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AFIT ENGINEER

The Graduate School of the U.S. Air Force

March 2022 | Vol. 4, Issue 1

AFIT Graduates Urged to Push DOD into Next 30 Years of Transformation

By Caroline Clauson
88th Air Base Wing Public Affairs

After years of study, research, late nights and long papers, over 200 graduates crossed the stage to receive their diplomas from the Air Force Institute of Technology's Graduate School of Engineering and Management on March 24 at the National Museum of the U.S. Air Force.

"I'm so glad we are back in this place for our commencement activities," said Walter Jones, AFIT's director and chancellor. "It's been a tough couple of years, but it's great to be back, and this atmosphere is hard to beat. I am delighted that all of you could join us to recognize the achievements of our graduating students and wish them well in their next assignments."

The graduating class included 163 Air Force officers and eight NCOs, 25 Space Force officers, five Army officers, three Marine Corps officers and 18 civilians. One international student from South Korea also received his degree.

Of the 223 degrees awarded, the Graduate School conferred 219 master's degrees and four doctorate degrees in science, technology, engineering and math fields. Two graduates received dual degrees, while two master's students and seven doctoral alumni who graduated earlier in the academic year returned to participate in the ceremony.

Capt. Joshua Rinaldi became a third-generation AFIT alum at the ceremony. His father, retired Lt. Col. Steven Rinaldi earned his master's and doctorate degrees in electrical engineering in 1982 and 1987. Rinaldi's grandfather, retired Col. Melvin Gillis, earned his master's degree in logistics management from AFIT in 1969.

Secretary of the Air Force Frank Kendall, the ceremony's guest speaker, charged graduates to



U.S. Air Force photo by R.J. Oriez

AFIT director and chancellor Dr. Walter Jones introduces commencement ceremony guest speaker Secretary of the Air Force Frank Kendall.

expand their new expertise into influence and recognize themselves as the catalyst for swift and innovative change that can meet current threats.

"You as AFIT graduates have the knowledge to advise your services and your nation's leaders," Kendall said. "Don't be the 'yes' person who changes when I change and nods when I nod. You have the education and experience to be the person who uses data and reason to advise senior leaders, even when your ideas might not be popular."

"You must use this education and your ability to be an adviser and mentor and speak truth to power when you know something needs to be fixed. You are now action officers of modernization and therefore of freedom and democracy."

Others officials in attendance included Maj. Gen. William G. Holt II, commander of the Curtis E. LeMay Center for Doctrine Development and Education, as well as Air

University vice commander; Heidi Ries, AFIT provost and chief academic officer; Col. Paul Harmer, Air University Detachment 1 commander; and Adedeji Badiru, dean of the Graduate School.

"We can prevail in this competition between democracy and autocracy, but we don't have time to waste," Kendall said. "We need your leadership and your academic background to push the Department of Defense into the next 30 years of transformation, of unbridled innovation, of capability development."

"I look to you and your generation to be the leaders we need. You will make history as those military and civilian professionals who ensure America and its allies prevail. Before you receive your graduation certificates tonight, I want you to remember that you must use this education that your service has given to you to be the voice who speaks up for the change we need. Work quickly to ensure you create or design what our services need."

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www.afit.edu/EN/afitengineer



International Collaboration and Spring Graduation Highlight First Quarter Activities

This year has been exceptionally exciting so far. Coming on the heels of the well-received Hypersonics-themed December 2021 issue of the *AFIT Engineer*, we now bring you the 2022 March graduation issue, with coverage of Secretary of the Air Force, Frank Kendall, as our March graduation guest speaker. As the front-page caption surmises, SECAF Kendall, in his address, urged AFIT graduates to push DOD into the next thirty years of transformation. In this regard, transformation is expected to be multi-faceted, and not limited to technological transformation. Broadly speaking, AFIT is at the forefront of many transformation initiatives, including technical innovation, research advancement, teaching excellence, process improvement, and workforce development.

Rather than steal and echo the thunder and lightning of the ensuing pages, I urge you to keep flipping (or scrolling) through the pages to read it all yourself. You will be amazed by what our faculty, students, staff, and administrators are accomplishing locally, regionally, nationally, and internationally in teaching, research, and service.



Dr. Adedeji Badiru

I particularly call your attention to the international collaboration news on page nine. We are delighted to be hosting two exchange visitors from Germany, Dr. Nils Wagenknecht and Mr. Andreas Mertens, who are, respectively, on ESEP (Engineering and Science Exchange Program) and APEP (Administrative and Professional Exchange Program) from the German Ministry of Defense. Within just a few months, they have both made tremendous contributions to AFIT's international and interdisciplinary research collaboration. They have presented a paper at a STEM conference, co-authored a forthcoming refereed journal article, and contributed to the manuscript for a handbook of AFIT's technical publications. Based on this template of exchange success, we are looking forward to hosting additional exchange visitors from Germany and other allied countries in the coming months and years. Details and updates will be published in future issues of the *AFIT Engineer*.

Please join us in the intellectual journey and fellowship of the missions of AFIT. "Go AFIT!"

Adedeji B. Badiru, Ph.D., PE, PMP
Dean, Graduate School of Engineering and Management

Secretary of the Air Force Tours AFIT Prior to Keynote Address at Graduation

Secretary of the Air Force Frank Kendall visited the Air Force Institute of Technology campus on 24 March prior to his keynote address at the Graduate School of Engineering and Management's commencement ceremony that evening. During his visit, Kendall learned about the defense-focused research the faculty and students accomplish as part of their degree programs. He also toured world-class AFIT centers hearing firsthand from students about their cutting-edge research.

Capt. Tyler Brown, an electrical engineering master's student, discussed his thesis research on autonomous aircraft via deep reinforcement learning with Kendall during a stop at the Autonomy and Navigation Technology Center. The ANT center focuses on three research thrusts: autonomous and cooperative systems, non-global positioning system precision navigation, and robust GPS navigation/navigation warfare.

Applied physics master's student Capt. Benjamin Rinaldi explained his efforts to characterize the effects small nano-sized aerosols can have on lasers and their effectiveness in future military operations with Kendall. Such nano-aerosols are common to both outdoor atmospheric as well as indoor laboratory settings such as found in AFIT's High Energy Laser (HEL) Lab. Rinaldi's research advanced a unique method to quantify ambient aerosol optical properties and their effects on HELs in laboratories or in the field, and has implications for both future military capabilities and civil climate assessment studies.



U.S. Air Force photo by K. Scott

Dr. Steven Fiorino demonstrates new miniaturized optical turbulence sensors integrated on AFIT's small unmanned aircraft system (sUAS) for Secretary of the Air Force Frank Kendall during his visit on 24 March.

Dr. Steven Fiorino, professor of atmospheric physics and director of the Center for Directed Energy, discussed the Multi-Spectral Targeting System (MTS) flown on USAF Reaper aircraft. The MTS will be used to profile atmospheric properties so that students can research and develop methods to enhance both future laser capabilities and reconnaissance/surveillance sensor systems.

Fiorino also demonstrated new miniaturized optical turbulence sensors integrated on AFIT's small unmanned aircraft system (sUAS). With

the aid of sUAS pilots students can profile atmospheric effects at any point along a laser's path in the lower atmosphere.

Additional tour stops provided Kendall with a broad introduction to the applied and experiential research conducted by AFIT students and faculty. The tours emphasized how AFIT prepares students with the skills required to maintain the world's best Air and Space Force with the recognition of research as a critical element in quality graduate education.

TEACHING WHAT WE RESEARCH. RESEARCHING WHAT WE TEACH.



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AFIT ENGINEER

AFIT Graduate School of Engineering and Management

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U.S. Air Force photo by R.J. Oriez

Secretary of the Air Force Frank Kendall joins Air Force Institute of Technology leadership and this year's distinguished graduates prior to the school's graduation ceremony 24 March in the National Museum of the U.S. Air Force.

2022 Distinguished Graduates

The AFIT chancellor is authorized to designate no more than 10 percent of each graduating class as Distinguished Graduates. The criteria for identifying DG achievement encompasses academic scores, the “whole person” concept based on professional qualities, and the recommendation of the department heads to ensure the students are deserving of the honor associated with DG. The DGs for the class of 2022 were:

- Capt. Patrick Assef (M.S. Systems Engineering)
- Capt. Tyler Brown (M.S. Electrical Engineering)
- Capt. Charles Carr (M.S. Astronautical Engineering)
- Capt. Zachary Cleveland (M.S. Atmospheric Science)
- Capt. Alexander Contarino (M.S. Applied Mathematics)
- 2nd Lt. Tristan Creek (M.S. Cyber Operations)
- Capt. Tyler Dolezal (M.S. Applied Physics)
- Capt. Jacob Hatzinger (M.S. Systems Engineering)
- Capt. Mark Kurtz, USSF (M.S. Space Systems)
- Capt. Jedidiah Langlois (M.S. Engineering Management)
- 2nd Lt. Irene Liew (M.S. Operations Research)
- 2nd Lt. Austin Logan (M.S. Operations Research)
- Capt. Kaiana Miller (M.S. Cost Analysis)
- Capt. Zachary Moer (M.S. Engineering Management)
- 2nd Lt. Andrew Mogan (M.S. Operations Research)
- 2nd Lt. David Mottice (M.S. Operations Research)
- Capt. Daniel Parkhill (M.S. Logistics and Supply Chain Management)
- Capt. Niko Petrocelli (M.S. Computer Engineering)
- 1st Lt. Guillermo Salcedo (M.S. Electrical Engineering)
- 2nd Lt. Owen Sedej (M.S. Environmental Engineering and Science)
- Capt. Samuel Vonniederhausern (M.S. Electrical Engineering)
- Capt. Brady Weaver (M.S. Acquisition and Program Management)

LEARN MORE ONLINE

See all 2022 graduation award winners online:
<https://e.afit.edu/jkVc1Z>

Find the complete list of all graduates online: <https://e.afit.edu/00h1HT>



Dean’s Award Winners

The Dean’s Award recognizes the most exceptional master’s thesis by a graduating student within each academic department. Award determination is based on the master’s thesis reflecting the most exceptional contribution to scientific, management, or engineering knowledge. Each individual was competitively selected by their respective academic department.

- Mathematics and Statistics Department**
Capt. Alexander Contarino (M.S. Applied Mathematics)
- Electrical and Computer Engineering Department**
Capt. Andrew Dittrich, USSF (M.S. Electrical Engineering)
- Engineering Physics Department**
Capt. Tyler Dolezal (M.S. Applied Physics)
- Operational Sciences Department**
2nd Lt. Andrew Mogan (M.S. Operations Research)
- Systems Engineering and Management Department**
2nd Lt. Owen Sedej (M.S. Environmental Engineering and Science)
- Aeronautics and Astronautics Department**
Capt. Charles Carr (M.S. Astronautical Engineering)



AFIT 2022 Dean’s Award winners.

U.S. Air Force photos by Jaima Fogg

Chancellor’s Award Winner

From the collection of Dean’s Award recipients, one overall winner is chosen to receive the Chancellor’s Award. The Chancellor’s Award is presented to the graduating student who produced the most exceptional master’s thesis. The 2022 Chancellor’s Award and Russ Prize, sponsored by the AFIT Foundation, went to Capt. Andrew Dittrich, USSF (M.S. Electrical Engineering).



- 1. Dr. Alan Lair, AFIT Professor of Mathematics, serves as Grand Marshal for the ceremony.
- 2. Chaplin (Capt.) Gerardo Rodriguez provides the commencement invocation.
- 3) Marine Corps graduates Capt. Jason McDonald, Maj. Tyson Metlen, and Capt. Bryan Leicht.
- 4) Graduates pose for a group photo following the ceremony.



U.S. Air Force photos by R.J. Oriez and K. Scott



- 5) Graduates 2nd Lt. Charles Unkrich, Capt. Brian Johnson (Army), and Maj. Andrew Pekarek (Army).
- 6. Civilian and military graduates celebrate.



Graduation 2022 BY THE NUMBERS

Degrees by Type

MS	219
PHD	4
Total Degrees	223

Graduates by Type

U.S. Air Force	169
U.S. Space Force	25
U.S. Army	5
U.S. Marine Corps	3
Civilian	18
International	1

Graduates by Location

In-Residence	213
Distance Learning	10

Center for INNOVATION in EDUCATION

Story and photos by Katie Scott
Air Force Institute of Technology



The Center for Innovation in Education is led by Dr. Alice Grimes, director of faculty development, (center) and teammates Carolyn Stoermer, writing and communications specialist, (left) and Jonathan Zemmer, educational technology liaison (right).

AFIT Supports Student and Faculty Excellence with New Center

The Center for Innovation in Education at the Air Force Institute of Technology supports excellence in teaching, learning, and research by facilitating collaboration, showcasing best practices and technologies, and supporting writing and publication. Specific services offered by the CIE include writing assistance, support with accessing and using educational technology, workshops, and a quarterly book club.

“The nature of education has changed so rapidly over the last two decades that we really needed a place where faculty, students, and staff can come to learn about new innovations in education technology, and receive help with communication skills, writing, and presentations,” said Dr. Alice Grimes, CIE lead and director of faculty development within AFIT’s Graduate School of Engineering and Management.

The CIE team conducted focus groups to facilitate the development of programs and services in writing and educational technology. Since opening in the fall of 2021, the CIE team has conducted workshops on faculty learning communities, integrating technology into the classroom, podcasting, teaching with polling applications, crafting effective assignment descriptions, developing learning outcomes, and others.

Forming faculty learning communities to explore innovative ways to leverage technology in the classroom and create meaningful learning

opportunities for students is a new project for the Center. “There are so many great faculty here and being able to share ideas across all the schools on different ways of leveraging technology to promote learning in the classroom is something I am really excited about,” said Jonathan Zemmer, CIE educational technology liaison.

Located in the D’Azzo Research Library, the CIE offers space for collaboration, team meetings, and individual work stations. In-person or virtual consultation and collaboration appointments are also offered to students, faculty, and staff.

“Traditionally, I think writing centers at universities just have that student focus, but here we’re also able to bring some of those resources to faculty as well, both for their own research and publication, or as they work with students on their thesis or dissertation, and then also with staff who are working on their own reporting or business writing,” said Carolyn Stoermer, CIE writing and communications specialist.

The impetus for creating the CIE came from activities surrounding AFIT’s reaccreditation process completed in 2021. AFIT followed the Higher Learning Commission’s Open Pathway option for reaccreditation which focuses on quality assurance and institutional improvement through the development of a Quality Initiative



Carolyn Stoermer, writing and communications specialist, meets with future master’s student Capt. Vivian Hedberg.

Proposal. The purpose of AFIT’s QIP was to identify ways to improve the learning experience for students and the teaching environment for all instructional personnel. Faculty and staff from across AFIT’s schools served on QIP committees and one of the recommendations was to develop a teaching and learning center.

Providing guest lecture to classes has helped introduce the CIE to faculty and students. “They know that they can bring their work to the writing lab and work with me,” said Stoermer. “I have been connecting with students, both those who are just finishing their thesis writing and those getting geared up to start that thesis research and planning. That’s been really interesting to see both ends.”

AFIT International and Interdisciplinary Research Collaboration Focuses on Systems Integration

Dr. Adedeji Badiru, dean of the Air Force Institute of Technology’s Graduate School of Engineering and Management, collaborated on a research paper with Dr. Nils Wagenknecht and Andreas Mertens, two German exchange officers at AFIT. The paper titled “Mathematical and Graphical Representation of Systems Integration in DEJI Systems Model” was also co-presented at the 47th Dayton-Cincinnati Aerospace Sciences Symposium on 8 March at the Sinclair Ponitz Conference Center in Dayton.

“In these days of global collaboration, it is essential to incorporate the diverse technical opinions of our international colleagues,” said Badiru. “I am delighted to have our German colleagues, Dr. Wagenknecht and Mr. Mertens, collaborating with AFIT on this important topic.”

The paper addresses the use of the design, evaluation, justification, and integration systems model as an avenue through which systems modeling research can be conducted to develop quantitative metrics for assessing the existence or value of systems integration beyond qualitative rhetoric.

Badiru is the developer of the trademarked DEJI Systems Model and is an expert in the areas of mathematical modeling, project modeling and analysis, economic analysis, systems engineering models, and efficiency/productivity analysis and improvement. Mertens brought an extensive expertise of cost benefit analysis to the project while Wagenknecht addressed legal norms and merits of systems integration.

“I am grateful having had the opportunity to be involved in the creation as well as the co-presentation of the research paper. The fascinating variety and applicability of the integrative approach of the DEJI Systems



Dr. Nils Wagenknecht (left) and Mr. Andreas Mertens (middle) co-authored a paper with Dr. Adedeji Badiru (right), dean of AFIT’s Graduate School of Engineering and Management, on systems integration.

Model on multi-faceted platforms and domains allows to apply this tool in new system development initiatives,” said Mertens.

Wagenknecht and Mertens joined the AFIT team for a one year assignment as part of the administrative and engineering professional exchange programs with the German government. Wagenknecht is a contracts lawyer for the Federal Ministry of Defense in Germany. While at AFIT, he serves as an executive staff member working to identify education exchange opportunities between AFIT and German universities. Mertens is an assistant project manager for the German Federal Ministry of Defense working efficiency analysis of a follow-on solution for clothing management. During his time at AFIT, he serves as an engineering executive staff member researching international collaboration using a systems approach with Badiru.

Assistant Professor Named 2022 Dayton Chapter ICEAA Educator of the Year

Dr. Robert “Dave” Fass, AFIT Assistant Professor of Cost Analysis and System Integration, received the 2022 Educator of the Year award from the Dayton Chapter of the International Cost Estimating & Analysis Association (ICEAA).

The award is given to an individual who has made significant education and training contributions in cost estimation and analysis. Specifically, recipients of this award have demonstrated excellence in their contributions disseminating knowledge and building proficiency of the next generation of successful cost estimators and analysts.



Dr. Robert Fass



Fass was nominated by his students for the award. Students commended his course design, preparedness, and commitment to their success. Additionally, they praised the teaching and technological adjustments Fass made for the COVID pandemic. They enjoyed taking part in an original experiment he designed and conducted related to training subject matter experts (SMEs) to better understand probability theory.

While teaching courses in managerial economics, decision analysis, risk analysis, engineering economics, and cost analysis; Fass collaborates with his students on DoD acquisition system related research. His research interests are wide and often cross-disciplinary, with his most recent

research projects related to SME elicitation, engineering change orders, the costs and benefits of preventative medicine for Air Force fighter pilots, and Monte Carlo simulation based estimation methods.

The 2020 National Defense Authorization Act (NDAA) mandated that acquisition career fields realign their certification requirements based on the nationally-recognized standards of an accredited third party. Fass holds a current Certified Cost Estimator/Analyst (CCEA®) designation from ICEAA, and actively teaches ICEAA’s Cost Estimation Body of Knowledge (CEBoK®) so that his students can successfully take the certification exam. This allows the 65X career field to demonstrate commitment to meeting the NDAA requirements and upgrades the professionalism of cost estimators in the Air Force.

AFIT Team Partners with Army to Gather Nuclear Forensics Data

If a radiological dispersal device, sometimes called a dirty bomb, were to detonate in the United States, soldiers would deploy alongside the Federal Bureau of Investigation, Air Force Technical Applications Center, and the Department of Energy to collect nuclear forensic samples used to determine the type and source of the bomb. Because the samples could be evidentiary, the FBI maintains a chain of custody. Due to the mission's logistical constraints, it could take days before the samples reach a national lab for analysis.

To address this issue, Army Lt. Col. Christina Dugan, assistant professor of nuclear engineering and the deputy director of the Nuclear Expertise for Advancing Technologies Center at the Air Force Institute of Technology, received a research grant through AFIT's Scientific Test and Analysis Techniques Center of Excellence from the Department of Homeland Security to determine if samples collected by soldiers could be tested on site to identify nuclear signatures that may have decayed to a daughter isotope prior to national laboratory analysis.

That data collection process is something Dugan is very familiar with having served as the nuclear disablement team chief for the 20th Chemical Biological Radiological Nuclear Explosives Command. Her relationship enabled her and two students to partner with the 20th CBRNE Nuclear Command's Disablement Team Three on a training mission at the Nevada National Security Site in October 2021. Army Maj. Christopher Sutphin, a nuclear engineering master's student, is working with 1st Lt. Ashwin Rao, an AFIT doctoral student, to complete the data analytics on the samples.

"I have been using these portable devices for my research over the last three and a half years but never had the opportunity to evaluate them in an operational setting," said Rao. "It was amazing to finally be able to apply these analytical devices in the field on real nuclear debris at these historic test sites. As students, being able to translate research to a practical military environment helps bridge the gap between academia and the operational world."



U.S. Air Force contributed photo

Air Force Institute of Technology students Army Maj Christopher Sutphin and 1st Lt. Ashwin Rao and faculty member Army Lt. Col. Christina Dugan gather nuclear forensics data at Nevada National Security Site in partnership with Army's 20th Chemical Biological Radiological Nuclear Explosives Command (CBRNE).

LEARN MORE ONLINE

Read the full story online at:
<https://e.afit.edu/1g1BBGG>

AETC Chief Learning Officer Looking Forward to AFIT Collaboration

Air Education and Training Command's new chief learning officer, Dr. Wendy Walsh, visited Wright-Patterson AFB in February to develop awareness of the learning requirements, capabilities and capacities at the Air Force Institute of Technology, Air Force Research Laboratory, Air Force Materiel Command, and the National Air and Space Intelligence Center.

"My time at Wright-Patterson has been impressive and inspiring," said Walsh. "AFIT shared a broad view of the Air Force learning network in action. The interconnection and synergy between AETC, AFIT, AFRL, AFMC, NASIC, the 711th Human Performance Wing and the National Museum of the U.S. Air Force are incredible assets for enterprise learning."

During her time at AFIT, Walsh toured research centers and met with faculty and students to understand how AFIT's graduate and professional continuing education enables the execution of the Department of the Air Force's mission.

"Dr. Walsh's valuable insights and enthusiastic engagement during her visit will advance AFIT's educational partnerships internal to the DAF, with other federal agencies and with civilian institutions," said Dr. Heidi Ries,

AFIT provost and chief academic officer. "I look forward to both new and strengthened collaborations as a result."

Walsh also met with the leaders of AFIT's new Center for Innovation in Education. The CIE supports excellence in teaching, learning, and research by facilitating collaboration, showcasing best practices and technologies, and supporting writing and publication.

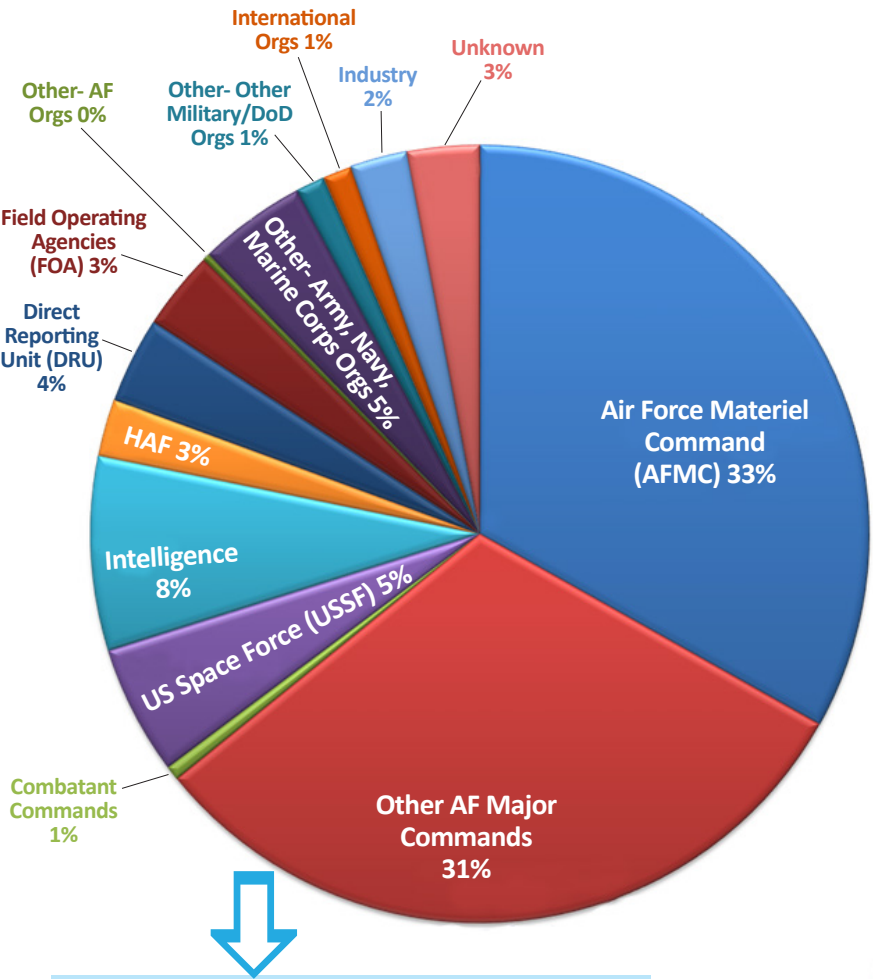
"I look forward to continued collaboration to advance force development through learning, technology, and innovation," Walsh said.

Dr. Wendy Walsh, chief learning officer for Air Education and Training Command, and Dr. Robert Leishman, Autonomy and Navigation Technology Center director, discuss the center's unmanned aerial vehicle testbed that is used to fly various alternative navigation experiments.

U.S. Air Force photo by K. Scott

AY 2020-2021 POST-GRADUATION STUDENT ASSIGNMENTS

The post-graduation student assignments chart below details MS and PhD graduates' assignments immediately following graduation. Percentages reflect the percent of the graduating class who were placed into the specified organization. This data was gathered from 336 AFIT alumni from academic year 2020-2021.



Breakout of Other AF Major Commands

ACC	38%	AMC	14%
AETC	34%	ANG	1%
AFGSC	1%	PACAF	5%
AFRC	1%	USAFE	3%
AFSOC	3%		

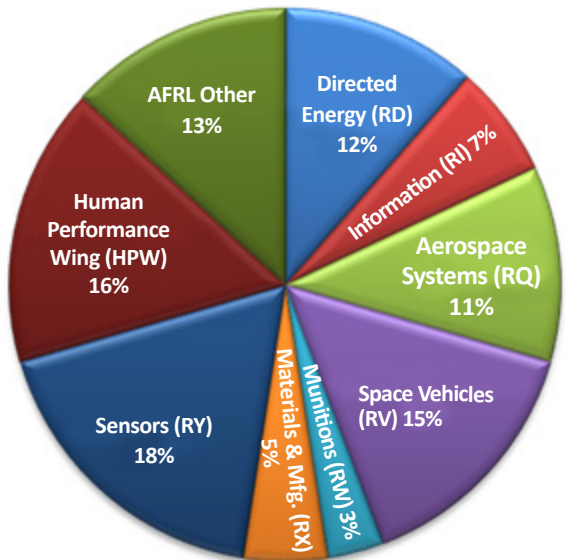
Other AF MAJCOMs: US Southern Command (USSOUTHCOM) & US Transportation Command (USTRANSCOM) had 0%

Source: AFIT Alumni Affairs and Institutional Advancement Office

18%

of the 338 alumni from the AY 2020-2021 class work in AFRL

Air Force Research Laboratory (AFRL)
Breakout of AFRL Technology Directorates



Dean for Research Honored with SECDEF Medal for Exceptional Civilian Service

Ahner Recognized for Modernizing DoD's Culture of Test & Evaluation

Dr. Darryl Ahner, dean for research within the Air Force Institute of Technology's Graduate School of Engineering and Management, received the Office of the Secretary of Defense Medal for Exceptional Civilian Service for his leadership, commitment, and professional expertise as the director of AFIT's Scientific Test and Analysis Techniques Center of Excellence. The Office of the Secretary of Defense Medal for Exceptional Civilian Service is the OSD's highest level career medaled award.

The STAT COE consists of an interdisciplinary group of test and evaluation professionals dedicated to improving the planning, execution, and assessment of test and evaluation methodologies. Ahner served as STAT COE director from its inception in 2012 until his promotion to dean for research in 2021. He was presented the award virtually by Christopher Collins, SES, director of Developmental Test, Evaluation, and Assessments within the Office of the Under Secretary of Defense for Research and Engineering.

Ahner was recognized for creating and leading a center of 45 highly-educated experts dedicated to modernizing the Department of Defense's culture of test and evaluation. His efforts culminated in managing a \$17 million yearly budget and enabling defense and homeland security test and evaluation interests across nine lines of effort supporting the objectives of the 2018 National Defense Strategy. He created a unique systems engineering and test hybrid process that improved rigor and effectiveness for 65 major defense acquisition programs, generating more than \$204 million in cost savings.

"While this is an individual award, I share it with the great professionals within the STAT COE and the office of Developmental Test, Evaluation, and Assessments," said Ahner. "It is a testament to surrounding yourself with great professionals and staying out of their way."

A registered professional engineer and professor of operations research, Ahner has written over



U.S. Air Force photo by K. Scott

Dr. Darryl Ahner was re-presented the Secretary of Defense Medal for Exceptional Civilian Service by Dr. Walter Jones, AFIT director and chancellor.

70 technical articles, made over 100 technical presentations, and has led several technical working groups. He is an active member of the Military Operations Research Society, Institute for Operations Research and the Management Sciences, International Test and Evaluation Association, and the American Society for Engineering Education.

AHNER'S ACCOMPLISHMENTS

\$17 million
annual budget

\$204 million
cost savings to DoD

70+ technical
articles published

100+ technical
presentations

Graduate School Professor Wins 2022 AEESP Distinguished Service Award

Dr. Willie Harper, AFIT Professor of Environmental Science, received the 2022 Association of Environmental Engineering and Science Professors (AEESP) Distinguished Service Award. The AEESP is composed of professors who engage in scholarship in the sciences and technologies related to environmental quality. The Distinguished Service Award is given to the individual who exhibits excellence while fulfilling a three-year term of service on the AEESP Board of Directors.



Dr. Willie Harper

Since being elected to the Board in 2019, Harper has made a number of significant contributions. He developed AEESP's statement of core values, which includes its commitment to diversity and professional ethics. Harper

expanded efforts to prevent sexual assault by disseminating policies and best practices related to personal conduct in the workplace. He also revised the bylaws for the AEESP Foundation, designed membership surveys, reviewed grant applications, and participated in long-term strategic planning. Harper also provided oversight for several AEESP subcommittees. Harper's participation on the Board has had a positive impact on AFIT outreach efforts. More people learned about AFIT, its military-focused mission, and the research opportunities that exists with the DoD. For example, Harper informed AEESP members about the AFRL Summer Faculty Fellowship program (SFFP) and opportunities to collaborate with AFIT. As a result, junior faculty from California State University, Fullerton and Marshall University will be participants in the 2022 SFFP.

Harper will receive a plaque for the Distinguished Service Award in June 2022 at the AEESP Research and Education Conference in St. Louis, Missouri.

Dean Receives Professional Society's Highest Honor

Dr. Adedeji Badiru, dean of the Graduate School of Engineering and Management at the Air Force Institute of Technology, is the recipient of the 2022 Industrial Engineering and Operations Management Society International Frederick Winslow Taylor Award. The award was presented at the society's international conference in March.



Dr. Adedeji Badiru

"Efficient and effective operations management is at the heart of every organization. I am delighted to receive this award in recognition of what my colleagues and I have done in operations management for several decades. Onward with teamwork and collective successes," shared Badiru.

The IEOM Frederick Winslow Taylor Award is the highest award presented by the society to recognize members who have distinguished themselves in the IEOM field through scholarly publications, leadership accomplishments, technical achievements including patents, scientific methods invented to improve and elevate mankind welfare, and long and distinguished service to the profession and community.

In a letter to Badiru, Dr. Hamid Parsaei, chair, Global Council and Dr. Ahad Ali, executive director, IEOM Society International wrote that Badiru's "...scholarship, lifelong dedication to profession, leadership, and unparalleled service to the IEOM Society...are exemplary and indeed exceptional."

Badiru's career as an industrial engineer extends over 37 years. He joined the Graduate School of Engineering and Management in 2006 as the head of the Systems Engineering and Management department. He was promoted to the school's dean in 2013 where he is responsible for planning, directing, and controlling operations related to granting doctoral and master's degrees, professional continuing cyber education, and research and development programs.

AFIT Annual Chancellor's Award Winners

Congratulations to all Graduate School of Engineering and Management 2021 Annual Chancellor's Award Winners.

Innovation Awards:

Junior Faculty- **Dr. Hengky Chandraham**, Assistant Professor of Electrical Engineering
Team- **AFIT Center for Directed Energy**

Leadership Awards:

Junior Staff- **Ms. Robin Manly**, Graduate School Executive Support Specialist

Wingman Awards:

Faculty- **Maj Peter Saunders**, Assistant Professor of Atmospheric Science



PATENTS ISSUED TO FACULTY MEMBERS

System, Method and Apparatus for Recovering Polarization Radar Data

PATENT # 11,194,014 **DATE:** December 7, 2021

INVENTORS: **Dr. Julie A. Jackson**, Professor of Electrical Engineering, and **Forest A. Lee-Elkin**

ABSTRACT: A method and apparatus that measure M coupled channels of radar polarization data, that is a subset, which is less than the full set of received coupled channels. Sparse recovery operations are performed on the measured M coupled channels of radar polarization data and a representation of a set of more than M channels of radar polarization data is generated from the sparse recovery performed on the subset of coupled channels.

ONLINE LINK: <https://patents.justia.com/patent/11194014>

Method of Making Hinged Self-Referencing Fabry-Pérot Cavity Sensors

PATENT # 11,287,575 **DATE:** March 29, 2022

INVENTORS: **Dr. Hengky Chandraham**, Assistant Professor of Electrical Engineering, and **Lt. Jeremiah C. Williams**

ABSTRACT: A method is provided for fabricating a passive optical sensor on a tip of an optical fiber. The method includes perpendicularly cleaving a tip of an optical fiber and mounting the tip of the optical fiber in a specimen holder of a photosensitive polymer three-dimensional micromachining machine. The method includes forming a three-dimensional microscopic optical structure within the photosensitive polymer that comprises a two cavity Fabry-Pérot Interferometer (FPI) having a hinged optical layer that is pivotally coupled to a suspended structure. The method includes removing an uncured portion of the photosensitive polymer using a solvent. The method includes depositing a reflective layer on a mirror surface of the hinged optical layer. The method includes positioning the pivotally hinged optical layer to a closed position with the suspended structure, aligning the mirror surface with the cleaved tip of the optical fiber.

ONLINE LINK: <https://microsystems.group/patents/11,287,575%2029Mar2022.pdf>

AFIT-USAFA Data Science Cooperative Team Excels at CogPilot Datathon Challenge

The AFIT-USAFA Data Science Cooperative team participated in the Air Force Chief Data Office (CDO) sponsored USAF-MIT Artificial Intelligence Accelerator (AIA) CogPilot Datathon Challenge in September 2021.



The Challenge was created to leverage innovative AI research from Airmen, Guardians and the public to optimize USAF pilot training. The objective was to explore how quantitative performance measurements and multimodal physiological data can provide more individualized and accurate assessment of a student pilot's cognitive state than current subjective, one-size-fits-all approaches. The additional level of cognitive state estimation can then be used to refine an individual's training curriculum and improve the pilot training process.

The Challenge consisted of using multimodal sensor data (e.g., heart rate and eye-tracking) to predict a flight's difficulty and regress pilot error. The AFIT-USAFA team won five of the 10 awards for which it competed. The team awards included:

- Flight Difficulty Prediction (Best Model)
- Pilot Error Regression (Runner Up)
- Most Innovative Approach
- Most Interpretable Model
- Best Pitch

In addition to these team awards, Capt. Matthew Grimm, a 2019 M.S. Computer Engineering AFIT alum, won two separate awards: Most Elegant Solution and Best Model for Pilot Error Regression.

"The outstanding performance of the AFIT-USAFA team at the CogPilot Datathon Challenge demonstrates the impact AFIT has with regards to tackling challenging DoD problems. These accomplishments clearly illustrate that AFIT personnel have the required expertise to help the Air Force support the DoD AI Strategy," said Maj. Phillip Jenkins, AFIT Assistant Professor of Operations Research.

AFIT-USAFA team members participating in the challenge were Maj. Phillip Jenkins, AFIT Assistant Professor of Operations Research (Ph.D. Operations Research, 2019), Dr. Nathan Gaw, AFIT Assistant Professor of Operations Research, Maj. William Caballero, USAFA Assistant Professor of Mathematical Sciences (Ph.D. Operations Research, 2019), Maj. Joseph Hoecherl, (AFIT Operations Research graduate student), and Capt. Chancellor Johnstone, AFIT Assistant Professor of Statistics (M.S. Operations Research, 2015).



Cannaday Receives Appointment to NASA's Marshall Space Flight Center

John Cannaday (M.S. Contracting Management, 1989) has been named director of the Office of Procurement

at NASA's Marshall Space Flight Center. Cannaday will oversee more than 130 civil service and contract employees and supervise work on more than 500 active contracts, grants, and cooperative agreements. He will lead planning and execution of all Marshall procurements for a range of multiprogram and institutional activities, including source selections, sole source procurements, contract negotiation and administration, construction of facilities, contract closeout and termination, and administration of small and minority business programs, cost analysis, and grants.

LEARN MORE ONLINE

Read the NASA Marshall Star News:
<https://e.afit.edu/d0201>

AFIT Alum Presented with Prestigious Peter Haas Award

Dr. Robert "Bob" Pugh (Ph.D. Applied Physics, 1993), an Air Force Research Laboratory Space Vehicles Directorate expert, was presented the prestigious Peter Haas award at the 2022 Hardened Electronics and Radiation Technology (HEART) Conference.

The Peter Haas award is given annually and is the highest level of recognition the HEART Society offers. The award is for demonstrating "outstanding and innovative technical contributions or leadership in the successful development of U.S. hardened military and space systems." The HEART Conference is a U.S.-only restricted/classified conference focused on mitigating the effect of nuclear-weapon radiation on defense systems.

Pugh was recognized for his life-long contributions in developing advanced radiation-hardened electronics for defense space and missile systems, and for his service to the HEART community. He has held several society and conference positions, including leading the preparation of two classified HEART short courses on weapons effects and mitigation.

LEARN MORE ONLINE

Read the complete article online at:
<https://e.afit.edu/QQWLSk6>

Alum Named Editor-in-Chief of Military Ops Research Journal

By Tamara O. Ellenbecker
Department of Industrial Engineering,
College of Engineering, University of Arkansas

Ed Pohl, professor and head of the Industrial Engineering Department, was recently announced as the editor-in-chief of the Military Operations Research Society Journal. The journal publishes articles that describe operations research methodologies and theories used in key military and national security applications.

Pohl joined the University of Arkansas in 2004. Before coming to Arkansas, he spent 21 years in the United States Air Force, where he served in a variety of engineering, operations analysis and academic positions. Previous assignments include the deputy director of the Operations Research Center at the United States Military Academy; operations analyst in the Office of the Secretary of Defense, where he performed independent cost schedule, performance and

risk assessments on major acquisition programs; and as a munitions logistics manager at the Air Force Operational Test Center.

Pohl received his Ph.D. in systems and industrial engineering from the University of Arizona. He holds an M.S. in systems engineering from the Air Force Institute of Technology, an M.S. in reliability engineering from the University of Arizona, an M.S. in engineering management from the University of Dayton and a B.S. in electrical engineering from Boston University.

His primary research interests are in risk, reliability, engineering optimization, health care and supply chain risk analysis, decision making and quality. Pohl is a certified professional engineering manager. He is a fellow of IISE, ASEM and SRE. He is a Senior Member of IEEE and ASQ, a Diplomate in the Society of Health Systems, and a member of INCOSE, INFORMS and AHRMM.



Dr. Edward Pohl

He also previously served as director of the Master of Science in Operations Management online degree program. He has participated and led several risk and supply chain related research efforts at the U of A.

His work is widely published in peer-reviewed publications, and he has received numerous awards and honors, both military and academic, including the J. Steinhardt Prize for lifetime achievement in military operations research.

New Director of Las Vegas Parks and Recreation

Lt. Col. (Ret) Steven Ford (M.S. Engineering & Environmental Management, 1993) was selected as the new Las Vegas Parks and Recreation director.



Mr. Steven Ford

Most recently, Ford had served as the acting director of Parks and Recreation, and as the city engineer. During his short tenure with Parks and Recreation, Ford has overseen more than 20 capital improvement projects, advocated for competitive rates for hard-to-fill hourly positions and balanced the department's budget.

SOURCE: Director of Communications, City of Las Vegas, NV



Honey Confirmed as Deputy Under Secretary of Defense for Research and Engineering

AFIT alum, Dr. David Honey (M.S. Engineering Physics, 1989), was recently confirmed as the DoD Deputy Undersecretary for Research and Engineering.

In this role, he assists the Under Secretary and Chief Technology Officer in managing research, development, and prototyping activities across the Department of Defense (DoD) enterprise. He also helps oversee the activities of the Defense Advanced Research Projects Agency (DARPA), the Missile Defense Agency (MDA), the Defense Innovation Unit (DIU), the Space Development Agency (SDA), the DoD Laboratory and Engineering Center enterprise, and the Under Secretariat staff focused on developing advanced technology and capability for the U.S. military.

Dr. Honey is a retired U.S. Air Force Lieutenant Colonel who began his military career as a pilot in the B-52D and H model bombers and the FB-111 fighter-bomber, and later transitioned into managing a wide variety of R&D programs.



Dr. David Honey

AFIT GRADUATE SCHOOL FY21 EXTERNAL SPONSOR FUNDING

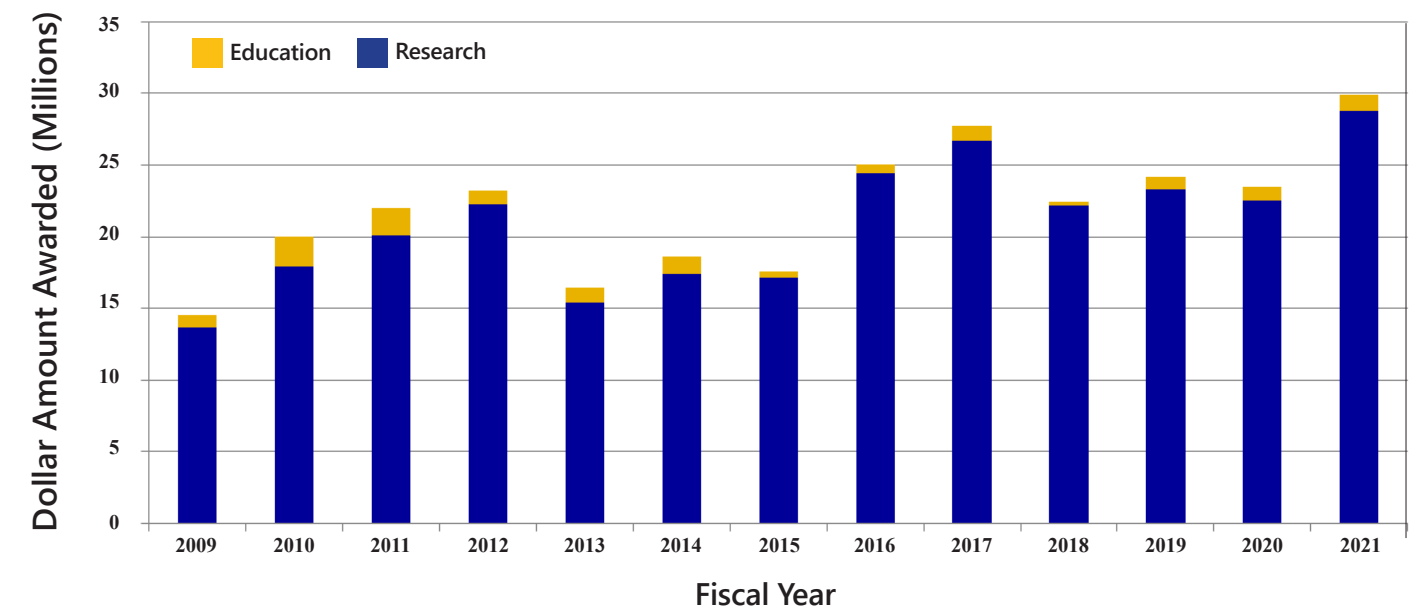
Many of the Graduate School of Engineering and Management's theses and research projects completed under faculty supervision are funded in part by other Department of the Air Force, DoD and government units and agencies. Often, this funding results from collaboration between faculty and thesis sponsors and occurs when the research project can be leveraged by the purchase of equipment or services not otherwise available. The table directly below summarizes external funding awards for FY21 while the bar chart at the top of the next page shows new funding received per fiscal year from FY09-FY21. The pie charts at the bottom of the next page show the breakdown of FY21 external awards by sponsor with a more specific breakdown by AFRL Technology Directorates.

FY21 External Funding Awards

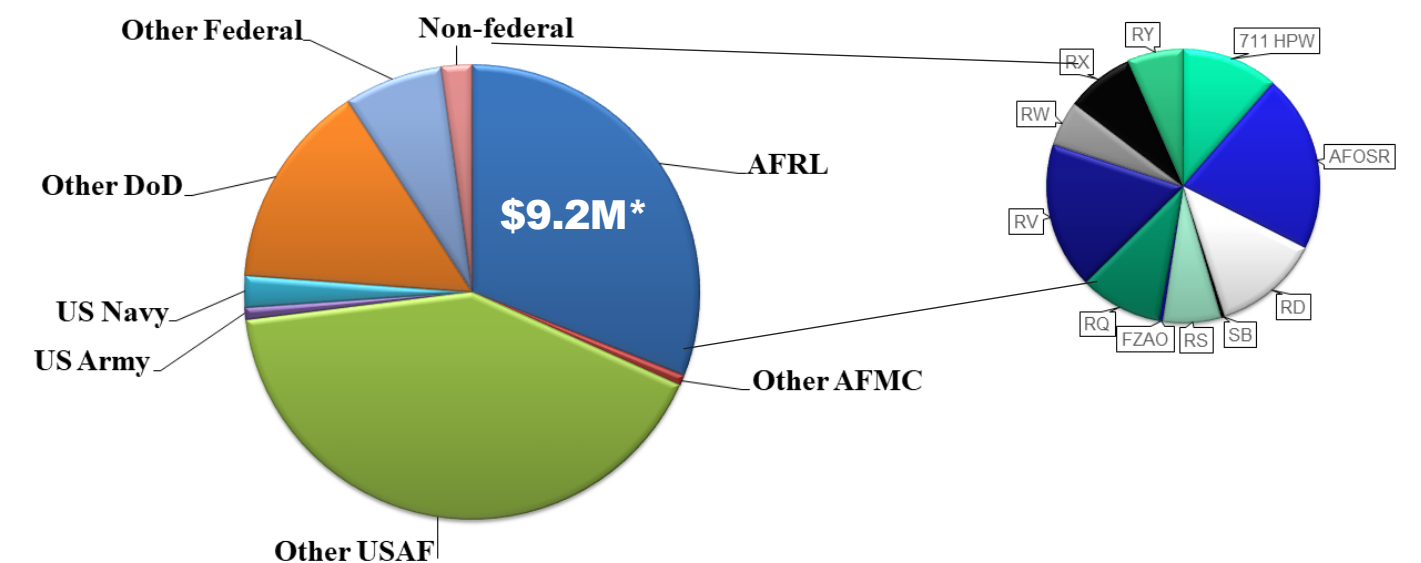
DEPARTMENTS	Total FY21 Newly Awarded Projects		Total FY21 Research Expenditures
	#	\$k	\$k
Mathematics & Statistics (ENC)	4	124	196
Electrical & Computer Engineering (ENG)	54	5,085	5,199
Engineering Physics (ENP)	72	9,725	8,274
Operational Sciences (ENS)	30	9,151	8,384
Systems Engineering & Management (ENV)	15	1,380	1,025
Aeronautics & Astronautics (ENY)	67	4,439	3,938
TOTAL	242	29,906	27,016

RESEARCH CENTERS	#	\$k	\$k
Autonomy and Navigation Technology (ANT)	30	4,035	3,853
Center for Cyberspace Research (CCR)	8	350	646
Center for Directed Energy (CDE)	20	2,332	3,058
Center for Operational Analysis (COA)	5	941	796
Center for Space Research and Assurance (CSRA)	29	2,506	2,588
Center for Technical Intel Studies & Research (CTISR)	18	3,004	2,267
Nuclear Expertise for Advancing Technologies (NEAT)	12	2,027	983
TOTAL	122	15,197	14,191

New Funding Received Per Fiscal Year FY09-FY21



FY21 External Awards by Sponsor



Total Funding: ~\$29.9 Million

***AFRL is AFIT's largest single sponsor: \$9.2 Million from multiple components**

CALENDAR EVENTS

APRIL 2022

Hypersonic Innovation Conference

Dayton, OH | 26-28 Apr 2022

MAY 2022

AFIT Graduate School Summer Quarter Registration Begins

AFIT Campus, WPAFB, OH | 02 May 2022

JUNE 2022

AFIT Graduate School Spring Quarter Classes End

AFIT Campus, WPAFB, OH | 03 Jun 2022

AFIT Graduate School Spring Graduation (No Ceremony)

AFIT Campus, WPAFB, OH | 16 Jun 2022

AFIT Graduate School Summer Quarter Classes Begin

AFIT Campus, WPAFB, OH | 27 Jun 2022

Annual Graduate School Faculty Excellence Showcase Now Available Online

Learn about AFIT Graduate School faculty publications and research expertise in the AY 2021-2022 Faculty Excellence Showcase:

 www.AFIT.edu/EN/facultyexcellence



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To produce outstanding technical leaders in the Department of Defense by providing superior graduate education built on defense-focused research.

VISION

To be internationally recognized as the school of choice in engineering and applied science for defense-focused and research-based graduate education.



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