hill 25%, Stone 25%, Freels 25%, Hodson 25%.

REFEREED JOURNAL PUBLICATIONS

Russell, B. D, Hill, R. R., Ahner, D. K. and Penmetsa, R., Mar 2015, “Capturing Uncertainty in Fatigue Life Data,” *International Journal of Reliability and Safety* (IJRS-94197).

HUSCROFT, JOSEPH R., Lt Col, Department of Operational Sciences

JOHNSON, ALAN W., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center (Research).” Sponsor: AFMC. Funding: \$350,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Research, Analysis and Transition Support to the Directorate of Logistics and Sustainment Air Force Sustainment Center (Research).” Sponsor: AFMC. Funding: \$90,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Boehmke, B., Johnson, A, A., White, A. Weir, J., and Gallagher, M., “A Multilevel Understanding of Tooth-to-Tail,” Proceedings of the IIE Industrial and Systems Engineering Research Conference, Nashville, TN, 30 May -2 Jun 2015.

LUNDAY, BRIAN J., LTC, Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“Research Support for the Military Theater Distribution Network Design Problem.” Sponsor: NPS. Funding: \$5,650.

MILLER, JOHN O., Department of Operational Sciences

OGDEN, JEFFERY A., Department of Operational Sciences

OVERSTREET, ROBERT E., Lt Col, Department of Operational Sciences

REIMAN, ADAM D., Lt Col, Department of Operational Sciences

ROBBINS, MATTHEW J., Lt Col, Department of Operational Sciences

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Parson, C.R., Ahner, D.K., and Robbins, M.J., “Dynamic Weapon Targeting Problem,” 2014 INFORMS National Meeting, San Francisco, CA, 9-12 Nov 2014.

SCHULTZ, KENNETH L., Department of Operational Sciences

STONE, BRIAN B., Maj, Department of Operational Sciences

STRAKOS, JOSHUA K., Lt Col, Department of Operational Sciences

WEIR, JEFFERY D., Department of Operational Sciences

SPONSOR FUNDED RESEARCH PROJECTS

“JDPAC and AFIT Distribution Research Proposal (LOC).” Sponsor: USTRANSCOM. Funding: \$95,000.

“Research, Analysis and Transitional Support to the Simulation and Analysis Facility (SIMAF).” Sponsor: AFLCMC. Funding: \$150,000 – Weir 75%, Chrissis 25%.

6.5. CENTER FOR SPACE RESEARCH AND ASSURANCE

Center for Space Research and Assurance (CSRA)

Director 255-3636 x4578

Deputy Director 255-3636 x4542

Director of Research 255-3636 x4901

Homepage: <http://www.afit.edu/CSRA>

6.5.1. DOCTORAL DISSERTATIONS

DEXTER, MICHAEL L., *Investigation and Development of Atmospheric Nuclear Detonation Optical Forensics Techniques*. AFIT/ENP/DS/15S-022. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

SLAUGHTER, ROBERT C., *Multidimensional Analysis of Nuclear Detonations*. AFIT/ENP/DS/15S-029. Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA.

6.5.2. MASTER THESES

DINH, DAVID H., *Ground Station and Mission Operations Validation for the FalconSAT-7 CubeSat*. AFIT/ENY/MS/15M-239. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: DARPA.

DINIZ, HEATHER C., *Navigation Constellation Design Using a Multi-Objective Genetic Algorithm*. AFIT/ENY/MS/15M-245. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: N/A.

EKEN, MELIH, *Modular Heat Dissipation Technique for a CubeSat*. AFIT/ENY/MS/15S-073. Faculty Advisor: Maj James L. Rutledge. Sponsor: N/A.

GREEN, ASHLEY E., *Comparison of Varying Mass-to-Yield Ratio Nuclear Detonations Using DIRSIG*. AFIT/ENP/MS/15M-094. Faculty Advisor: Dr. John W. McClory. Sponsor: DOE/NNSA.

HEPPE, JUSTIN T., *Methods of Measuring Stress Relaxation in Composite Tape Springs*. AFIT/ENY/MS/15M-221. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFRL/RV.

JACKSON, PETER T., *Determination of Dimensions and Yield of Nuclear Fireballs from Test Films*. AFIT/ENP/MS/15M-103. Faculty Advisor: Dr. John W. McClory. Sponsor: DTRA.

JENSON, DANIEL N., *Space Object Self-Tracker Experiment Design and Analysis*. AFIT/ENY/MS/15M-223. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

JEWELL, BENJAMIN A., *Applying Model-Based Systems Engineering to CubeSats: A Tailored Approach for a Reusable State Analysis Tool*. AFIT/ENV/MS/15M-194. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

MOOMEY, DANIEL, *Aiding Geostationary Space Situational Awareness Using Small Aperture Commercial Telescopes*. AFIT/ENY/MS/15M-218. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

PENN, DYLAN R., *Characterization and Modeling of a Control Moment Gyroscope*. AFIT/ENY/MS/15M-235. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

SALVADOR, VICTOR A., *Low Earth Orbit Satellite Tracking Telescope Network: Collaborative Optical Tracking for Enhanced Space Situational Awareness*. AFIT/ENV/MS/15M-200. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: AFRL/RV.

SCHMIDT, NICHOLAS S., *Evaluation of the Military Utility of Employing an Angle of Arrival Payload Hosted on a CubeSat as an Augmentation to Existing Geolocation Systems*. AFIT/ENY/MS/15M-213. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

TIBBS, MICHAEL L., *Design and Test of an Attitude Determination and Control System for a 6U CubeSat Using AFIT's CubeSat Testbed*. AFIT/ENY/MS/15M-240. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

UDELL, HEATHER M., *A CubeSat Mission Modeling Tool*. AFIT/ENY/MS/15M-243. Faculty Advisor: Dr. Richard G. Cobb. Sponsor: N/A.

VAN DYNE, DYLAN M., *Simulation of Locking Space Truss Deployments for a Large Deployable Sparse Aperture Reflector*. AFIT/ENY/MS/15M-250. Faculty Advisor: Dr. Alan L. Jennings. Sponsor: AFOSR.

WRIGHT, JONATHAN W., *Advancements of In-Flight Mass Moment of Inertia and Structural Deflection Algorithms for Satellite Attitude Simulators*. AFIT/ENY/DS/15M-261. Faculty Advisor: Dr. Eric D. Swenson. Sponsor: AFRL/RV.

6.5.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

AYRES, BRADLEY J., Department of Aeronautics and Astronautics

REFEREED JOURNAL PUBLICATIONS

Thompson, R.E., Colombi, J.M., Black, J.T., and Ayres, B.J., "Model-Based Conceptual Design Optimization Methods: Disaggregated Weather System Follow-On," *Journal of Spacecraft and Rockets*, Vol. 52, No. 4, pp. 1021-1037, Jul 2015. DOI: 10.2514/1.A33135.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Thompson, R.E., Colombi, J., Black, J.T., and Ayres, B.J., "Disaggregated Space System Conceptual Design Optimization – Stochastic Analysis Methods," 2015 IEEE Aerospace Conference, Big Sky, MT, Mar 2015. DOI: 10.1109/AERO.2015.7119027.

BAILEY, WILLIAM F., Department of Engineering Physics

COBB, RICHARD G., Department of Aeronautics and Astronautics

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Bellows, C.T., Black, J.T., Cobb, R.G., and Jennings, A.L., "Updating Track Data from Partial Serendipitous Satellite Streaks," 25th AAS/AIAA Space Flight Mechanics Meeting, Williamsburg, VA, AAS 15-268, Jan 2015.

Gross, K.H., Clark, M.A., Hoffman, J.A., Swenson, E.D., Cobb, R., Whalen, M.W., and Wagner, L., "Application and Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System," Space Forum, Pasadena, CA, Sep 2015.

COLLINS, PETER J., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

"Technical Support: Geospatial Intelligence (GEOINT) and Measurement and Signature Intelligence (MASINT)." Sponsor: NASIC. Funding: \$37,618.

COLOMBI, JOHN M., Department of Systems Engineering and Management

REFEREED JOURNAL PUBLICATIONS

Thompson, R., Colombi, J., Black J., and B. Ayres, “Disaggregated Conceptual Design Optimization Methods Applied to the Weather System Follow-on (WSF) Enterprise,” *AIAA Journal of Spacecraft and Rockets* (published online. <http://arc.aiaa.org/doi/abs/10.2514/1.A33135>). 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

Thompson, R., Colombi, J., Black J., and B. Ayres, “Disaggregated Space System Conceptual Design Optimization – Stochastic Analysis Methods,” IEEE Aerospace Conference, Big Sky, MT, 2015.

CORBELL, PHILLIP M., Lt Col, Department of Electrical and Computer Engineering

COUTU, RONALD, A., Jr., Department of Electrical and Computer Engineering

DECKRO, RICHARD F., Department of Operational Sciences

FERDINANDUS, MANUEL R., Maj, Department of Engineering Physics

FIORINO, STEVEN T., Department of Engineering Physics

FORD, THOMAS C., Lt Col, Department of Systems Engineering and Management

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-Domain Modeling & Simulation.” Sponsor: AFMC. Funding: \$103,000 – Ford 60%, Sambora 25%, Colombi 15%.

GEISEL, CHRISTOPHER D., Maj, Department of Aeronautics and Astronautics

HAWKS, MICHAEL R., Department of Engineering Physics

JACQUES, DAVID R., Department of Systems Engineering and Management

LOPER, ROBERT D., Department of Engineering Physics

MAGNUS, AMY L., Department of Engineering Physics

MCBEE, BRIAN K., Lt Col, Department of Mathematics and Statistics

MCCLORY, JOHN W., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENP Research In Support Of Defense Threat Reduction Agency Nuclear Technologies.” Sponsor: DTRA. Funding: \$65,000.

“Irradiation of Thin Film Systems.” Sponsor: AFRL/Ry. Funding: \$16,000 – McClory 50%, Hogsed 50%.

REFEREED JOURNAL PUBLICATIONS

C.A. Lenyk, D.J. Bunker, J.W. McClory, S.R. McHale, B.R. Kowash, “Defining a Methodology for Data Analysis Using Streak Films,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 85-98, May 2015.

R.C. Slaughter, T.R. Peery, J.W. McClory, “Two-dimensional temperature analysis of nuclear fireballs using digitized film,” *Journal of Applied Remote Sensing*, Vol. 9, 095096 (11 pages), Jan 2015.
<http://dx.doi.org/10.1117/1.JRS.9.095096>

S. Ashley Francis, James C. Petrosky, John W. McClory, and Cory D. Cress, “Effects of Proton and X-ray Irradiation on Graphene Field-Effect Transistors with Thin Gate Dielectrics,” *IEEE Transactions on Nuclear Science*, Vol. 61, No. 6, pp. 3010-3017, Dec 2014. <http://dx.doi.org/10.1109/TNS.2014.2364780>

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

R.C. Slaughter, J.W. McClory, D.T. Schmitt, M.D. Sambora, K.C. Walli, “3D sparse point reconstructions of atmospheric nuclear detonations,” *2014 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, pp.1-9, Oct 2014. <http://dx.doi.org/10.1109/AIPR.2014.7041938>

A.E. Green, T.R. Peery, R.C. Slaughter, J.W. McClory, “Physical Modeling of Nuclear Detonations in DIRSIG,” *2014 IEEE Applied Imagery Pattern Recognition Workshop (AIPR)*, Paper No. 0929-1 (6 pages), Oct 2014. <http://dx.doi.org/10.1109/AIPR.2014.7041907>

M.L. Dexter, J.W. McClory, B.R. Kowash, “Change in Shock Parameters for Early Time Nuclear Fireball Assuming Optically Thin Shock,” *2015 Hardened Electronics and Radiation Technology Conference* in Chantilly, VA on 23 Apr 2015.

M.C. Fish, S.R. McHale, J.W. McClory, M.L. Gettings, C.A. Lenyk, D.D. Lynes, G.D. Spriggs, “Analysis of Oscillations Near t_{min} in Nuclear Intensity Plots from Archival Streak and Frame Films,” *2015 Hardened Electronics and Radiation Technology Conference* in Chantilly, VA on 23 Apr 2015.

C.D. Reinecke, S.R. McHale, J.W. McClory, V.J. Jodoin, G.D. Spriggs, “Nuclear Fallout Cloud Analysis from Atmospheric Test Films,” *2015 Hardened Electronics and Radiation Technology Conference* in Chantilly, VA on 23 Apr 2015.

RUTLEDGE, JAMES L., Maj, Department of Aeronautics and Astronautics

SEAL, MICHAEL D., Maj, Department of Electrical and Computer Engineering

SWENSON, ERIC D., Department of Aeronautics and Astronautics

SPONSOR FUNDED RESEARCH PROJECTS

“AFRL/RV-AFIT 2012 MOA Research.” Sponsor: AFRL/RV. Funding: \$250,000 – Swenson 25%, Cobb 25%, Weisel 25%, Black 25%.

“Analysis of 3D Printing Satellite Component Housings.” Sponsor: Undisclosed. Funding: \$50,000.

“Application Development for Intelligent Imaging Satellites.” Sponsor: Undisclosed. Funding: \$97,000 – Swenson 25%, Simmons 25%, Jennings 25%, Cobb 25%.

“Satellite Design.” Sponsor: Undisclosed. Funding: \$100,000 – Swenson 50%, Cobb 50%.

“SIGINT Satellite Design, Build, and Test.” Sponsor: Undisclosed. Funding: \$80,000 – Jennings 25%, Swenson 25%, Simmons 25%, Cobb 25%.

“Use of Formal Methods Proofs and Run Time Assurance Bounds in the Design and Evaluation of a 6U CubeSat.” Sponsor: AFRL/RQ. Funding: \$25,000.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Gross, K.H., Clark, M.A., Hoffman, J.A., Swenson, E.D., Cobb, R., Whalen, M.W., and Wagner, L.,
“Application and Evaluation of Formal Methods Tools Applied to a 6U CubeSat Attitude Control System,”
Space Forum, Pasadena, CA, Sep 2015.

Penn, D. and Swenson, E.D., “Impacts of Control Moment Gyroscope Gear Slack on Spacecraft Pointing
Performance,” AIAA/Utah State University Small Satellite Conference, Logan, UT, Aug 2015.

TERZUOLI, ANDREW J., Jr., Department of Electrical and Computer Engineering

WIESEL, WILLIAM E., Jr., Department of Aeronautics and Astronautics

REFEREED JOURNAL PUBLICATIONS

Wiesel, W.E., “A Numerical Solution to the Vinti Problem,” *Journal of Guidance, Control and Dynamics*,
Vol. 38, pp. 1757-1764, 2015. DOI: 10.2514/1.G000661.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Wiesel, W.E., “Estimating Non-Gravitational Accelerations on High Area to Mass Ratio (HAMR) Objects,”
16th AMOS Conference on Space Situational Awareness, Maui, HI, Sep 2015.

6.6. CENTER FOR TECHNICAL INTELLIGENCE STUDIES AND RESEARCH

Center for Technical Intelligence Studies and Research (CTISR)

Director 255-3636 x4558

Homepage: <http://www.afit.edu/CTISR>

6.6.1. DOCTORAL DISSERTATIONS

BUTLER, SAMUEL D., *Experimental and Theoretical Basis for a Closed-Form Spectral BRDF Model*. AFIT/ENP/DS/15S-021. Faculty Advisor: Dr. Michael A. Marciniak. Sponsor: AFRL/RV.

6.6.2. MASTER'S THESES

ERWIN, WILLIAM J., *Verification and Validation of Monte Carlo N-Particle 6 for Computing Gamma Protection Factors*. AFIT/ENP/MS/15M-090. Faculty Advisor: Dr. Justin A. Clinton. Sponsor: DTRA.

6.6.3. FACULTY RESEARCH OUTPUT

Notes: Faculty Bios can be found under their respective department listings. Shared credit for funding awards is indicated by the percentages shown for each faculty member associated with the project.

BOREL-BONOHUE, CHRISTOPH C., Department of Engineering Physics

BUNKER, DAVID J., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$114,399 – Bunker 25%, McBee 25%, Oxley 25%, Hopkinson 25%.

FRANZ, ANTHONY L., Lt Col, Department of Engineering Physics

GROSS, KEVIN C., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Adapting and Improving Atmospheric Correction Algorithms for Wide-Band Hyperspectral Imaging Sensors.” Sponsor: NASIC. Funding: \$50,000 – Gross 75%, Fiorino 25%.

“Nondestructive Aircraft Coating Evaluation (NACE) Methods.” Sponsor: AFRL/RX. Funding: \$50,000.

“Overhead Persistent Infrared (OPIR) Target Discovery and Phenomenology.” Sponsor: NGA. Funding: \$125,000.

“Overhead Persistent Infrared (OPIR) Research and Algorithm Development.” Sponsor: NGA. Funding: \$100,000.

“Polarimetric HSI for Improved Radioactive Source Detection Sensitivity and Localization Accuracy.” Sponsor: DTRA. Funding: \$327,403 – Gross 45%, Kowash 45%, Marciniak 5%, McClory 5%.

“Polarimetric Hyperspectral Imaging of Metal Coupons.” Sponsor: Undisclosed. Funding: \$48,326 – Gross 75%, Marciniak 25%.

“Spectropolarimetric Imaging of Disturbed Earth (SIDE).” Sponsor: USACE. Funding: \$44,000 – Hawks 80%, Gross 20%.

“Target Tracking.” Sponsor: Undisclosed. Funding: \$55,000.

SPONSOR FUNDED EDUCATIONAL PROJECTS

“Open Skies Education Briefing.” Sponsor: NASIC. Funding: \$50,000 – Gross 50%, Terzuoli 50%.

REFEREED JOURNAL PUBLICATIONS

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Combustion kinetics of laser irradiate porous graphite from imaging Fourier transform spectroscopy*,” accepted for Combustion and Flame, 2015.

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “*Thermal degradation of poly(methyl methacrylate) with a 1.064 μm Nd:YAG laser in buoyant flow*” Polymer Degradation and Stability, **121**, 78-89, Nov 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Hans G. Korth, Kody A. Wilson, Kevin C. Gross, Michael R. Hawks and Timothy C. Zens, “Nondestructive evaluation of aircraft coatings with infrared diffuse reflectance spectra,” Proceedings of the SPIE, Vol. 9485 (2015).

Jacob A. Martin, Kevin C. Gross, “Estimating Index of Refraction from Polarimetric Hyperspectral Imagery,” presented at the OSA FTS/HISE meeting at the UCLA Lake Arrowhead Conference Center, Lake Arrowhead, CA between 1-4 Mar 2015.

Joel G. Holder, Jacob A. Martin, Kevin C. Gross, “Mathematical Model and Experimental Methodology for Calibration of a LWIR Polarimetric-Hyperspectral Imager,” presented at the 43rd IEEE International Workshop on Applied Imagery and Pattern Recognition at the Cosmo Club, Washington DC between 14-16 Oct 2014.

Jacob A. Martin, Kevin C. Gross, “Exploring polarimetric hyperspectral imaging as a tool for improved material identification,” presented at the 43rd IEEE International Workshop on Applied Imagery and Pattern Recognition at the Cosmo Club, Washington DC between 14-16 Oct 2014.

HAWKS, MICHAEL R., Department of Engineering Physics

HOPKINSON, KENNETH M., Department of Electrical and Computer Engineering

SPONSOR FUNDED RESEARCH PROJECTS

“A Cognitive Recommender System for a Closed Feedback Tasking Loop.” Sponsor: NPS. Funding: \$150,000 – Hopkinson, 20%, McBee 20%, Oxley 20%, Schubert Kabban 20%.

MAGNUS, AMY L., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“Signatures from Human Activities.” Sponsor: AFOSR. Funding: \$33,500.

MARCINIAK, MICHAEL A., Department of Engineering Physics

MCBEE, BRIAN K., Lt Col, Department of Mathematics and Statistics

MCCLORY, JOHN W., Department of Engineering Physics

SPONSOR FUNDED RESEARCH PROJECTS

“AFIT/ENP Research In Support Of Defense Threat Reduction Agency Nuclear Technologies.” Sponsor: DTRA. Funding: \$65,000.

“Rapid Location of Radiation Sources In Complex Environments Using Optical and Radiation Sensors.” Sponsor: DTRA. Funding: \$322,542 – McClory 25%, Borel-Donohue 50%, Magnus 15%, Tuttle 10%.

REFEREED JOURNAL PUBLICATIONS

A. W. Decker, S. R. McHale, M. P. Shannon, J. A. Clinton, J. W. McClory, “Novel Bonner Sphere Response Functions Using MCNP6,” *IEEE Transactions on Nuclear Science*, Vol.62, No.4, pp.1689-1694, Aug 2015.

A.W. Decker, M.P. Shannon, J.A. Clinton, J.W. McClory, S.R. McHale, “Verification and Validation of Monte Carlo N-particle Code 6 (MCNP6) with Neutron Protection Factor Measurements of an Iron Box,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 252-259, May 2015.

T. P. Genda, J. W. McClory, S. R. McHale, J.A. Clinton, B.R. Kowash, “Optimization of Detector Placement for High Energy Photon Interrogation of Special Nuclear Material,” *Journal of Radiation Effects, Research and Engineering*, Vol. 33, No. 1-E, pp. 130-140, May 2015.

W. J. Erwin, J. A. Clinton, J. W. McClory, S. R. McHale, “Verification and Validation of Monte Carlo N-Particle Code 6 (MCNP6) with Gamma Protection Factor Measurements,” *2015 Hardened Electronics and Radiation Technology Conference* in Chantilly, VA on 23 Apr 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

J.D. Casebolt, B.R. Kowash, J.W. McClory, K.C. Gross, J.M. Martin, D.J. Bunker, “Characterization of Construction Materials for Improved Radiation Background Assessments in Complex Environments,” *2014 IEEE Nuclear Science Symposium* in Seattle, WA on 5 Nov 2014.

A. W. Decker, S. R. McHale, M. P. Shannon, J. A. Clinton, J. W. McClory “Novel Bonner Sphere Response Function Calculations Using MCNP6,” *2014 IEEE Nuclear Science Symposium* in Seattle, WA on 5 Nov 2014.

OXLEY, MARK E., Department of Mathematics and Statistics

SPONSOR FUNDED RESEARCH PROJECTS

“Multi-INT Fusion for Anomaly Detection.” Sponsor: Undisclosed. Funding: \$114,399 – Bunker 25%, McBee 25%, Oxley 25%, Hopkinson 25%.

PERRAM, GLEN P., Department of Engineering Physics

REFEREED JOURNAL PUBLICATIONS

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “Combustion kinetics of laser irradiate porous graphite from imaging Fourier transform spectroscopy,” accepted for Combustion and Flame, 2015.

Robert I. Acosta, Kevin C. Gross, and Glen P. Perram, “Thermal degradation of poly(methyl methacrylate) with a 1.064 μm Nd:YAG laser in buoyant flow” *Polymer Degradation and Stability*, **121**, 78-89, Nov 2015.

PETERSON, GILBERT L., Department of Electrical and Computer Engineering

STEWART, BRYAN J., Department of Engineering Physics

7. TECHNOLOGY TRANSFER

7.1. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS

“ATD: Frame-Theoretic Algorithms for Smart Sensing,” USAF CRADA 15-AFIT-01, Collaborator: The Curators of the University of Missouri, Faculty Investigators: Dr Matthew Fickus and Capt Dustin Mixon, Effective Date: 25 October 2014, Term: 27 months.

“Evaluation of Biomass and Bioenergy Productions, Environmental Performance and Life Cycle Analysis of Prairie Cordgrass,” USAF CRADA 15-AFIT-07, Collaborator: South Dakota State University, Faculty Investigator: Dr Eric Mbonimpa, Effective Date: 18 May 2015, Term: 12 months.

“Facilitation of Graduate Research Development Program-FY15,” USAF CRADA 15-AFIT-06, Collaborator: Dayton Area Graduate Studies Institute, Faculty Investigator: Dr Heidi Ries, Effective Date: 06 May 2015, Term: 16 months.

“Film Cooling Effectiveness Measurements for Advanced Gas Turbine Engine Design Concepts,” USAF CRADA 15-AFIT-03, Collaborator: Innovative Scientific Solutions, Inc, Faculty Investigators: Dr Marc Polanka and Maj James Rutledge, Effective Date: 02 December 2014, Term: 20 months.

“NDA -UV LED Based Purification,” USAF CRADA 15-AFIT-04, Collaborator: AquiSense Technology, Faculty Investigator: Dr Michael Miller, Effective Date: 26 February 2015, Term: 12 months.

“NDA-Water Treatment Apparatus,” USAF CRADA 15-AFIT-10, Collaborator: Tom Smith Industries, Faculty Investigator: Dr Michael Miller, Effective Date: 03 September 2015, Term: 12 months.

“Side Channel Analysis,” USAF CRADA 15-AFIT-05, Collaborator: Riverside Research, Faculty Investigator: Dr Michael Temple, Effective Date: 11 April 2015, Term: 36 months.

“Spectrum Sensing and Sharing by Cognitive Radios in PNT Systems,” USAF CRADA 15-AFIT-08, Collaborator: Innoflight, Inc, Faculty Investigator: Dr Ken Hopkinson, Effective Date: 10 August 2015, Term: 15 months.

“The Personal Discount Rate: Evidence from Military Bonuses,” USAF CRADA 15-AFIT-02, Collaborator: Washington University in St Louis, Faculty Investigator: Maj Benjamin Bennett, Effective Date: 15 December 2014, Term: 30 months.

7.2. EDUCATIONAL PARTNERSHIP AGREEMENTS

“EPA - Fundamental Diagnostics and Experiments in Space Propulsion and Equipment Loan,” AFIT EPA 2015-02, Collaborator: University of Alabama, Faculty Investigator: Maj David Liu and Dr Carl Hartsfield, Effective Date: 25 August 2015, Term: 60 months.

“EPA - Unmanned Aerial Systems (UAS),” AFIT EPA 2015-01, Collaborator: Sinclair Community College, Faculty Investigator: Dr David Jacques, Effective Date: 18 March 2015, Term: 60 months.

APPENDICES

APPENDIX A: POST-DOCTORAL AND OTHER RESEARCH ASSOCIATES' CREDENTIALS

BASU, SANTASRI, Post-Doctoral Research Associate (through ORISE), Department of Engineering Physics, AFIT Appointment date: 2011 (AFIT/ ENP); BS, Electrical Engineering, Jadavpur University, India, 2000; MS, Electrical Engineering, New Mexico State University, 2005; PhD, Electrical Engineering, New Mexico State University, 2008. Dr. Basu is working on generation and propagation of partially coherent sources and laser beam propagation and imaging problems through atmospheric turbulence. Tel. 937-255-3636 X4903, email: Santasri.Basu.ctr.in@afit.edu.

REFEREED JOURNAL PUBLICATIONS

Milo W. Hyde IV, Santasri Basu, David G. Voelz, and Xifeng Xiao, "Experimentally generating any desired partially-coherent Schell-model source using phase-only control," *Journal of Applied Physics*, Vol. 118, No. 9, 093102 (10 pp.), Sep. 2015, doi: 10.1063/1.4929811.

M. W. Hyde IV, S. Basu, X. Xiao, and D. G. Voelz, "Producing any desired far-field mean irradiance pattern using a partially-coherent Schell-model source," *Journal of Optics*, Vol. 17, No. 5, 055607 (6 pp.), May 2015, doi: 10.1088/2040-8978/17/5/055607.

Milo W. Hyde IV, Santasri Basu, and Jason D. Schmidt, "Two-dimensional simulation of optical wave propagation through atmospheric turbulence," *Optics Letters*, Vol. 40, No. 2, pp. 233-236, Jan 2015, doi: 10.1364/OL.40.000233.

Santasri Basu, Milo W. Hyde IV, Xifeng Xiao, David G. Voelz, and Olga Korotkova, "Computational approaches for generating electromagnetic Gaussian Schell-model sources," *Optics Express*, Vol. 22, no. 26, pp. 31691-31707, Dec 2014, doi: 10.1364/OE.22.031691.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF FULL PAPER REVIEW

David G. Voelz, Xifeng Xiao, Santasri Basu, Milo W. Hyde, and Olga Korotkova, "Modeling the electromagnetic Gaussian Schell-model source," Imaging and Applied Optics, invited (OSA, 2015).

Santasri Basu, Jack McCrae, Zach Pollock, Ping He, Chris Nunalee, Sukanta Basu, David G. Voelz, and Steven Fiorino, "Comparison of atmospheric refractive index gradient variations derived from time-lapse imagery and mesoscale modeling," Imaging and Applied Optics, (OSA, 2015).

Milo W. Hyde, Santasri Basu, Xifeng Xiao, and David G. Voelz, "Producing any desired far-field mean irradiance pattern using a partially-coherent Schell-model source and phase-only control," Imaging and Applied Optics, (OSA, 2015).

David Voelz, Xifeng Xiao, Ivan Dragulin, Jose Barraza, Santasri Basu, Jack McCrae, Zach Pollock and Steven Fiorino, "Low Cost Digital Photography Approach to Monitoring Optical Bending and Guiding in the Atmosphere," 2015 IEEE Aerospace Conference, Big Sky, MT, 7-14 Mar 2015.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Matthew J. Gridley, Milo W. Hyde, Mark F. Spencer, and Santasri Basu, "Experimental method of generating electromagnetic Gaussian Schell-model beams," Proceedings of SPIE, Vol. 9617, 96170C, Sep 2015.

Santasri Basu, Jack McCrae and Steven Fiorino, "Estimation of the path-averaged atmospheric refractive index structure constant from time-lapse imagery," Proceedings of SPIE, Vol. 9465, 94650T, May 2015.

FATHEDDIN, PARISA

Research Assistant Professor (through ORISE), Appointment Date: 2015, BS. Belmont University (Nashville, TN), PhD. University of Tennessee (Knoxville, TN). Dr. Fatheddin's work is in stochastic partial differential equations (SPDEs), which are added noise to regular partial differential equations.

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GUSTAFSSON, JONATHAN

National Research Council Post-Doctoral Fellow, AFIT Appointment Date: 2015 (AFIT/ENC); MSc, Engineering Physics, Chalmers University of Technology (2006), MSc, Computational Science and Engineering, McMaster University (2007), PhD, Computational Science and Engineering, McMaster University (2013). Dr. Gustafsson's research focuses on modelling and numerically simulate high energy laser propagation through the atmosphere. Tel. 937-255-6565 ext. 4729, email: Carl.Gustafsson.SE@afit.edu

KANEL, SUSHIL R.,

Research Associate (Contractor), AFIT Appointment Date: 2010 (AFIT/ENV); BE, Civil Engineering, Tribhuvan University (Nepal), 1992; MS, Environmental Science and Engineering, Gwangju Institute of Science and Technology (South Korea), 2001; PhD, Environmental Science and Engineering, Gwangju Institute of Science and Technology (South Korea), 2006. Dr. Kanel's work is focused on the physical chemical treatment, fate and transport of nanomaterials in the subsurface, as well as the application of nanomaterials for water remediation. Tel. 937-255-3636 x4568, email: Sushil.Kanel.ctr@afit.edu

REFEREED JOURNAL PUBLICATIONS

Kanel, S. R., Misak H., Nepal, D., Mall, S., Brittle, S. W., Sizemore, I., Kempisty, D., Goltz, M. Application of Carbon Nanotube Yarns as a Filter Media to Treat Nitroaromatic-contaminated Water, New Carbon Materials: Accepted, 2015

Kanel, S. R., Flory J., Meyerhoefer, A., Fraley J. L., Sizemore, I. E., Goltz, M. Influence of natural organic matter on fate and transport of silver nanoparticles in saturated porous media: laboratory experiments and modeling, J of Nanoparticle Research, 17, 1-13, 2015

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Rashid, U., Kanel, S. R., Bezbaruah, A. Injectable Nanoparticle-based Permeable Reactive Barriers for Groundwater Contaminant Remediation, Environmental & Water Resources Institute (EWRI)Congress Conference, Austin, TX, 17-21 May, 2015.

Kanel, S. R., M. Kempisty, D., Goltz, M.N. Application of Carbon Nanotubes as a Filter Media to Treat Nitroaromatic-contaminated Water, Environmental & Water Resources Institute (EWRI)Congress Conference, Austin, TX, 17-21 May, 2015.

Emily N. A., Kanel, S. R., Brittle, S. W., Markopoulos, M. M. Sizemore, I. P., Kempisty, D., Goltz, M.N. Application of Carbon Nanotubes as a Filter Media to Treat Nitroaromatic-contaminated Water, Wright State University Celebration of Research, Dayton, OH, 10 April, 2015.

Kanel, S. R., Doane, B., Misak H., Mall, S., Brittle, S. W., Sizemore, I. P., Ebrahimian, T., Kempisty, D., Goltz, M. Kempisty, D., Goltz, M.N. Application of Carbon Nanotube Yarn as a Filter Media to Treat Nitroaromatic-contaminated Water, 245th ACS National Meeting, Denver, CO, 22-26 March, 2015.

O'Neil K., Jessica Fraley, J., Brittle, S., Purvis, J., Kanel S. R., Higgins, S., Sizemore, I. P. Raman study of the adsorption behavior of silver nanoparticles at mineral- and natural organic matter-water interfaces, 245th ACS National Meeting, Denver, CO, 22-26 March, 2015.

Kanel, S. R., Bruce A. Manning, B.A. Brittle, S. W., Sizemore, I.E.P., Felker, D., Kempisty, D., Goltz, M.N. Spectroscopic and microscopic investigation of soil mineral and natural organic matter-treated silver nanoparticles, 245th ACS National Meeting, Denver, CO, 22-26 March, 2015.

KEEFER, KEVIN J., Research Physicist (Contractor), Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Atmospheric Physics, United States Air Force Academy, 1981; MS, Systems Management, University of Southern California, 1983; MS Engineering Physics, Air Force Institute of Technology, 1985; PhD Solid State Physics, Air Force Institute of Technology, 1990; Measurement and Signature Intelligence Certificate, Air Force Institute of Technology, 2004. Dr. Keefer's research interests include atmospheric sciences with special emphasis on atmospheric radiative transfer effects for remote sensing and directed energy applications; microphysical and radiative effects associated with atmospheric molecular and aerosol constituents; and military/geo-political history and implications for development of current and future national security strategy.

REFEREED CONFERENCE PAPERS ACCEPTED ON THE BASIS OF ABSTRACT REVIEW

Fiorino, S. T., D.C. Meier, L.R. Burchett, M.F. Via, C.A. Rice, B.J. Elmore, and K.J. Keefer, "Using Satellite, NWP, and Atmospheric Refraction Assessments to Enhance Radiative Transfer Characterizations for Remote Sensing and Directed Energy Applications," (Poster), 19th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans and Land Surface (IOAS-AOLS), 95th Annual American Meteorological Society Meeting, Phoenix, AZ. (Jan 2015) [CDE]

OTHER SIGNIFICANT RESEARCH PRODUCTIVITY

Fiorino, S.T., K.J. Keefer, E. Matchefts, B. Elmore, N. Nash, and M.F. Via, "A Weather Effects Metric for Beam Control Development and Design," 10th DEPS Systems Symposium, Norfolk, VA. (Sep 2015) [CDE]

Van Zandt, N.R., S.T. Fiorino, M. Burton, J. Davis, and K.J. Keefer, "HELEEOS Validation for Field Test Forensics," 10th DEPS Systems Symposium, Norfolk, VA. (Sep 2015) [CDE]

Madry, J.V. Hall, D.H., D.M. Courtney, S.T. Fiorino, K. J. Keefer, M.F. Via, A. Farid, J.N. Elele, "V&V of Atmospheric Characterization Tools," 14th Annual Directed Energy Test and Evaluation Workshop, International Test and Evaluation Association / Directed Energy Professional Society, Las Vegas, NV. (May 2015) [CDE]

Hall, D.H., D.M. Courtney, S.T. Fiorino, K.J. Keefer, J.V. Madry, M.F. Via, A. Farid, J.N. Elele, "What's the Use? V&V of an Atmospheric Characterization and Radiative Transfer Code," 2015 Verification and Validation Symposium, The American Society of Mechanical Engineers, Las Vegas, NV. (May 2015) [CDE]

Fiorino, S.T., C.A. Rice, K.J. Keefer, and M.F. Via, "Development of a Deconfliction Plan for AFIT's Model Validation LIDAR," Directed Energy Professional Society 17th Annual DE Symposium, Anaheim, CA. (Mar 2015) [CDE]

KEENAN, CAMERON B., Post-Doctoral Research Associate (through ORISE), AFIT Appointment Date: 2013 (AFIT/ENP); BS. Physics, Case Western Reserve University, 2002; PhD, Physics, West Virginia University, 2011. Dr. Keenan's work is focused on computer simulation and analysis of gas species during combustion events using imaging and non-imaging Fourier Transform Spectroscopy.
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T. MOHAN, MANIL,

National Research Council Post-Doctoral Fellow, AFIT Appointment Date: 2015 (AFIT/ENC); BSc, Mathematics, Kerala University (India, 2006); MSc, Mathematics, Kerala University (India, 2008); Master of Science(MSc), Mathematics: May 2008, Kerala University (India); PhD, Indian Institute of Science Education and Research (IISER) (India, 2014); NBHM Post Doctoral Fellow: Jan 2015- May 2015, Indian Institute of Science Education and Research (IISER). Tel. 937-255-6565 ext. 4722, email: Manil.ThankamaniMohan.IN@afit.edu

RICE, CHRISTOPHER A., Post-Doctoral Research Associate (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2012 (AFIT/ENP); BS, Electrical Engineering, Cedarville University, Cedarville Ohio 2004; MS, Electrical Engineering, AFIT, WPAFB, Ohio, 2006; PhD, Applied Physics, AFIT, WPAFB, Ohio, 2012. Dr. Rice is interested in topic areas related to high energy lasers, remote sensing, and optical diagnostics. His work on specific research topics currently include atmospheric propagation of diode pumped alkali lasers; diode pumped alkali laser gain cell construction; aerosol measurement and validation; modeling, simulation, and validation of directed energy simulations; rare gas laser device construction; remote sensing; and atmospheric aerosol characterization. Tel. 937-255-6565 x4375, email: Christopher.Rice.ctr@afit.edu

TURNER, DAVID B., DNDO/NTNFC Post-Doctoral Fellowship (through ORISE), AFIT Appointment Date: 2013 (AFIT/ENP); BS, Biochemistry, Millersville University (United States), 2003; PhD, Chemistry, The Ohio State University (United States), 2009. Dr. Turner's work is focused on the surface chemistry, band gap, work function and electrical properties of thorium and uranium oxides for their use as novel neutron detectors. Tel. 937-255-3636 x4742, email: David.Turner@afit.edu

XING, YUN Post-Doctoral Research Associate (through ORISE), Department of Engineering Physics, AFIT Appointment Date: 2011; BS, Biochemical Engineering, Tianjin University (China), 1998; PhD, Bioengineering, Georgia Institute of Technology, 2005. Dr. Xing's work is focused on high temperature processing of thermal protection materials, biothreat agents inactivation, nanosensors and synthesis of luminescent nanomaterials. Tel. 937-255-3636 x4241, email: Yun.Xing@afit.edu

APPENDIX B: SELECTED ACRONYM LIST

There are a number of abbreviations for organizations that are used in this report. This alphabetical listing includes only selected organizations.

711 HPW/RH	711 th Human Performance Wing Human Effectiveness Directorate
ACC	Air Combat Command
AETC	Air Education and Training Command
AFCEC	Air Force Civil Engineering Center
AFCAA	Air Force Cost Analysis Agency
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AFMC	Air Force Materiel Command
AFMOA	Air Force Medical Operations Agency
AFMSA	Air Force Medical Support Agency
AFNWC	Air Force Nuclear Weapons Center
AFPA	Air Force Petroleum Agency
AFRL	Air Force Research Laboratory
AFRL/AFOSR	AFRL/Air Force Office of Scientific Research
AFRL/RD	AFRL/Directed Energy Directorate
AFRL/RI	AFRL/Information Directorate
AFRL/RQ	AFRL/Aerospace Systems Directorate
AFRL/RV	AFRL/Space Vehicles Directorate
AFRL/RW	AFRL/Munitions Directorate
AFRL/RX	AFRL/Materials and Manufacturing Directorate
AFRL/RY	AFRL/Sensors Directorate
AFSC	Air Force Sustainment Center
AFSEO	Air Force Seek Eagle Office (46 SK/SKE)
AFSPC	Air Force Space Command
AFTPS	Air Force Test Pilot School
AFTAC	Air Force Technical Applications Center
AFWA	Air Force Weather Agency
AIAA	American Institute of Aeronautics and Astronautics
AMC	Air Mobility Command
AMEDD	United States Army Medical Department
AMRDEC	Aviation and Missile Research Development and Engineering Center
ASEE	American Society for Engineering Education
ATEC	United States Army Test and Evaluation Command
CAA	Center for Army Analysis
CPM	College of Performance Management
CyTCoE	Cyberspace Technical Center of Excellence
DAGSI	Dayton Area Graduate Studies Institute
DARPA	Defense Advanced Research Projects Agency
DASD	Deputy Assistant Secretary of Defense
DAU	Defense Acquisition University
DHS	Department of Homeland Security
DISA	Defense Information Systems Agency
DOD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EPA	Environment Protection Agency
ERDC	Engineer Research and Development Center
EUCOM	United States European Command
FORSCOM	United States Army Forces Command
HELJTO	High Energy Laser Joint Technology Office
IEEE	Institute of Electrical and Electronics Engineers

INCOSE	International Council on Systems Engineering
JASPO	Joint Aircraft Survivability Program Office
JTWC	Joint Typhoon Warning Center
JWAC	Joint Warfare Analysis Center
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LTS	Laboratory for Telecommunications Sciences
MDA	Missile Defense Agency
MIT	Massachusetts Institute of Technology
MORS	Military Operations Research Society
NAMRU-D	Naval Medical Research Unit - Dayton
NASA	National Aeronautics and Space Administration
NASIC	National Air and Space Intelligence Center
NAVSEA	Naval Sea Systems Command
NGA	National Geospatial-Intelligence Agency
NHSRC	National Homeland Security Research Center
NNSA	National Nuclear Security Administration
NPS	Naval Postgraduate School
NSA	National Security Agency
NSF	National Science Foundation
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
OSD	Office of the Secretary of Defense
PACAF	United States Pacific Command
SAF	Office of the Secretary of the Air Force
SERDP	Strategic Environmental Research and Development Program
SMC	Space and Missiles Systems Center
SPIE	The International Society for Optical Engineering
TuAF	Turkish Air Force
USAACE	United States Army Aviation Center of Excellence
USAF	United States Air Force
USAFA	United States Air Force Academy
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
USTRANSCOM	United States Transportation Command
WPAFB	Wright-Patterson Air Force Base

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1. REPORT DATE (DD-MM-YYYY) 01 Mar 2016		2. REPORT TYPE Annual Report		3. DATES COVERED (From – To) 01 Oct 14 – 30 Sep 15	
4. TITLE AND SUBTITLE AIR FORCE INSTITUTE OF TECHNOLOGY RESEARCH REPORT 2015				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Office of Research and Sponsored Programs, Graduate School of Engineering and Management				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S) Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 Hobson Way WPAFB OH 45433-7765				8. PERFORMING ORGANIZATION REPORT NUMBER AFIT/EN/TR-15-03	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 Hobson Way WPAFB OH 45433-7765				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <p>This report summarizes the research activities of the Air Force Institute of Technology's Graduate School of Engineering and Management. It describes research interests and faculty expertise; lists student theses/dissertations; identifies research sponsors and contributions; and outlines the procedures for contacting the school. Included in the report are: faculty publications, conference presentations, consultations, and funded research projects. Research was conducted in the areas of Aeronautical and Astronautical Engineering, Electrical Engineering and Electro-Optics, Computer Engineering and Computer Science, Systems Engineering and Management, Operational Sciences, Mathematics, Statistics and Engineering Physics.</p>					
15. SUBJECT TERMS Air Force Institute of Technology, Research Report 2015					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 242	19a. NAME OF RESPONSIBLE PERSON Dr. Michael J. Caylor
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