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THE GRADUATE SCHOOL OF ENGINEERING AND MANAGEMENT

AFIT ENGINEER

Air Force Institute of Technology

World Systems View of the Environment

The Essential Education Role of the United States Military

By Dr. Adedeji Badiru
Air Force Institute of Technology

The latest United Nations report on climate change was released in August 2021. It points to several devastating realities and predictions about the current environment we live and work in. The situation is dire and urgent and we must all pay attention.

The scientific assessment, released by the Intergovernmental Panel of Climate Change (IPPC), concluded that, due to a continued rise in global temperatures, the world can expect more extreme weathers: floods, wildfires, heat waves, vicious hurricanes, tormentous tornadoes, unpredictable earthquakes, extreme cold snaps, rain storms, and so on over the next three decades. This dire situation calls for an urgent worldwide attention and action. So much is the alarm that the Biden administration called on the world's leaders gathering at the UN climate summit in Scotland in November 2021 to take an immediate action.

Whether charged directly or not with the mission of climate-change response, the military does have a direct role to play. I envision one essential role of the military being predicated on education and awareness. In as much as it has been confirmed that most adverse impacts on the environment are caused by human activities, humans need more education and awareness of all the systemic intertwining factors. Education of the military workforce is one primary avenue for the military to step forward and help the nation with the environmental predicament. The approach should center not only on reversing the current environmental trends, but also in advancing environmental science and engineering that impinges on the future of the environment. A sick environment will lead to a sick workforce. A sick workforce will impede, derail, or upend military mission goals. This is why the discipline of industrial hygiene is fundamental for maintaining a military workforce needed for mission accomplishments. Industrial hygiene is the science of anticipating, recognizing, evaluating, and controlling workplace conditions that may cause workers' injury or illness. This calls for a systems approach, in which all the little pieces fit together to make rational decisions. The roles of individuals are important in combatting environmental issues. But, how do humans know and understand such roles, except through focused education? We don't know what we don't know, unless we are educated about what needs to be known.

Recognizing the above critical needs for the nation and the military, the Air Force Institute of Technology (AFIT) has robust advanced academic programs in Environmental Science and Engineering and Industrial Hygiene. Unfortunately, these two essential academic programs are being forced to close due to a lack of student inflows from the US Air Force.

World Systems View continued on page 4

WHAT'S INSIDE

www.afit.edu/EN/afitengineer

Welcome to New Leadership, Students & Faculty

New Students and Faculty Arrive on Campus for Fall Quarter

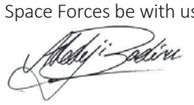

Dr. Adedeji Badiru

Welcome to the September 2021 issue of ***The AFIT ENgineer***, the quarterly newsletter of AFIT's Graduate School of Engineering and Management. The month of September is one of the two high-point months in AFIT's academic calendar. September ushers in the kick-off point for the Fall Quarter, leading to the start of classes at the beginning of October. The other high point of the year occurs in March, when we graduate a new crop of Air Force officers with advanced degrees (Masters and Ph.D.'s). September always piques my interest as I look forward to meeting and receiving our new batch of officers with shiny brass and silver, ready to tackle the rewardingly arduous challenge of studying at AFIT. So, my message in this issue serves as both a welcome message to new students and a salute to our continuing students. Having been at AFIT for fifteen years now, I can attest to the high level of intellectual engagements that exist in every corner of the Institute. We thrive on teamwork and I look forward to working and "studying" with everyone to continue to advance the mission of AFIT.

I am also delighted to welcome Dr. Walter Jones as the second civilian Director and Chancellor of AFIT. Dr. Jones comes to us via the paths of civilian experiences at AFRL, AFOSR, the Navy, and civilian universities. As he has already discovered, AFIT is a unique and rewarding academic institution, unlike anywhere else. Using our mix of military culture, federal government character, and the mandate of conventional academia, we do great things, not only for the Air Force, but also for sister services, DoD, and the nation. Please join me in giving a great shout-out welcome to Dr. Jones.

The stars cannot align any better for us because we also welcome Colonel Paul Harmer as AFIT's new Director of Staff and Air University Detachment 1 Commander. As an Electrical Engineering Ph.D. graduate of AFIT, Col Harmer knows our business inside-out, from both aisles. Still fresh from the excitement of having Dr. Heidi Ries appointed as AFIT's Chief Academic Officer, the Graduate School of Engineering and Management is delighted to partner with the current slate of AFIT leaders in moving the AFIT mission forward.

On the topic of mission accomplishment, our stock is reflected in the several recent externally-competitive awards received by our students, faculty, and staff. Please read about some of these on the inside pages of this newsletter. As in my past calls for action, I encourage our readers to join us in our team march toward excellence and preeminence. May the rising winds of the Air and Space Forces be with us!



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

TEACHING WHAT WE RESEARCH. RESEARCHING WHAT WE TEACH.

AFIT ENGINEER
AFIT Graduate School of Engineering and Management

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AFIT Ceremonies Celebrate New Leadership

By Christopher J. Warner
88th Air Base Wing Public Affairs

The Air Force Institute of Technology welcomed two new senior leaders in separate ceremonies at Wright-Patterson AFB. Dr. Walter Jones officially became AFIT's new director and second chancellor in an acceptance-of-leadership ceremony July 27. The following day, Colonel Paul Harmer took command as the AFIT director of staff and Air University Detachment 1 commander. The ceremonies took place at Kenney Hall Auditorium. The presiding senior leader and officiant for both was Lieutenant General James Hecker, commander and president of Air University.

Jones is the 50th AFIT leader in the school's history. Prior to Jones' appointment, he served 11 years as executive director of the Office of Naval Research, planning and managing the entire $3 billion science and technology program for the Navy and Marine Corps. Jones has also served in many military and civilian research and higher-education roles throughout his career. He replaces Dr. Todd Stewart, who retired in March as AFIT's longest-serving leader. Stewart was the first civilian leader and chancellor at the institute.

Hecker said Jones was handpicked based on his various experience in private, military research and university roles, at the most senior levels. During the ceremony, Jones was presented the AFIT chain-of-office by Stewart, while Hecker presented him with the school's ceremonial mace.

"AFIT provides a unique opportunity for educating the future leadership of the Air Force, the Space Force and others in key roles in the national security enterprise," Jones said during his inaugural remarks. "Several phrases were used to describe AFIT, my favorite being national treasure; it is indeed that."

According to its website, AFIT's official mission is to educate the "total force" military and civilian defense professionals to innovatively accomplish the deterrence and warfighting missions of the U.S. Air and Space Forces ... today and tomorrow.

"So why am I so excited about being here at AFIT? Here at AFIT, our continuing professional education and courses provide the educational foundation for our civil engineering community, cyber community, nuclear community, logistics community, acquisition community and the space community," Jones said."Officers and civilians come to AFIT for their initial training and badging, and then they return to AFIT for additional training as they progress throughout their careers."

Jones pointed out that AFIT is training "real-world problem solvers" for current and future unique Department of Defense-specific issues and problems.

Prior to Harmer's assignment as AFIT's senior military leader, he was the National Air and Space Intelligence Center vice commander. Harmer replaces Col. Paul Cotellesso, who retired after 30 years on active duty with the Air Force, including the past five as AFIT director of staff.

Hecker praised Harmer as the perfect choice for this position. "He has been here three times, well educated – here at AFIT on two occasions, to include assignments at (Air Force Research Laboratory), (Air Mobility Command) and NASIC," Hecker said. "He has what it takes – no question – and I know he is going to do well here."

"I learned at AFIT that (Wright-Patt) is an amazing place and does great things for the Air Force and our nation," Harmer said. "I recently learned that AFIT educates about 30,000 students a year. Everything we do here is amazing and far reaching beyond the Air Force."


U.S. Air Force photo by Wesley Farnsworth

Dr. Walter Jones, incoming Air Force Institute of Technology director and chancellor, delivers remarks during an acceptance-of-leadership ceremony at AFIT on July 27. Jones is the 50th AFIT leader and only the second civilian to hold the position.


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

Colonel Paul Harmer (right), Air University Detachment 1 commander and AFIT director of staff, and Lieutenant General James Hecker (left), commander and president of Air University.

Graduate School Calls for Published Papers for Upcoming Book

The Graduate School has announced a Call for Papers, to include previously-published AFIT journal papers and conference proceedings, particularly award-winning papers for inclusion in the upcoming book titled, "Handbook of Scholarly Publications from the Air Force Institute of Technology (AFIT), Volume 1, 1960-2020." Volume 2 will cover 2021 and beyond.

The premise of the handbook is to promote and disseminate the great intellectual work coming out of AFIT by showcasing a rare collection of selected journal publications highlighting AFIT's research. Topics will cover technologies in the "USAF 2030 Science and Technology Strategy." **Please submit papers or questions by Oct. 31 to Frank.Ciarallo@afit.edu or Eric.Mbonimpa@afit.edu.**

Continued from cover

This is at a time that the programs are most needed. The dilemma is that of Input-Process-Output linkages. No officers in means no officers out. Thus, leading to less-environmentally-savvy decision makers for the US Air Force for now and for the future. Where and when local communities blame and sue the military for adverse environmental impacts, the conundrums could be prevented by up front educational awareness on all fronts. In this regard, it is the duty and expected honor of the military education processes to recognize the value of relevant academic programs and get more officers in the pipelines of producing more defense-focused environmentally-savvy military decision makers.

I hope this article will open an avenue to incite and pique the interest of the Air Force Education Requirements Board (AFERB) to get the highest levels of Air Force leaders to reverse the decline of interest in sending officers for environment-oriented academic programs either at AFIT or civilian institutions. The role of AFIT is to educate and inform. If we are going to lead the world in responding to the environment, we must lead from the position of advanced education.

> "On a recent vacation in Milford, Michigan, I saw the sign below by a lake. It portends the growing environmental risk of PFAS as 'Forever Chemicals' that adversely impact our ways of life at work and leisure."
>
> — Dr. Adedeji Badiru
> Dean, Graduate School of Engineering and Management

Photo by Adedeji Badiru, Milford, Michigan

Systems Viewpoint

Environmental Impact of Littered Cigarette Butts

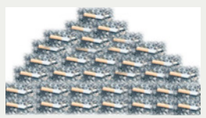
By Dr. Adedeji Badiru
Air Force Institute of Technology

As an environmentally-conscious person and a member of the Beavercreek Environmental Advisory Committee, one thing that has always been my pet-peeve is seeing someone casually tossing a cigarette butt out of a car window, as if that one butt doesn't matter to the environment. From a systems viewpoint, it matters a lot to the environment. I would like to point out to my fellow citizens that cigarette butts pollute the environment in many different ways.

Thinking of what a system represents in this context: "A system is defined as a collection of interrelated elements, whose collective output (together) is higher than the sum of the individual outputs." So, in the context of cigarette butts, the collective damage of several cigarette butts is higher than the damage from one butt. Of course, the person doing the butt flipping will claim that it is just one butt. But, what if several other smokers keep tossing their own butts at the same spot, say at a traffic light at an intersection? What will happen is that what starts as just one butt can become one unsightly and toxin-loaded pyramid of butts, as depicted in the graphics presented below.

To me, one flip of a cigarette butt from a car is like a flip of the finger from the driver (or passenger) of the car. People who behave this way suffer from a lack of awareness of the environmental impact. I believe raising awareness through a systems viewpoint may help encourage smokers to cease and desist from this environment-damaging practice. It is unsightly and unhealthy.

Just one cigarette butt



Ugly pyramid of cigarette butts

According to a study by the Keep America Beautiful organization, cigarette butts are the most commonly-littered item in the United States and around the world. As much as we find that hard to believe, it is, indeed, true. To save and preserve the environment, we must learn how our activities can damage the environment and we must all behave responsibly. Everyone has a role to play.

LEARN MORE ONLINE

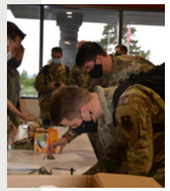
To read an informative article on how cigarette butts damage the environment, please visit https://www.verywellmind.com/world-cigarette-litter-facts-that-will-shock-you-2824735

New Students Arrive at AFIT

During the new student orientation, Dr. Walter Jones, AFIT Director and Chancellor, welcomed the master's class of 2023 and the doctoral class of 2024. He stressed the uniqueness of the education AFIT provides as a defense-focused, accredited graduate school highlighting the active duty military faculty members and the campus location near the Air Force Research Laboratory, Air Force Life Cycle Management Center, and the headquarters for the Air Force Materiel Command.

The new Air University Detachment 1 Commander, Colonel Paul Harmer, stressed the importance of having and being a wingman. Harmer said he understood the stress the students would face during their time at AFIT since he was in their seats before having earned his master's degree in computer engineering in 2000 and his PhD in electrical engineering in 2013 from AFIT.

Following the welcome remarks from AFIT and Graduate School leadership and introductions from key staff positions, the students participated in department orientations. A highlight of the morning was the welcome gift each students received from the AFIT Foundation.



Above: New students receive welcome gifts from the AFIT Foundation. Right: New student check-in. Below: Colonel Paul Harmer addresses new students.

U.S. Air Force contributed photos

Fall 2021 breakdown of new students by degree type

Associate Dean of Students Appointed

Lieutenant Colonel Jason R. Anderson has been appointed Associate Dean of Students, Graduate School of Engineering and Management at the Air Force Institute of Technology. He leads more than 1,000 joint, international, and civilian students enrolled in graduate engineering and management programs. Lt Col Anderson is responsible for all graduate student matters, supervising personnel in support of student services, registrar, and admissions functions.

Lieutenant Colonel Jason Anderson

Lt Col Anderson graduated from the United States Air Force Academy in 2000 with a degree in Operations Research and a minor in Mathematics. He became a KC-135 Instructor Pilot and became an expert in air refueling. He was selected to cross-flow major weapons systems as a PHOENIX Reach Officer to the C-130. He became an instructor pilot and attained the skills of airdrop, air land, and aeromedical missions. As an aviator, he has deployed 14 times accumulating over 1,125 combat and combat support hours during 278 sorties. Lt Col Anderson is a senior pilot, having logged over 2,500 hours in both airlift and tanker aircraft.

Lt Col Anderson has served in a variety of positions at the squadron and group level. Upon graduating from the AFIT Ph.D. program in supply chain management, Lt Col Anderson led the Graduate School's Operational Science Department through multiple programs in logistics, operations management, operations research, and data analytics. As a Major, he served as the Director of Staff for the 317th Airlift Group at Dyess AFB, Texas supporting numerous humanitarian missions in the US, Haiti, Pakistan, and Japan. He has also served as an Assistant Director of Operations (ADO) in the largest airlift (C-130) and tanker (KC-135) deployed units in support of Operation IRAQI FREEDOM and Operation ENDURING FREEDOM. In these positions, he was responsible for directing and facilitating over 850 missions, delivering essential equipment to the warfighter through airlift, air land, air refueling, aeromedical, and airdrop missions.

Graduate School Holds New Faculty Orientation

Prior to the start of the fall quarter each year the Graduate School conducts its New Faculty Orientation to assist faculty in acclimating to their roles of teaching, advising, and mentoring AFIT's students. On September 7, the Graduate School welcomed 25 new faculty members – a group comprised of both military members and civilians – through a virtual orientation.

The first week of orientation consisted of a comprehensive review of critical information such as the Education Technology program of the graduate school, the computer help desk, library services, student records, AFIT research programs, faculty council, and more. During orientation week two, faculty were guided through a Course Design Workshop which was developed to assist them in creating the courses they will instruct. Each new faculty member was also assigned to an experienced faculty member who will serve as a mentor through the first year at AFIT.

Graduate School to Host ABET Re-accreditation Visit

ABET Visit Planned

AFIT's Graduate School of Engineering and Management will be hosting ABET for a re-accreditation visit in October 2021. ABET's previous visit to AFIT was in 2015, at which time graduate programs were reviewed and granted the full six-year re-accreditation. Graduate School leadership expects to receive an additional six years of ABET accreditation from the 2021 visit.

Having ABET-accredited programs at the graduate level is a proudly held AFIT legacy. AFIT has offered ABET-accredited graduate programs since 1964. AFIT's first two graduate programs accredited by ABET were MS in astronautical engineering and MS in nuclear engineering, which are both still accredited and offered today. The Graduate School currently has nine total programs accredited by ABET.

Although ABET is specifically for engineering, technology, applied sciences, and computer science programs, AFIT's graduate school opines that non-engineering programs can also benefit from the rigorous template of ABET evaluation of student outcomes, program objectives, and assessment processes. "To be prepared is to be confident," advised Dean Adedeji Badiru, AFIT Graduate School of Engineering and Management, who, himself, is an ABET program evaluator (PEV).

What is Accreditation?

- The action or process of officially recognizing someone as having a particular status or being qualified to perform a particular activity
- Affirmation of meeting/complying with standards of delivering education

What is ABET?

- ABET is a non-profit, non-governmental agency that accredits programs in applied and natural science, computing, engineering and engineering technology (globally).
- ABET accreditation provides assurance that a college or university program meets the quality standards of the profession for which that program prepares graduates.

Benefits of Accreditation

Accreditation adds multi-dimensional values to an academic program. It assures confidence that a collegiate program has met standards essential to prepare graduates to enter critical STEM fields in the global workforce. Graduates from an ABET-accredited program have a solid educational foundation and are capable of leading the way in innovation, emerging technologies, and in anticipating the welfare and safety needs of the public. There are benefits for students, faculty, staff, the institution, and employers.

ABET Criteria

ABET accreditation facilitates global relevance of academic programs. In the pursuit of ABET accreditation, the following criteria are evaluated for each program:

- Criterion 1: Students
- Criterion 2: Curriculum
- Criterion 3: Program Educational Objectives (PEOs)
- Criterion 4: Student Outcomes (SO)
- Criterion 5: Program Quality
- Criterion 6: Faculty
- Criterion 7: Facilities
- Criterion 8: Institutional Support
- Program-specific criteria (as presented by the cognizant professional society of each program, such as IEEE)
- ABET APPM. Each ABET program is required to comply with the ABET's Accreditation Policy & Procedure Manual

Two AFIT Professors Publish Innovation Technical Textbook

Dr. Adedeji Badiru, Dean and Professor of Systems Engineering, and **Dr. Gary Lamont**, Professor of Electrical Engineering, have just published a textbook on innovation.

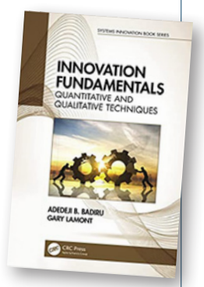
The book entitled "Innovation Fundamentals: Quantitative and Qualitative Techniques," was published by Taylor and Francis/CRC Press.

The three-year joint writing labor started witfully as a WIT (Write It Yourself) when they co-taught an innovation course at AFIT in 2018 and discovered that no classroom-compliant textbook existed on innovation, even though scores of general qualitative reference books were available on the topic.

The book uses a systems-based approach to show how innovation is pervasive in all facets of endeavors, including business, industrial, government, military, and even academia. It presents chapters that provide techniques and methodologies for achieving the transfer of science and technology assets for innovation applications.

By introducing systems-based innovation, the book offers different viewpoints, both qualitative and quantitative. It includes the role that systems can play and discusses approaches along technical and process issues. There is a showcase of innovation applications, and coverage on how to manage innovation individually as well as within a team and it also includes how to develop, manage, and sustain innovation in various organizations.

Open-ended questions and exercises are included at the end of chapters. Written for the advanced-level textbook audience as well as for the professional reader, it targets those within the engineering, business, and management fields.



Women's Panel Focuses on Work/Life Balance

By Stacy Burns
Air Force Institute of Technology

Creating a healthy work/life balance is something many people strive for and also struggle with every day. Unfortunately, the COVID pandemic has magnified this struggle in ways that could never have been predicted. To facilitate conversation on the work/life balance topic, AFIT Graduate School of Engineering and Management Faculty Development, in partnership with AFIT Diversity, Equity & Inclusion (DEI) Working Group, developed an online panel presentation entitled "Voices of Women: Finding Work/Life Balance." The virtual presentation has been offered to AFIT and Air Force Women in Science & Engineering (AFWISE) over the summer season.

Voices of Women: Finding Work/Life Balance panelists during a virtual presentation in July. Clockwise from top left: Dr. Alice Grimes, Dr. Megan Hennessey, Ms. Teri French and Dr. Amanda Bullock.

Graduate School Director of Faculty Development, Dr. Alice Grimes, invited panelists from the AFIT academic communities to participate in a virtual dialogue on the subject. Panelists who joined Dr. Grimes for these sessions included: Ms. Teri French, Engineering Management Instructor, AFIT Civil Engineer School; Dr. Amanda Bullock, Process and Data Integration Team Lead, Air Force Research Laboratory; Dr. Megan Hennessey, Teaching & Learning Center Director, Air University; Dr. Jill McQuade, AFRL; and Ms. Rachel Goenaga, Lead Resource Advisor, AFIT School of Systems and Logistics.

As the presentation moderator, Grimes described some driving forces that can make achieving work/life balance difficult. "In an effort to balance home and work life, women may choose work positions with greater flexibility or fewer hours which can result in a limited lifetime potential for earnings, career advancement, and pension income," Grimes said.

> The Pew Research Center reported in 2019 that over the past 20 years, highly educated women have experienced a particular dramatic increase in motherhood. In 2014, 80% of women ages 40-44 with a Ph.D. had given birth, compared to only 65% in 1994.

"Women are also likely to exit the workforce for extended periods of time for family obligations. Young adult women exit the workforce due to caregiving obligations for children; middle-aged women cope with adult children returning home; and mid-life and older women assume caregiving responsibilities for elder family members or grandchildren. Mid-life women are often referred to as the 'sandwich generation' as they are sandwiched between demands at home, such as caring for adolescent children and elderly family, and the demands of work," Grimes explained.

PANEL DISCUSSES COMMON CHALLENGES

Saying 'yes' to every request often results in a losing battle for both time and energy. "We can't be as effective when we are stretched too thin," Teri French said. "One solution is to include family in outside interests. In 2019 I volunteered at the Dayton Air Show with my family, which allowed me to pursue a personal interest in volunteering, and served a dual purpose of providing my family the opportunity to share quality time together."

During the 2020 COVID pandemic lockdown, Megan Hennessey's child daycare center closed down with only 20 minutes notice, which left her with a two year old at home. "This led to me having to say no to work which was a very difficult thing for me to do," Hennessey said. "The lockdown taught my husband and me how resilient we are and how important it is to have open communication in our marriage."

Amanda Bullock experienced the same situation when she was left with no daycare for her toddler twins during the lockdown. Bullock's mom moved in for 15 months to help her and her husband care for the children. "Mom guilt is something I have experienced and have learned to work through. It's hard not to feel guilty for leaving my kids to go to work, and feeling guilty for missing work when the kids need me to be at home," she explained. "Accepting help from my own mom and having a supportive workplace team have both been instrumental in my ability to hold dual roles as an engineer and a mom at the same time," Bullock admitted.

FUTURE CHANGES TO THE WORKPLACE

When panelists were asked what changes they would like to see in future workplaces, they each noted that having a telework option in place over the past year has provided work flexibility that has been missing up until this point. They hope to see telework options continued or even expanded in the future. Having career development options close to home and giving male employees equal time off to support new mothers were both cited as possible future improvements to work/life balance.

More Ways to Achieve Balance at Work & Home

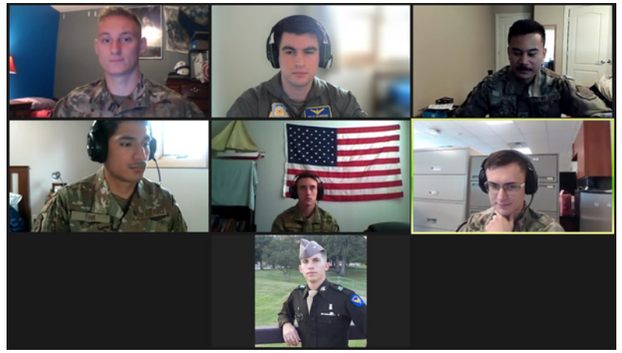
- **Use the last 30 minutes of every day as your daily reflection time.** This encourages you to be better organized and also allows you to reflect on the accomplishments of the day. Setting the schedule and work goals for the next day can help you make more efficient use of your time.

- **Save enough work leave to take a half-day off each month just for yourself.** Use that time to do something enjoyable for yourself when no one else is relying upon you. This helps alleviate stress and gives you time to re-energize for work and family. Your physical and mental health go hand-in-hand and taking time for self-care can have a lasting impact.

- **Dedicate vacation time or weekends as family-only time.** When you set aside time for family without work interruptions, it lets them know they can count on your full attention. And they may be more understanding when occasional work emergencies arise after hours.

Advanced Cyber Education Program Goes Virtual in ’21

AFIT’s Air Force Cyberspace Technical Center of Excellence and Center for Cyberspace Research’s annual ACE program is a four-week summer course targeted to Reserve Officer Training Corps cadets between their junior and senior years in college. The objective of the ACE program is two-fold; to develop the next generation of cybersecurity leaders through an intense program that immerses undergraduate students in the cybersecurity discipline, and to grow new cyber officers into future military leaders.



U.S. Air Force contributed photo

Team Alpha, comprised of AFROTC cadets, participated in the Air Force Institute of Technology’s annual four-week virtual Advanced Cyber Education program. The objective of the ACE program is to develop the next generation of cybersecurity and to grow new cyber officers into future military leaders.

By Katie Scott
Air Force Institute of Technology

The introduction to the Air Force Institute of Technology’s Advanced Cyber Education program started with an unexpected demonstration: cracking a physical lock. Dr. Barry Mullins, a professor within AFIT’s department of electrical and computer engineering, held up a combination lock, turned it to face the cadets, closed his eyes, and then cracked it open.

“Dr. Mullins grabbed our attention from the start; seeing him break the combination lock so effortlessly blew my mind. It even scared me a little bit, since I’ve used those kinds of locks for years and assumed they were safe,” said Tilak Bhatnagar, a student in the ACE program and an incoming cyber officer with the U.S. Air Force.

Mullins went on to explain that trying to hack into a computer system is similar to cracking a traditional door lock. By becoming familiar with the lock’s system – how to rotate it and what clicks to listen for – he was able to open it without a key in under ten seconds.

“That’s the focus of ACE,” said Bhatnagar. “We’re developing familiarity with computer systems in order to exploit them. By building experience with different programs and systems, we can break the digital ‘locks’ in computers – just like people have been breaking traditional locks for centuries.”

The 2020 ACE program was canceled due to COVID, but the AFIT team developed a virtual course for 2021 – a first for the program. This year, 45 cadets from a multitude of STEM degree programs from ROTC detachments across the United States participated.

“It’s ironic that this program is virtual this year since we are studying cyber. It’s been educational to learn and see how AFIT organized their government network just to host us cadets,” said Zachary Harmeyer, a U.S. Army cadet attending the ACE program. Harmeyer is a junior at Virginia Tech studying industrial and systems engineering with plans to work in the cyber field when he enters the military.

Students develop an understanding of information warfare, computer network defense, cryptology and software reverse engineering through online learning and hands-on cyber war exercises. In addition, cadets participate in cyber officer development days that focus on the study of cyber and its unique leadership challenges.

“It’s very rewarding to have a small part in educating the next generation of cyber warriors in our military,” said Dr. Timothy Lacey, AFIT adjunct assistant professor and ACE instructor. “Now, more than ever, we need men and women that understand the threats to our cyber capabilities, both militarily and commercially, and how to best respond to those threats.”

The program culminates in a Hackfest where teams of cadets race to break into each other’s networks. “It’s really interesting to put the pieces together of what we’ve learned in the past couple weeks. It’s been a really great learning experience,” said Harmeyer.

“Hackfest was exciting because it was my first time trying offensive cyber operations – it was a unique opportunity to apply what we learned during ACE,” said Bhatnagar.

Bhatnagar commissioned into the Air Force as a second lieutenant in May 2021, and will enter Active Duty in early 2022 as a cyber officer. Participating in the ACE program allowed him to develop skills beyond the traditional software programming he learned in his undergraduate studies. “When we made programs in college classes, we had to follow very specific requirements. ACE required more creative and open-ended thinking,” said Bhatnagar.

“I would say programs like ACE are valuable for recruiting tech talent in the military, by exposing cadets to operational problem-solving even before they become officers. A lot of civilian computer science students intern at tech companies before they graduate, so cadets aspiring to go cyber should seek similar exposure with programs like ACE before they commission,” said Bhatnagar.

Having graduated from the ACE program, Bhatnagar will share his ACE experience with a group of Civil Air Patrol cadets in August. “One of my college computer science professors asked me to come speak to his CAP cadets to share some insight into cyber-ops. I look forward to discussing ACE with the cadets, some of whom could be aspiring cyber officers. ACE was a transformative experience, and a great start to getting involved in the military cyber domain,” said Bhatnagar.

AFIT Establishes Homeland Security Community of Best Practices

The Department of Homeland Security in partnership with the Air Force Institute of Technology has established the Homeland Security Community of Best Practices. The HS CoBP is born out of the innovative approaches to test planning and follow-on data analytics within AFIT’s eight-year-old Scientific Test and Analysis Techniques Center of Excellence.

The new community’s core mission is strategic, leading a consortium of academic, industry, and government experts to assess future homeland threats to inform test and analysis plans across nine DHS test and evaluation critical areas including:

1) Counter Unmanned Aerial Systems
2) Cyber Security and Resilience
3) Information Technology
4) Artificial Intelligence and Autonomous Systems
5) Cloud Technologies
6) Systems Reliability
7) Sub-terrain (Cross Border Tunnels) Detection Technologies
8) Chemical Biological Radiological Nuclear and Explosives Detection and Interdiction
9) Scientific Test and Analysis Techniques

The purpose of a strategic future-look is to shape the application of T&E in each critical area ahead of a new technology’s requirement to defend against future threats.

The HS CoBP team will function as a knowledge integrator, leveraging its position at AFIT to bring together the best T&E and critical area experts to establish a strategic T&E plan that anticipates rapidly changing threats. Each T&E plan will function as a playbook for DHS programs, and will include best practices, lessons learned, and identify subject matter expert reach-back for specialized systems, test planning, and data analysis.

The HS CoBP will also provide tactical support to equip the DHS program workforce with technically rigorous methods, tools, and best practices that lead to efficient tests with defensible results. This support builds on three recent years of STAT COE support, where STAT experts assisted more than 30 DHS programs as they formulated T&E strategies, drafted test plans, and performed data analysis. In addition to direct support, the team will enable graduate-level scientific and technical support to acquisition programs and provide technical training to the DHS workforce.

The HS CoBP is the new strategic arm and tactical support community at AFIT for DHS T&E. The Director of the Scientific Test and Analysis Techniques Center of Excellence, Dr. Darryl Ahner, will lead the stand-up of the new HS CoBP.

AFIT PhD Student Interviewed for Astronaut Selection

By Stacy Burns
Air Force Institute of Technology

Space exploration and aspirations of becoming a United States astronaut have been life-long interests for Lieutenant Colonel Derek Spear, Air Force Institute of Technology aeronautical engineering doctoral student.

Lieutenant Colonel Derek Spear

“The idea of space exploration always caught my interest, and as I got older, I found the science and engineering behind going to space, along with the experiments that take place on the space station, even more intriguing,” said Spear.

Spear’s life-long dream became a reality when he applied to NASA’s open call Astronaut Selection in March 2020 that received more than 12,000 applications. In the summer of 2021, Spear was one of 120 finalists chosen for an extensive three-day in-person interview at NASA’s Johnson Space Center in Houston, Texas.

“I think my status as a doctoral student at AFIT helped me make it through the application screening process and increased my chances of being selected for an interview. I believe the research I have been performing at AFIT in material characterization of additively manufactured structures is also of interest to NASA,” noted Spear.

AFIT has a long-standing connection to NASA dating back to the first flights into space during the 1960s. AFIT’s Graduate School and Civilian Institution Programs alumni have served as NASA astronauts over the last six decades on space missions Project Mercury, Gemini and Apollo, as well as various Space Shuttle missions.

During his visit to NASA, Spear had the chance to meet eight astronauts and described the interview process as a great life experience that he will cherish, due to the incredible caliber of people he came in contact with during the application and interview process.

“Although I was not selected to advance in the application process, I want to keep pushing the limits of the science that we understand, and advancing the capability of sending people to the moon or other planets while focusing on building a sustainable infrastructure there,” explained Spear. After graduation, he hopes to utilize his education and experience to make an impact on space exploration, science and engineering.

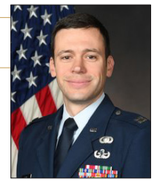
“Recognizing that NASA seeks the best and AFIT produces the best, I am not surprised that Lt Col Derek Spear advanced this far into the competition. I am delighted and proud of his accomplishment and I commend him for his bold venture into the highly-competitive astronaut selection program. AFIT has an established legacy of producing a cadre of astronauts for NASA. I expect us to continue living up to that legacy. I encourage more AFIT students to explore NASA astronaut possibilities and opportunities in the future,” said Dr. Adedeji Badiru, dean, AFIT Graduate School of Engineering and Management.

Faculty Academic Promotions

The Air Force Institute of Technology's Graduate School of Engineering and Management has completed the academic year 2020-2021 promotion and tenure cycle. Five faculty members underwent a rigorous evaluation of their teaching, scholarship and service resulting in a promotion in academic rank.

By Katie Scott I Air Force Institute of Technology

Major James Bevins
Associate Professor



Major James Bevins earned promotion to Associate Professor of Nuclear Engineering with military tenure within the Department of Engineering Physics. His research interests cover nuclear and radiation effects, nuclear forensics and detection, and fundamental nuclear science with a primary focus on the interaction of radiation with matter and nuclear weapons environments, effects, and signatures.

Bevins has 19 refereed publications, 16 in open source archival journals and three in limited distribution publications. In the past three years he has received sponsor funding totaling approximately $3.4M ($2.5M as PI). This does not include two awarded NIF shot grants, an Oak Ridge National Laboratory Lab-Directed Research and Development grant, or $550,000 obtained through the Defense Threat Reduction Agency and the Office of the Secretary of Defense Threat Reduction and Arms Control.

Bevins was an academic advisor for three nuclear engineering student classes, committee chair for seven completed master's degrees, committee chair for one completed PhD degree, and currently chairs two master's and three PhD committees.

Dr. Carl Hartsfield
Associate Professor

Dr. Carl Hartsfield earned promotion to Associate Professor of Aerospace Engineering with tenure within the department of Aeronautics and Astronautics.

His research focuses on experimental evaluation and diagnostics for space propulsion, analytic evaluation of spacecraft design, and applications of additive manufacturing for optimal spacecraft structures.

Hartsfield has 12 refereed publications and 20 reviewed conference proceedings. He has served as a reviewer for the Journal of Propulsion and Power, the Journal of Propulsion and Energetics, and Transactions in Plasma Science.

As an educator, Hartsfield has taught 25 sections of five different courses in the areas of propulsion and system design, both in residence and distance learning to more than 180 students. He has served as an advisor for 27 master's students across multiple departments and served on an additional seven master's research committees.

Hartsfield has received more than $5M ($1.9M as PI) in sponsored research funds. He has 21 approved research project proposals with DoD and national security space sponsors covering chemical and electric rocket propulsion, thermal control of spacecraft, and spacecraft structures. In addition, he has consulted on propulsion/launch and spacecraft design topics and implications of rocket exhaust plume conductivity.

Dr. Brent Langhals
Associate Professor

Dr. Brent Langhals earned promotion to Associate Professor of Information Resource Management with tenure within the department of Systems Engineering and Management. His research interests include modern data management, with emphasis on database technologies, data analytics, machine learning, and human-technology interaction.

Langhals has successfully advised four PhD students (two as research chair), 18 master's students as thesis chair, and another 25 as a thesis committee member. He founded the first AFIT database and analytics lab and was appointed Director of AFIT's Data Analytics Program in 2021.

As a researcher, Langhals has received seven grants totaling over $950K which include partnerships with Air Force Material Command, Air Force Office of Scientific Research, Air University, 711th Human Performance Wing, and 689th Combat Communications Wing. His research has culminated in eight peer-reviewed journal articles, two book chapters, 10 peer-reviewed conference papers, and a patent for a novel 3D Air Traffic Control system.

Langhals has served as a reviewer and/or editorial board member for multiple journals including Journal of Management Information Systems, Decision Support Systems, the Institute of Electrical and Electronics Engineers Systems Journal, International Journal of E-Politics, Psychophysiology Journal, and International Journal of Database Management Systems. He has also served as session chair for the 21st International Conference on Artificial Intelligence: Learning Methodologies, Machine Learning, Cognitive Computing, Reasoning, and Applications.

AWARDS & RECOGNITION

Dr. Jonathan Ritschel
Associate Professor

Dr. Jonathan Ritschel earned promotion to Associate Professor of Cost Analysis with tenure within the department of Systems Engineering and Management. He joined the AFIT faculty in 2011 as the military director and sole faculty member of the cost analysis program serving as program chair, curriculum chair, mentor to students, teacher, and research advisor or thesis committee member for every single cost analysis student.

Ritschel has received over $760K in research grants. His research interests focus on public choice, the effects of acquisition reforms on cost growth in DoD weapon systems, research and development cost estimation, and economic institutional analysis.

Ritschel has 35 peer reviewed journal articles published with three others accepted for publication. Additionally, to disseminate findings to the broader DOD and scientific communities, he has been a part of 17 conference presentations, 15 non-peer reviewed publications, and 10 invited presentations. He is an Associate Editor for the Military Operations Research Society Journal and was an Associate Editor for the Journal of Cost Analysis and Parametrics.

In total, Ritschel has taught 33 classes to more than 325 students and currently serves as the program and curriculum chair of the cost analysis program where he has twice successfully led the program through its six-year external academic review. He has served as the chair for 18 M.S. theses, a committee member for 51 M.S. thesis, and a committee member on one systems engineering dissertation.

Dr. Sanjeev Gunawardena
Research Associate Professor

Dr. Sanjeev Gunawardena earned promotion to Research Associate Professor of Electrical Engineering within the department of Electrical and Computer Engineering.

As an educator, Gunawardena has taught the satellite navigation receiver design course annually since 2015 and developed and taught 11 additional special study courses in the areas of satellite navigation, digital systems and high performance computing. He has graduated eight M.S. students and is currently advising another eight M.S. and one PhD student.

Since 2014, the research projects he has led have brought in $5.9M of sponsor funds and supported numerous ANT students, research, and support staff. His research accomplishments include the implementation of a super resolution technique known as 'chip shape' that can be used to authenticate satellite navigation signals for use in critical applications. Some of his contributions have been adopted and deployed in operational systems.

In 2016, Gunawardena successfully implemented and demonstrated an antenna array signal processing technique known as correlator beamforming which significantly reduces multipath at a fraction of the complexity and cost of traditional array-based approaches. This accomplishment was showcased as the cover story of the January 2017 issue of GPS World Magazine. He also led the development of advanced satellite navigation signal prototyping systems that are currently used in support of architecting and specifying requirements for the next-generation GPS.

Gunawardena has published one book chapter, five peer reviewed journal articles, 16 referred full paper publications, and 18 conference papers. He also serves as a satellite navigation subject matter expert and review committee member for several Air Force Research Laboratory programs and one DoD-based standards committee.

LEARN MORE ONLINE

Read the full faculty promotion article in AFIT news:
www.afit.edu

Graduate School faculty bios:
Find out more about graduate school faculty and the research areas of interest.
www.afit.edu/bios

BY THE NUMBERS

Accumulative achievements by these five graduate school faculty members:

- 160+ publications
- 80+ students advised
- more than $16M in sponsored research funds
- 2 patents awarded for the development of an integrated gamma-ray and neutron imaging system using the rotating scatter mask concept

Dr. Glen Perram Named AFIT Distinguished Professor

Dr. Glen P. Perram, Professor of Physics at AFIT's Graduate School of Engineering and Management, was awarded the honorary title of Distinguished Professor on July 28, 2021. The title of Distinguished Professor is reserved for individuals who have displayed exceptional, lifelong performance and achievement as a faculty member.

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

Lieutenant General James Hecker, commander and president of Air University (left) presents Dr. Glen P. Perram with the AFIT Distinguished Professor Award on July 28, 2021. Also pictured on right is Chief Master Sergeant Randy Kwiatkowski, Command Chief Master Sergeant for Air University.

"Distinguished professorship is the pinnacle of our professoriate. Dr. Glen Perram's accomplishment, as a distinguished professor, is a manifestation of what I expect in our faculty in the pursuit of our education mission for the US Air Force and Space Force. I am proud of him and I cite him as a benchmark for those who will come after him," Graduate School of Engineering and Management dean Dr. Adedeji Badiru said.

Perram arrived at AFIT as an Assistant Professor in 1989 after a tour of duty as Chief of the Visible Chemical Laser Section at Kirtland AFB. He was promoted to Associate Professor in 1992 and served as the Deputy Department Head until 1996. In 1996 Perram was promoted to Full Professor, he served as Associate Dean for Research from 1998 to 1999, and was the Director for the Center for Directed Energy from 2000 to 2005.

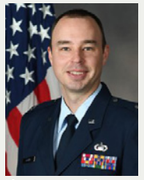
Over the past 30 years, Perram has built a nationally and internationally recognized research program that has focused on the development of high power laser systems, and remote sensing and spectroscopy of energetic events. He created AFIT's first research center, the Center for Directed Energy, and served as the first Center Director from 2000 to 2005. Perram's research program has generated 105 journal articles, 110 conference proceedings, over 150 additional conference presentations, eight technical reports, four book chapters and one textbook. His archival publications appear in top tier journals and are highly cited, with three publications garnering over 100 citations each. Perram has been the principle investigator for 50 research grants valued at more than $26M, and his research program has generated 51 MS and 36 PhD degrees, supported 23 undergraduate interns, four postdoctoral researchers and four research faculty.

As a professor at AFIT, Perram has taught 99 offerings of 24 different courses. In addition, he led the development and teaching of a laser weapons short course that became sought after by AF organizations across the country. Perram also serves as an important mentor to his students. As a retired Lieutenant Colonel, Perram is able to provide both academic and military guidance to officers that are working with him, guiding many of his students on to be very successful AFRL scientists and leaders.

Perram's extensive service to his profession also has been widely recognized. He served as Chair from 2003 to 2005 for the Modeling and Simulation Conference given by the Directed Energy Professional Society and was a member of the NATO SAS-140 Panel on Directed Energy from 2018 to 2020, as well as a member of the Review Panel for the LLNL DPAL Program in 2012, 2015 and 2017. He was also Chair of the Technical Area Working Group on Modeling and Simulation of High Energy Lasers for the Joint Technology Office from 2002 to 2006, and was the Program Manager for the Missile Defense Agency, SBIR Program on Chemical Lasers from 2002 to 2003.

AFIT Faculty Member Receives International Early Career Award

By Katie Scott
Air Force Institute of Technology



Lieutenant Colonel Brian Bohan

Lieutenant Colonel Brian Bohan received the 2021 American Society of Mechanical Engineers (ASME) International Gas Turbine Institute (IGTI) Dilip R. Ballal Early Career Award. The award is competitively selected from the international community with one recipient per year and is presented to the individual who has made significant contributions in the gas turbine industry within the first five years of their career.

Bohan is an assistant professor of aeronautical engineering within AFIT's Graduate School of Engineering and Management. He teaches courses in advanced turbomachinery, applied computational fluid dynamics, and aircraft design. He has authored over 30 technical journal and conference publications, three self-published genealogy books, and is a peer-reviewer for IGTI conference papers and ASME and American Institute of Aeronautics and Astronautics (AIAA) Journals.

Bohan's research is focused on compact gas-turbine combustion, gas-turbine engine controls, heat transfer, fluidic oscillating devices, and alternate methods and materials for manufacturing turbomachinery. A new compact gas-turbine engine configuration he designed that is ideal for power generation is currently patent pending.

A double AFIT graduate, Bohan earned his master's and doctorate in aeronautical engineering in 2011 and 2018, respectively. His master's thesis was judged the most exceptional thesis in his graduating class earning the AFIT Commandant's Award. He is also a graduate of the Air Force Squadron Officer School and Air Command and Staff College, and holds Air Force Acquisition Professional certifications in Systems Engineering and Test and Evaluation.

LEARN MORE ONLINE: Read the complete articles in AFIT news at www.AFIT.edu

AFIT Doctoral Student Wins Innovations in Nuclear Technology R&D Award

By Katie Scott
Air Force Institute of Technology

First Lieutenant Ashwin Rao, a nuclear engineering doctoral student within the Air Force Institute of Technology's Graduate School of Engineering and Management, received the Innovations in Nuclear Technology R&D Award sponsored by the U.S. Department of Energy, Office of Nuclear Fuel and Supply Chain.

"I am extremely humbled and honored to accept this award for my journal article; this is the latest of many great opportunities I have been given in my time in the graduate nuclear engineering program at AFIT," said Rao.

His award-winning research paper, "Comparison of Machine Learning Techniques to Optimize the Analysis of Plutonium Surrogate Material via a Portable LIBS Device," was published in the Journal of Analytical Atomic Spectrometry in January 2021.

"I am delighted to hear the great news of this prestigious federal-level award for Lt Ashwin Rao. When our students do what they do best, our external stakeholders take note positively," said Dr. Adedeji Badiru, dean of the Graduate School of Engineering and Management. "This extremely competitive award demonstrates that AFIT is always on the leading edge of innovation. It is even more gratifying when the innovation work is directed at nuclear technology R&D."

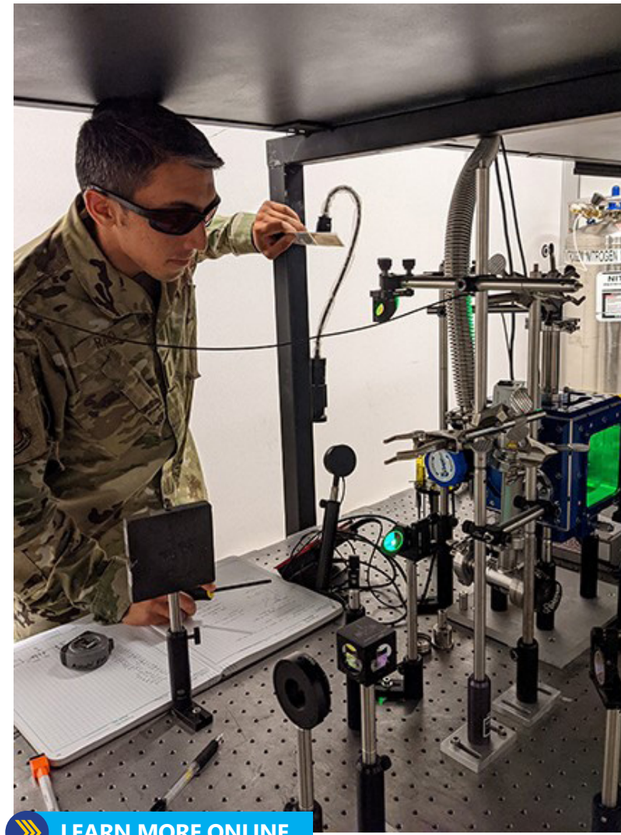
The award program is for university students and in 2021 they awarded 22 prizes for student publications relevant to innovative nuclear technology. Rao's publication was judged in the Competition for Students at Universities with Less than $600 Million in 2019 R&D Expenditures category.

Rao's PhD advisor, Dr. Anil Patnaik, explained that Rao developed a novel method to rapidly measure trace elements in plutonium alloys by using machine learning to enhance the measurement precision of a portable laser-induced breakdown spectroscopy device.

"This research is critically important to increasing the rate of plutonium component production in order to ensure the necessary capacity of U.S. nuclear weapons infrastructure in the future," said Patnaik.

A press release from the award administrators states that in order to be successful and retain its leadership role in nuclear technologies, the United States must foster creativity and breakthrough achievements to develop tomorrow's nuclear technologies. The Department of Energy has long recognized that university students are an important source of breakthrough solutions, and a key component in meeting its long-term goals. The Innovations in Nuclear Technology R&D Awards program was developed for this purpose.

"I am grateful to my dedicated doctoral committee members who have supported my research endeavors and helped me push my publications out into the field. I am also thankful for the support of my department, as well as the efforts of my collaborators at Los Alamos National Laboratory who made this project possible," said Rao.



U.S. Air Force photo by Lt Ryan Pinson

First Lieutenant Ashwin Rao checks the alignment of the Everbright 532 nm Nd:YAG laser's beam path for his laser-induced breakdown spectroscopy experiments.

LEARN MORE ONLINE

Comparison of machine learning techniques to optimize the analysis of plutonium surrogate material via a portable LIBS device.

Read the abstract at this link:
https://pubs.rsc.org/en/content/articlelanding/2021/ja/d0ja00435a#!divAbstract

PATENTS ISSUED TO FACULTY

An integrated gamma-ray and neutron imaging system using the rotating scatter mask concept has been developed at AFIT, resulting in US patents 11047997 and 11054535. The ultimate goal of this system is to enable medium to high fidelity neutron and gamma-ray imaging and spectroscopy in a single, portable system. Current research is developing new and improved machine learning based imaging and post-processing algorithms to improve radiological search performance of the system for discrete volumetric sources. This area of research could be expanded to mapping continuous or semi-continuous radiation fields generated from fallout from a radiation dispersal device, nuclear weapon, or nuclear accident such as Fukushima.

Rotating Scatter Mask for Directional Radiation Detection and Imaging

PATENT # 11047997 **DATE:** June 29, 2021

INVENTORS: Dr. Darren Holland (AFIT Assistant Research Professor of Nuclear Engineering); **Dr. Larry Burggraf** (AFIT Professor of Chemical and Engineering Physics); **Maj James Bevins** (AFIT Assistant Professor of Nuclear Engineering and AFTAC Endowed Term Chair for Nuclear Treaty Monitoring); **Capt Robert Olesen** (former AFIT PhD student) and **Col Buck O'Day** (former faculty member).

Efficient, Dual-particle Directional Detection System Using a Rotating Scatter Mask

PATENT # 11054535 **DATE:** July 6, 2021

INVENTORS: 1st Lt Bryan Egner (AFIT PhD student), **Dr. Darren Holland** (AFIT Assistant Research Professor of Nuclear Engineering), **Dr. Larry Burggraf** (AFIT Professor of Chemical and Engineering Physics), **Maj James Bevins** (AFIT Assistant Professor of Nuclear Engineering and AFTAC Endowed Term Chair for Nuclear Treaty Monitoring), **Capt Robert Olesen** (former AFIT PhD student) and **Col Buck O'Day** (former faculty member) and Valerie Martin (AFRL summer faculty fellowship intern).

Alum Selected as First Military Commander of Multi-Domain Test Force

By 1st Lt. Christine Saunders
Air Force Test Center Public Affairs

The Air Force Test Center ushered in a new era of the Multi-Domain Test Force, appointing its first military commander, Lt. Col. David Levene, at the AFTC Detachment 1 and MDTF Assumption of Command ceremony July 9. The MDTF will take residence at Nellis AFB, Nevada, with future employees set to additionally operate out of Edwards and Eglin AFB.

U.S. Air Force photo by 1st Lt. Christine Saunders

AFIT alum Lt. Col. David Levene (M.S. Aeronautical Engineering, 2014) assumed command of the Multi-Domain Test Force at the Air Force Test Center Detachment 1 MDTF Assumption of Command ceremony July 9 at Nellis Air Force Base, Nevada.

"The need for a test environment to support joint, all-domain, warfighting has been recognized for years, but left to the innovative airmen in our test squadrons to create for themselves…until the standup of the MDTF," said the presiding official, Maj. Gen. Christopher Azzano, Air Force Test Center commander.

The MDTF will serve as the connective tissue for test environments that aim to bridge air, land, maritime, cyberspace, space, and electromagnetic spectrum domains. "The MDTF is an enduring pursuit, not a new building, new people, or new equipment," said Azzano. "It's a new paradigm, an adaptable, evolving team…a mindset for collaborating across the vast talent of the test center and our mission partners."

Air Force Test Center formally stood up the MDTF Oct. 1, 2020 at Edwards, under the leadership of Christopher Klug.

"At the stand-up we said what the MDTF would be: a service, domain, and geographically agnostic organization, people and capability based," said Klug. "Things that were questions 1, 2, 3 years ago, are now answers."

The group of new hires set to work at Nellis, Edwards, and Eglin will serve as the core nucleus to support and enable thousands of testers who make multi-domain test happen.

"The MDTF's mission is an opportunity to add to the Air Force and DoD's test enterprise and help shape and ensure the effectiveness of the next generation of warfighting capabilities," said Lt. Col. David Levene. Forging partnerships and relationships within the developmental and operational test communities will be a top priority for the MDTF as it grows in capability.

"To the Warfare Center, to the Air Force and joint acquisition communities, to our friends in the departments of the Navy and the Army, to the Air Force Major Commands, the Combatant Commands, and many other future mission partners," said Levene, the new MDTF commander. "We are excited to work with you, because while this is an Air Force unit, Multi-Domain testing is inherently joint."

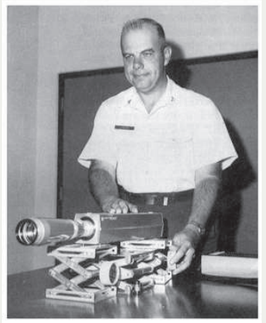
The MDTF will aim to fill in the seams in test organizations, identifying needs to connect, collaborate or create new technological capabilities at the speed of relevance.

MDTF will work alongside Large Force Test Events such as the 412th Test Wing's Orange Flag, the 96th Test Wing's Emerald Flag, and the 53rd Wing's Black Flag.

Major General Donald Lamberson, USAF, Retired

AFIT Distinguished Alum Known as "Father of Lasers" in U.S. Air Force

AFIT Distinguished Alum General Lamberson's technical expertise and leadership in directed energy physics made him the "father of lasers" in the Air Force. He held a critical role in high-energy laser development in the Air Force in the 1970s and 80s, and was particularly influential in his leadership over the Airborne Laser Laboratory, the first high-powered laser to work from an aircraft for precision targeting.



Donald Lamberson at the Air Force Institute of Technology in the 1960s.

Lamberson began his distinguished 35-year Air Force career as an ROTC student at Purdue, where he graduated with a bachelor's degree in chemical engineering in 1953. He continued his education at the Air Force Institute of Technology, earning a master's degree in nuclear engineering in 1961 and a doctorate in aerospace engineering in 1969.

In March 1961 he was assigned to the Air Force Weapons Laboratory at Kirtland Air Force Base, N.M., as a nuclear weapons research officer. He was chief of the laboratory's X-Ray Group and performed several nuclear weapons effects shots before returning to the Institute of Technology to begin his doctoral studies in July 1965.

General Lamberson returned to the Air Force Weapons Laboratory at Kirtland Air Force Base in August 1967 to do doctoral research. In March 1969 he was assigned to lead the Air Force's high-energy laser program, and in July 1972 became chief of the Advanced Radiation Technology Office, where high-energy laser technology and prototypes were developed and tested.

He transferred to the Armament Development and Test Center at Eglin Air Force Base, Fla., in April 1978 and served as deputy for development and acquisition of conventional armament. The general remained in this position through transition to the Armament Division, Air Force Systems Command, at Eglin in October 1979.

General Lamberson was assigned as deputy assistant for directed energy weapons, Office of the Undersecretary of Defense for Research and Engineering, Washington, D.C., in April 1982. The general served as the focal point for the president's initiatives on defense against ballistic missiles. In October 1983 he became assistant deputy chief of staff for research, development and acquisition, Headquarters U.S. Air Force, Washington, D.C. He assumed duties in March 1987 as part of the Goldwater-Nichols DOD Reorganization Act and retired at the rank of Major General in the late 1980s.

Information on this page is reprinted from https://www.af.mil/About-Us/Biographies/Display/Article/106449/major-general-donald-l-lamberson/

Military Decorations and Awards

General Lamberson's military decorations and awards include the Distinguished Service Medal, Defense Superior Service Medal, Legion of Merit and Air Force Commendation Medal. He also received the Air Force Outstanding Research and Development Officer Award, and the Air Force Association's Theodore von Karman Award and Citation of Honor.

Service After Retirement

After retirement Lamberson continued his involvement as a member of the Air Force Scientific Advisory Board and as a member of the Industrial Advisory Council for the Purdue University School of Aeronautics and Astronautics. He was also a member of the Air University Board of Visitors, President and CEO of the Directed Energy Professional Society, and a consultant to industry.

CALENDAR EVENTS

SEPTEMBER 2021

AFIT Graduate School Doctoral Graduation Ceremony
AFIT Campus, WPAFB, OH I 16 Sep 2021

OCTOBER 2021

AFIT Graduate School Fall Quarter Classes Begin
AFIT Campus, WPAFB, OH I 04 Oct 2021

NOVEMBER 2021

AFIT Graduate School Winter Quarter Registration Opens
AFIT Campus, WPAFB, OH I 08 Nov 2021

AFIT Graduate School Fall Graduation Applications Due
AFIT Registrar's Office I 19 Nov 2021

DECEMBER 2021

AFIT Graduate School Fall Quarter Classes End
AFIT Campus, WPAFB, OH I 10 Dec 2021

AFIT Graduate School Fall Graduation (No Ceremony)
AFIT Campus, WPAFB, OH I 23 Dec 2021

GRADUATE SCHOOL MISSION & VISION

MISSION
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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