SCHOOL OF ENGINEERING

SCHOLARSHIP
2013 - 2014
At the University of Dayton School of Engineering, we are motivated by ‘Engineering that Matters’ — engineering with a higher purpose.

As a top-tier Catholic research university, we are recognized for outstanding engineering research that

1) addresses critical needs of the world — Dr. Aaron Altman, director of Aerospace Graduate Program, employs exergy metrics and takes a fresh look at the formation of the wingtip vortex to reduce aircraft drag to improve aircraft fuel efficiency;

2) addresses critical needs of humanity — Dr. Kristen Comfort, director of Bioengineering Graduate Program, proves that in vivo replication of the complex physiological systems aids in the development of enhanced predictive systems and nanoparticle safety;

3) addresses critical needs of our environment and humankind — Dr. Kenya Crosson protects our drinking water from undesirable elements and promotes awareness of engineering designs that assist disabled farm owners and workers through AgrAbility;

4) provides economic growth to our region and the world — Dr. Andrew Sarangan, director of Nanofabrication and Nanophotonics Cleanroom Laboratory, develops new nanoscale materials that can emit, detect, and manipulate light and designs new device concepts for boosting their performance;

5) positively advances the human condition — Dr. Kellie Schneider employs “community-based operations research” to assist our area Food Bank that serves over 125,000 people who are food insecure.

Following our Catholic, Marianist tradition to understand social and global awareness and serve as leaders, we are committed to graduating engineers who are ready to make an impact on the environment, the human condition and the world.

Eddy Rojas
Dean, School of Engineering
Featured Articles

4 Dr. Aaron Altman, Professor, Department of Mechanical and Aerospace Engineering and Director, Graduate Aerospace Program

6 Dr. Kristen Comfort, Assistant Professor, Department of Chemical and Materials Engineering and Director, Bioengineering Graduate Program

8 Dr. Kenya Crosson, Associate Professor, Department of Civil and Environmental Engineering and Engineering Mechanics

10 Dr. Andrew Sarangan, Professor, Department of Electro-Optics and Photonics

12 Dr. Kellie Schneider, Assistant Professor, Department of Engineering Management, Systems and Technology

Faculty Activities

14 Department of Chemical and Materials Engineering

19 Department of Civil and Environmental Engineering and Engineering Mechanics

20 Department of Electrical and Computer Engineering

29 Department of Electro-Optics and Photonics

39 Department of Engineering Management, Systems and Technology

41 Department of Mechanical and Aerospace Engineering

51 Brother Joseph W. Stander Symposium
Aaron Altman, professor at the University of Dayton School of Engineering, shares his aerospace enthusiasm with students and colleagues nationally and internationally through his scholarship.

Altman, 2015 recipient of the Alumni Award in Teaching, directs the Graduate Aerospace Program, the Low Speed Wind Tunnel (LSWT) Laboratory, and the Flight Simulator Laboratory and teaches Introduction to Flight, Aerospace Design, Engineering Design, and Experimental Aerodynamics for the School of Engineering.

Currently, Altman focuses his research on drag reduction. One path that he and his students take to achieving this is through exergy research. Exergy determines the amount of available energy, which can lead to the identification of energy wasted through suboptimal processes. This knowledge can then be used to optimize processes to reduce the wasted energy. Exergy metrics identify inefficiencies and losses, and in aerospace engineering, the metrics can identify ways to lower fuel burn, improve overall aerodynamic performance and reduce lift-induced drag. Altman believes that evaluating aircraft drag/wakes through the lens of exergy can increase fuel economy and benefit our U.S. economy and the environment.

As a frequent collaborator in aerospace and a lifelong learner, Altman continues to advance his knowledge as a representative for UD (and sometimes for the USAF Research Labs) to the Subsonic Aerodynamic Testing Association (SATA). SATA is a worldwide association that provides a medium for the interchange of ideas, techniques and solutions for those involved in low speed aerodynamic testing.

In addition, Altman advises the University’s student Aero Design Team, the student section of the American Institute of Aeronautics and Astronautics, and the It Flies Competition Team.

As the It Flies adviser, Altman coordinates the annual It Flies competition at the University of Dayton, where Air Force test pilots, from Majors to Brigadier Generals, evaluate student designs by using our Flight Simulator Laboratory. Altman champions student designs ranging from Light Sport Aircraft, Transport Aircraft, Firebombers, Crop Dusters, Military Trainers, to Red Bull Racers. Several student projects have been sponsored by the USAF and local companies.

The simulator, in combination with individual conceptual designs, Altman says, “empowers the students. They cannot slack because their airplane’s performance in the flight simulator is true to life, and the students become engaged in perfecting their designs . . . it is an incredibly rich learning environment.”

The full-motion simulator literally provides the user with a feel for how the plane flies allowing them to close the loop on their designs in ways unavailable to students at other schools.
The hands-on flight simulator gives the students what the classroom cannot — a grasp as to the how and why a plane performs in a certain way. It is testing within a controlled environment. “The experimental test pilot feedback further enriches the experience by providing them insight into the world of handling qualities and flight testing that they then must incorporate into their designs,” says Altman.

By integrating the simulator lab with the design process class, students understand how their design decisions affect the equations that determine the flight dynamics and handling characteristics of their airplanes. When taking the stick in the cockpit of the simulator and maneuvering the aircraft, the student quickly realizes how well (or if!) any oscillations dampen out as well as the oscillation period and amplitude.

Recently, during the British It Flies competition, two Dayton students, Alex Watt and Matt Pulfer, teamed up and won first place after impressing the test pilots with their simulation of the Wright B Flyer Silver Bird.

Beginning with flight simulator tests, Watt and Pulfer created a model of the new Silver Bird design that will be built in Dayton, Ohio, at the original Orville and Wilbur Wright factories. Wright B Flyer, Inc., a non-profit corporation, and the National Aviation Heritage Alliance (NAHA) support the project.

Altman’s ongoing aerospace efforts continue to influence students and colleagues around the world.
Kristen Comfort, assistant professor at the University of Dayton School of Engineering was recently named director of the Bioengineering Graduate Program.

As director of bioengineering, she promotes a selective, high-quality, multi-disciplinary program, and the University’s Bachelor’s-Plus-Master’s program provides a pipeline of undergraduate science, technology, engineering and mathematic (STEM) seniors to grow the program. Comfort seeks students with leadership skills and a vested interest in bioengineering to maintain the rigor and quality of the program.

As professor and research scientist in chemical engineering and biotechnology, Comfort’s interests complement her role as bioengineering director. She focuses on the impact of nanomaterials in the bioengineering field and teaches in the areas of material and energy balances, thermodynamics, fluid flow and heat transfer, transport phenomena in biological systems, and research methods. With practical models, Comfort makes the abstract easier for her students and uses research references that generate enjoyment and interest.

In the Journal of Nanobiotechnology, Comfort, along with Emily K. Breitner and Saber M. Hussain, published, “The role of biological fluid and dynamic flow in the behavior and cellular interactions of gold nanoparticles,” which documents the feasibility of in vitro model improvements with physiological variables. By replicating biological fluid and dynamic flow, an enhanced in vitro model is developed. Nanomaterials have been studied in vitro, but Comfort investigates how they behave when the in vivo environment is replicated in vitro.

Comfort, Alexandra O. Luby and Emily K. Breitner, published, “Preliminary protein corona formation stabilizes gold nanoparticles and improves deposition efficiency,” in Applied Nanoscience to demonstrate the possibilities and the challenges of using the protein corona to influence nanoparticle behavior.

Gold nanoparticles are used for a number of applications because of their biocompatibility. The protein corona surface masks the nanoparticle, and preformed protein corona particles stabilize and maintain the nanoparticle characteristics for drug delivery, cancer therapy and multiple other applications that depend on certain properties of the particle.

In the future, Comfort will continue to bridge the in vitro in vivo gap to advance the standard in vitro methodologies. She has proven that in vivo replication of the complex physiological systems will aid in the development of enhanced predictive systems and nanoparticle safety.

Beginning her engineering track at the University of Dayton, Comfort graduated with a bachelor’s degree in chemical engineering.
Afterwards, she attended North Carolina State University, where she received her Ph.D. in the fields of chemical engineering and biotechnology. Her application for a National Research Council Post-Doctoral Fellow with the Air Force Research Laboratory (AFRL) was accepted, and for the first time, her research centered on \textit{in vitro} toxicity. Saber Hussain, Ph.D., AFRL toxicologist, with expertise in nanotoxicity and nanobiotechnology, encouraged Comfort to discover her niche, thus began her nanomaterials' research from an engineer’s viewpoint.

Comfort is a member of the American Institute of Chemical Engineers, Materials Research Society, Society of Biological Engineering, Sigma Xi and Tau Beta Pi and faculty adviser of Chi Omega Epsilon and Tau Beta Pi.

As a UD undergraduate student, Comfort was an enthusiastic researcher and developed her passion for bioengineering. When she returned to UD as a faculty member, her love of teaching was confirmed. Now, she follows her research passion as the director of the Bioengineering Graduate Program and is respected as both—enthusiastic researcher and inspirational professor.

\textit{Image of the human, lung co-culture under dynamic flow following exposure to silver nanoparticles. The cells underwent actin (red) and nuclear (blue) staining with the silver nanoparticles appearing as white. The macrophages are easily identifiable because of their globular nature versus the lamellipodia spreading of the epithelial cells.}
Kenya Crosson, associate professor at the University of Dayton School of Engineering, walks multiple avenues in her teaching and research work. Originally from Dayton, Crosson was young when her family moved to rural North Carolina, and environmental issues touched her life. Because of her father’s work as a health administrator, she noticed an increase in rare cancers in the area, which developed her curiosity about water systems, the environment and human health.

From that point, the environment motivated her research. To protect our drinking water from undesirable elements, Crosson’s research spans water + environment + energy + agriculture.

One chemical additive in particular, denatonium benzoate, a bittering agent, has been on Crosson’s research radar because of state governmental mandates. To prevent accidental deaths by ingestion, antifreeze manufacturers voluntarily add the bitter denatonium benzoate to their products. Antifreeze has a sweet taste, so the bittering agent prevents children and pets from ingesting large amounts of the deadly substance.

Denatonium benzoate is likely to enter water supplies through runoff or illegal discharges containing antifreeze amended with the bitter additive. Recently, Crosson and her husband, Garry, published in the *Journal of Water Resource and Protection*, “Activated carbon and clay minerals for the sorptive removal of denatonium benzoate from water,” which confirms that by using traditional sorbents, carbon or clay minerals, we can lower the amount of the bittering agent in our drinking water.

Currently, Crosson combines carbon and oxidation to optimize the removal of denatonium benzoate from water. Crosson says, “Carbon alone does not lower the denatonium benzoate concentration enough, but including activated carbon with oxidation, the level of the off-flavor is lowered enough to be undetected in the drinking water.” Her experiments with carbon and oxidation sequencing found that “when oxidation precedes sorption, the activated carbon sorption ability is diminished.”

In addition to her research, she advises and mentors undergraduate and graduate students on their research on the removal of microcontaminants and emerging contaminants from water using filtration and adsorption. They tailor natural and engineered sorptive media for removal of contaminants in agricultural runoff, which promises to provide new, exciting applications and treatments.

Always closely attuned to human needs and agriculture, Crosson’s cross-collaborations as research scientist and professor benefit AgrAbility, a national agricultural program with a mission to keep disabled farmers and other
agricultural workers in their professions. The goal of AgrAbility is a safe farming environment.

Ohio is a large agricultural state, and Crosson contributes to student awareness about this previously unconsidered field of study — engineering designs for farming solutions.

In 2009, Crosson contacted AgrAbility as a client for the first-year engineering design course, EGR 103 Engineering Innovation, and the collaboration developed. At that time, she visited a paraplegic farmer to understand how he was able to work on his farm and to research how students in her engineering design class could enhance his capabilities. Crosson mentors students who develop open-ended projects that assist AgrAbility.

Along with design solutions, she and her students attend the Ohio State University’s annual Farm Science Review, a large outdoor meeting that showcases agricultural innovations and resources, where they showcase their EGR 103 student designs. The Review demonstrates not only biological engineering capabilities but also the technical side of agriculture with designs that improve safety. The AgrAbility program and the disabled farmers and farm workers have inspired Crosson and her engineering design students to identify problems and discover solutions to help.

In 2014, as invited speakers to the American Society of Agricultural and Biological Engineers International Meeting in Montreal, Canada, Crosson, along with S. Dee Jepsen, K. McGuire and J. Zeller, were able to disseminate their AgriAbility knowledge and successes. Their topics included, “Ohio AgrAbility Design Solutions Developed In A First-Year Engineering Innovation Course” and “Incorporating AgrAbility Projects into the University of Dayton First-Year, Service-Learning, Engineering Design Course.”

Crosson attended North Carolina Agricultural and Technical State University and received her B.S. in agricultural and biosystems engineering. Crosson received her M.S. and Ph.D. in environmental engineering from the Pennsylvania State University.

As her scholarship moves forward, Crosson examines new fields of study, new innovations and exciting future applications along a variety of avenues that will continue to benefit our environment and humankind.

City of Dayton, Ohio, and the Great Miami River
Andrew Sarangan, professor at the University of Dayton School of Engineering, directs the Nanofabrication and Nanophotonics Cleanroom Laboratory.

Sarangan teaches and conducts research guided by the principles of engineering, i.e., to build innovative things that solve real life problems. He says, “Engineering requires a thorough understanding of mathematics and science. This is the fuel-air mixture. Innovation is the spark that ignites this mixture to do useful things.”

In 2006, Sarangan built the Nano-Fab Lab entirely from externally sponsored research funding and has continued to operate and upgrade its capability with support from government and private companies.

Ten years later, the Lab’s advanced capabilities include optical thin film deposition, photolithography, deep-UV nano-lithography, semiconductor diffusion and oxidation processes, and a variety of plasma etching capabilities.

Sarangan focuses on two research areas: photonic devices such as photodetectors, waveguides and polarizers, and optical thin film design and synthesis. He endeavors not only to come up with great ideas but also to build and test functional prototypes.

Nanofabrication is the key enabler that makes integrated circuits (electronic chips) possible. It involves synthesizing and depositing novel types of material, patterning these materials, and then removing them (etching) in a systematic manner.

The next-generation of electronic chips will inevitably include some photonic components. This requires the development of nanoscale photonic components that are compatible with electronic integrated circuit manufacturing and assembly processes. This is the overarching vision of Sarangan’s research.

Specifically, his research includes developing new nanoscale materials that can emit, detect and manipulate light, and designing new device concepts for boosting their performance.

Sarangan uses a novel deposition method for creating nanostructured thin films with optical properties that can be engineered to meet specific characteristics.

He also developed a method to make silicon nanowires that exhibit unusual light absorption because of a quantum mechanical process known as sub-band absorption. He plans to utilize these materials in the next-generation photonic integrated circuits.

Sarangan’s current grants include an Air Force funded project on “Interferometric Lithography,” two projects funded by the National Science Foundation (NSF) and one funded by the Army Research Office.
One NSF project is a collaboration between Sarangan and Dr. Keigo Hirakawa, associate professor with the Department of Electrical and Computer Engineering. In it, they work to develop an image sensor that can record the full spectrum of color (or wavelengths) instead of the traditional red, green and blue. They plan on extending this concept to the infrared spectrum where the concept of color does not even exist.

In another project, in collaboration with Dr. Joseph Haus, professor with the Department of Electro-Optics and Photonics, and Dr. Imad Agha, assistant professor, Department of Physics and Electro-Optics, Sarangan works to develop a new method for detecting light using a phenomenon known as quantum tunneling through ultra-thin layers.

In the past, Sarangan was principal investigator on an NSF grant to establish a nanotechnology curriculum to undergraduate engineering students. He worked with Sinclair Community College and created an innovative delivery method for enhancing the teaching methods used in nanotechnology education.

New on the horizon, Sarangan plans to build electro-optic chips for biologists, chemists and toxicologists to study how biological cells respond to various environments. Known as “organs on a chip,” these are chips, not unlike electronic chips, that mimic the behavior of real organs, so responses to various stimuli and toxins can be studied easily, reliably and safely.

Sarangan’s Nano-Fab Lab has the capability to enable conceptualizing and building prototypes of all of the aforementioned. He and his graduate students do everything in the lab to keep it operational, including maintenance and repairs. He insists that his students develop useful, practical skills, and focus on building things that people need. As Sarangan says, he is an “engineer, and engineers build useful things.”

Sarangan’s courses, labs and research projects appeal to a wide range of students. He came up with the idea of using a live interactive video system for teaching to a classroom directly from his cleanroom laboratory.

The video setup allows for greater accessibility to a larger number of students and saves time because students do not have to “gown-up,” to enter the Lab. The system is like a super-broadband Skype with multiple cameras and multiple microphones. Sarangan can see and hear every student in the classroom, and the students can see every detail of the equipment or process that he is teaching.

Hands-on with state-of-the-art labs and mentoring describes Sarangan’s teaching style. He teaches and conducts research with undergraduate and graduate students from multi-disciplines: electro-optics, electrical and computer engineering, mechanical engineering and materials engineering. His teaching oeuvre encompasses Nano Fabrication, Integrated Optics, Quantum Electronics, Nano Photonics, Optical Thin Films, and Advanced and Principles of Nanotechnology.

As testimony to his teaching and research efforts, Sarangan has been honored with the Faculty Excellence in Teaching Award from the Southwestern Ohio Council for Higher Education and the Sigma Xi Noland Award for Excellence in Research.
Kellie Schneider, assistant professor at the University of Dayton School of Engineering, says that her teaching philosophy uses “less lecture to facilitate student learning.” She strives to develop courses that incorporate active learning, mastery-level assessment and service-learning opportunities for her students.

Schneider teaches a variety of classes including engineering analysis, quality assurance, reliability engineering, and probability and statistics. She also facilitates the departmental capstone project requirement.

Engineering management and systems classes are delivered online or simulcast over the internet via web conferencing software to accommodate the numerous working professionals enrolled. The simulcast sessions are recorded and available for asynchronous viewing, thus allowing students flexibility in how they complete their courses. Schneider admits that this is a challenging paradigm under which to work, but she says that she enjoys the challenge.

Currently, she and Department of Engineering Management, Systems and Technology colleague, Dan Zalewski, collaborate on “flipping” the classroom to incorporate learning-centered teaching approaches.

Recently, they revised their probability and statistics course to that of the “flipped classroom” by assigning readings and problems prior to the class sessions. During class, Schneider and Zalewski challenge the students with difficult problems related to their outside assignments.

Instead of traditional lectures, the flipped classroom provides students with the opportunity to work with others on authentic problems and receive personal, hands-on guidance during class time.

Engineering education and community are at the heart of Schneider’s research.

While at the University of Arkansas, she began her primary area of scholarship: Operations research methodologies and reliability methods to model, evaluate and quantify the interactions of individuals and the dissemination of information within various organizations.

“Qualitative analysis is important, but it is important to quantify too . . . . It is exploratory, and there are new insights that can be gained,” says Schneider.

When modeling engineering student retention, Schneider graphs for quantifiable statistics through social networks and engineering education and their relationships with student retention. Important factors include: GPA, ethnicity, test scores and positive or negative outcomes of student attendance.

Using quantifiable metrics, her research outcomes assess the importance of social networks and the impact of diversity programs at the University. Schneider states that through
assessment, “We can experience the true diversity of community that we seek to have at the University of Dayton.”

As a servant-leader, Schneider builds on her research efforts and assists our regional community Food Bank. Collaborating with Kelly Bohrer, Director of Community Engaged Learning at the Fitz Center, Schneider discovered that “There are over 125,000 people in the Miami Valley who are food insecure, and we have too much food in this country for anyone to be hungry. The Food Bank is an important agency that helps to relieve the situation.”

Together with her students, Schneider focused on reducing Food Bank costs by optimizing operations. By addressing vehicle routing schedules, including the Food Bank auditor’s travel routes, donation collections and donation deliveries, they successfully optimized Food Bank operations.

Recently, Schneider was awarded a Hanley Sustainability Institute summer grant, which enables her and two students to spend the summer working directly with the Food Bank on initiatives aimed at combating food insecurity in our area.

Reflecting on a University of Dayton faculty retreat, Schneider shared her personal vision statements:

• Engage in scholarly activities that (1) Improve the field of engineering education, (2) Provide practical solutions for our industry partners, and (3) Enhance the efforts of our community partners in combating poverty.

• Educate highly motivated, globally aware engineers that are capable of meeting the grand challenges required to advance civilization and ensure that our planet thrives.

• Serve both the University and the profession by participating in activities that align with my scholarship and educational goals.

At the University of Dayton, Schneider says that she has “found a unique place where I will be able to continue to grow both personally and professionally.”
Department of Chemical and Materials Engineering

BOOK CHAPTERS


JOURNAL ARTICLES


Comfort, K.K. 2013. The biological impact of concurrent exposure to metallic nanoparticles and a static magnetic field on keratinocytes. BioElectromagnetics 34, no. 7 (October): 500-511.


Athmer, C.J., C. Ruef, T.J. Jones, and R.J. Wilkens. 2013. Desalinization of kaolin soil using radial electromigration and...

PUBLICATIONS IN REFEREED JOURNALS


PLENARY AND THEMATIC CONFERENCES


**Lafdi, K.** 2013. Nano, the key technology for multifunctional composites. 2nd ACSD Symposium and 4th FASC Congress, May 7, in Marrakech, Morocco.


**Lafdi, K.,** C. Meng, D. Solomon, and L. Li. 2013. Mechanical properties of fuzzy fibers as a function of CVD growth conditions. DESS.

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### INVITED LECTURES


**Sandhu, S.** 2013. Energy and lithium-based cell/battery. IICHE (Indian Institute of Chemical Engineers). Chandigarh Regional Center, Panjab University, October 28, in Chandigarh, India.

### PRESENTATIONS

Black, W., and **D. Comfort.** 2013. Biogenic fabrication of silver nanoparticles by Shewanella oneidensis. Annual Ohio Space Grant Consortium (OSGC) Student Research Symposium, NASA, Ohio Aerospace Institute, April 5, in Cleveland, Ohio.


**Comfort, K.K.** 2013. Chronic in vitro exposure to low doses of silver nanoparticles identified distinct cellular consequences associated with long-term nanomaterial contact. Materials Research Society, April 5, in San Francisco, California.


Janz, E.E., R. Strong, **K.J. Myers,** and A. Mays. 2014. Agitator design at high solids loadings. 2014 Annual AIChE Meeting, paper 143a, November 16-21 in Atlanta, Georgia.


Shaik, M. U.R., **K.J. Myers,** and


Sarwan, Sandhu, and Joseph P. Fellner. 2014. Characterization of iron phthalocyanine as the cathode active material for lithium-ion batteries. Indian Institute of Chemical Engineers, Panjab University, December, in Chandigarh, India.

ABSTRACTS

Sandhu, S., and J.P. Fellner. 2014. Characterization of iron phthalocyanine as the cathode active material for lithium-ion batteries. Panjab University, Chandigarh: Indian Institute of Chemical Engineers.

Sarwan, Sandhu, and Joseph P. Fellner. 2014. Characterization of iron phthalocyanine as the cathode active material for lithium-ion batteries. New York: AIChE.

TECHNICAL REPORTS


POSTERS


MAGAZINES/TRADE PUBLICATIONS


PATENTS AND DISCLOSURES


CONTRACTS, GRANTS AND SPONSORED RESEARCH

Browning, C.E. (Principal). Ohio research scholar in materials, State of Ohio, $4.5M. (September 2013 - Present).

Browning, C.E. (Principal). Minority Leaders, Clarkson Aerospace, Private, $2M. (September 2013 - Present).


Skill, Thomas, Vijayan Asari, Shuang-Ye Wu, C.E. Browning, and Andrew M. Sarangan. CC-NIE network infrastructure:


Lafdi, K. Characterization of iron (II) phthalocyanine as the active material for lithium-ion batteries. AFRL, WPAFB, Ohio, Federal. (May 16, 2013 - August 16, 2013).

Department of Civil and Environmental Engineering and Engineering Mechanics

JOURNAL ARTICLES


PAPERS PUBLISHED IN CONFERENCE PROCEEDINGS

Bilgin, Ö. 2014. Soil-structure interaction for sheet pile walls considering ground surface and sub-wall soil conditions. ISSMGE TC 207 Conference.


Bilgin, Ö., and E. Mansour. 2013. Anchored sheet pile wall design in expansive soils. 18th International Conference on Soil Mechanics and Geotechnical Engineering, September 2-6, in Paris, France.


Eustace, D., A. Aylo, and W.Y. Mergia. 2013. Effects of left-side merging and diverging ramps on crash frequency on urban freeway segments. 4th International Conference on Road Safety and Simulation (RSS2013), Roma Tre University, October 24, in Rome, Italy.

Eustace, D., S. Ponnada, and S.-Y. Wu. 2013. Identifying locations with high rates of alcohol related traffic crashes in Ohio. 4th International Conference on Road Safety & Simulation (RSS2013), Roma Tre University, October 24, in Rome, Italy.

PRESENTATIONS

Bilgin, Ö. 2014. Mathematical model of the shell with the infill for retaining structures. ISSMGE TC 207 Conference, June, in St Petersburg, Florida.

Bilgin, Ö. 2014. Overview of shells with infill used in geotechnical engineering applications. ISSMGE TC 207 Conference, June, in St Petersburg, Florida.

Bilgin, Ö. 2013. Analysis of lateral earth pressures on anchored sheet pile walls using conventional and finite element methods. 18th ICSMGE, ISSMGE, September, in Paris, France.

Chase, D. V. 2013. Use of genetic algorithms to generate optimal pumping schedules - lessons learned. 9th Cincinnati Area Water Distribution System Seminar, November 18, in Cincinnati, Ohio.


Eustace, D. 2013. Safety modeling, session chair. 4th International Conference on Road Safety and Simulation
University of Dayton School of Engineering Scholarship 2013-2014

(RSS2013), Roma Tre University, October 25, in Rome, Italy.

POSTERS


CONTRACTS, GRANTS AND SPONSORED RESEARCH

Bilgin, Ö. Analysis of aggregate pier systems for stabilization of subgrade settlement, ODOT, State, $455,636. (October 2012 - October 2016).

Bilgin, Ö. Enhanced models for predicting soil consolidation parameters and settlements, University of Dayton, $6,500. (October 1, 2012 - September 1, 2013).

Chase, D.V. Real-time system optimization for sustainable water transmission and distribution, Great Lakes Protection Fund, Private, $293,745. (September 8, 2008 - Present).

Chase, D.V. Developing water distribution system analysis modules, National Science Foundation, State, $35K. (July 1, 2011 - June 30, 2014).


Toubia, E. Performance comparison of structural steel coating systems. ODOT, State, $208,817. (October 6, 2014 - February 2016).


Department of Electrical and Computer Engineering

BOOKS


BOOK CHAPTERS


Santhaseelan, V., and V.K. Asari, ed. 2013. In Moving object detection and tracking in wide area motion imagery, chapter 3,
vol. 6, 49-70. Berlin Heidelberg: Springer-Verlag.

JOURNAL ARTICLES


Asari, V.K. 2014. Recent advances in wide-area surveillance: What can we see now? Department of Computer Science Graduate Program, University of Texas, November 17, in Dallas, Texas.


School of Electrical Engineering Graduate Program, University of Costa Rica, San Pedro Montes de Oca, July 24, in San Jose, Costa Rica.


PRESENTATIONS


Asari, V.K. 2014. UD international collaborative program. International Twinning Engineering Program Orientation, International Center for Applied Sciences, Manipal University, August 26, in Manipal, India.


Meeting, SPIE, August 17, in San Diego, California.


POSTERS


ABSTRACTS


MAGAZINES/TRADE PUBLICATIONS


CONTRACTS, GRANTS AND SPONSORED RESEARCH


Asari, V.K. Object region segmentation in video, GrabTV (City of Dayton project through


Asari, V.K. Human action and activity recognition by video analysis - Central State University collaborative project, Central State University, State, $22,500. (March 1, 2013 - April 30, 2014).

Asari, V.K. Detection and tracking of moving objects in wide area motion imagery (Under the program SCISSORS), Air Force Research Laboratory (AFRL), Federal, $500K. (May 2012 - August 2013).

Balster, E. Academic layered sensing program (ALSP), project 22, AFRL/RYDI, Federal, $1.8M. (July 1, 2013 - Present).

Balster, E. Research, development, and evaluation of surveillance imaging (R-DESI), AFRL/RYAA, Federal, $900K. (March 1, 2013 - Present).


Balster, E. Academic layered sensing program, task 13, research and development of sensor processing systems, AFRL, University of Dayton, $950K. (February 1, 2011 - January 31, 2013).


Duncan, B.D. Sub-aperture based EO imaging systems, RNET, Inc., Local, $50K. (October 1, 2008 - Present).


Hirakawa, K. Chromatic aberration correction, CISCO, Private, $45K. (June 1, 2012 - May 15, 2013).

Hirakawa, K. Low photon count imaging, Sony, Private, $73,765. (April 1, 2012 - March 31, 2013).


Department of Electro-Optics and Photonics

BOOKS


JOURNAL ARTICLES


**INVITED LECTURES**


**Haus, J.W.** 2014. Quantum tunneling in nanoplasmonic systems. ECE Seminar, University of Alabama at Huntsville, January 10, in Huntsville, Alabama.

**Haus, J.W.** 2013. Quantum conductivity theory for nanoplasmonic systems. OSA Incubator on Structured Light in Structured Materials, Optical Society of America, October 1, in Washington, D.C.

**Haus, J.W.** 2013. Quantum conductivity and metal-insulator-metal nanoparticles. Seminar, University Roma-La Sapienza, July 4, in Rome, Italy.


**Haus, J.W.** 2013. Nonlinear optics in nanophotonic systems. SPIE Optics and Photonics, SPIE, April 17, in Prague, Czech Republic.


Vorontsov, M. 2014. Fiber-arrays: A coming revolution in the way we build optical systems. 7th Annual Ohio Innovation Sensor Summit, University of Dayton Research Institute, October 9, in Dayton, Ohio.

Vorontsov, M. 2014. Brightness function numerical simulation technique in analysis of active and passive atmospheric imaging systems. AFRL Sensors Directorate, hosted by Dr. LeMaster, AFRL, August 14, in Dayton, Ohio.


Vorontsov, M., V. Kulikov, Z. Yang, and D. Bricker. 2014. Optical waves propagation in atmosphere with strong variation of refractive index gradients: Toward fusion of ray tracing and wave optics techniques. AFOSR MURI Annual Review Meeting, University of Dayton Research Institute, July 23, in Dayton, Ohio.


Vorontsov, M., G. Filimonov, S. Lachinova, and V. Kolosov. 2014. Comparative analysis of Monte-Carlo and brightness function approaches in numerical simulations of incoherent imaging systems in deep turbulence. AFOSR MURI Annual Review Meeting, University of Dayton Research Institute, July 23, in Dayton, Ohio.


Vorontsov, M., and S. Lachinova. 2014. Target-in-the-loop atmospheric turbulence characterization based on remote


Vorontsov, M., T. Weyrauch, S. Lachinova, and D. Bricker. 2014. Intelligent beam control for optical phased arrays transceivers AFRL STTR Phase 2. Presentation to Dr. Dan Marker, AFRL, University of Dayton Research Institute, June 19, in Dayton, Ohio.


Zhan, Q. 2013. Tailoring optical complex fields with nanostructured metallic thin film. SPIE Optics+Photonics, SPIE, August, in San Diego, California.


**PRESENTATIONS**

Ohio.


Vorontsov, M. 2013. Update on deep turbulence effects compensation and coherent beam combining over a 7-km propagation path. 2013 MURI Technical Exchange Meeting, AFOSR, November 7, in Miami,
Florida.


**Vorontsov, M.** 2013. Overview of fiber array technology developments. Review Meeting, ARL, June 14, in Washington, D.C.


**Zhan, Q., and S. Wang.** 2013. Modified bow-tie antenna with strong broadband field enhancement for RF photonic applications. SPIE Optics + Photonics, SPIE, August, in San Diego, California.

**PAPERS PUBLISHED IN CONFERENCE PROCEEDINGS**


**Banerjee, P.P.** 2014. Recent advances in digital holography. OSA Int’l Conf. Fiber Optics and Photonics: 3.


Williams, L., P.P. Banerjee, G.


on optical wave propagation. SPIE 9224: 92240W.


**PAPERS**


**ABSTRACTS**


**WORKSHOPS**


**CONTRACTS, GRANTS AND SPONSORED RESEARCH**

Banerjee, P.P. Waveguide-based devices. AFRL/SSS, $41K.
(August 2014 - August 2015).


**Banerjee, P.P.** SBIR phase II-E subcontract: Spectral imaging sensor testing, applied optimization. $60K. (June 2014 - June 2015).


**Haus, J.W.** Sense and avoid Ladar for unmanned aircraft systems (UAS), Utopia Compression (AFRL Phase II), Private, $90. (January 19, 2011 - October 19, 2013).


**Sarangan, A.M.** Collaborative research: Cross-institutional nano-technology education and workforce training project. National Science Foundation, award #1138165, $100K. (January 2012 – December 2014).


**Sarangan, A.M.** Infrared coatings for laser effects on materials, structures and sensors, AFRL (through UES), Federal, $9K. (January 22, 2013 - December 31, 2013).

**Sarangan, A.M.** Ohio academic research cluster for layered sensing, Ohio Third Frontier Project, State, $24,348,718. (August 18, 2008 - November 18, 2013).

**Sarangan, A.M.** Development of metal vapor coating $\&$ blue enhanced medical imaging, FMI Medical Imaging, $30,800. (September 1, 2012 - April 30, 2013).


Vorontsov, M. Cooperative Agreement #W911NF-09-02-0040, ARL, Federal, $1,416,975. (September 9, 2009 - September 8, 2013).


Papers Published at Conference Proceedings


Zalewski, D., and K. Schneider. 2013. Seven years of success in implementation of a 3 + 1 transfer program in engineering technology between universities in China and the Unites States. ASEE Annual Conference, in Atlanta, Georgia.


Segalewitz, S.I. 2013. Seven years of success in implementation of a 3 + 1 transfer program in engineering technology between universities in China and the United States. ASEE Annual Conference, in Atlanta, Georgia.

PRESENTATION


Segalewitz, S.I. 2013. Seven years of success in implementation of a 3 + 1 transfer program in engineering technology between universities in China and the United States. ASEE Annual Conference, American Society for Engineering Education, June 25, in Atlanta, Georgia.


NEWSLETTER


CONTRACTS, GRANTS AND SPONSORED RESEARCH


Blust, R.P. Promoting women through LEADER (Launching equity in the academy across the Dayton entrepreneurial region, National Science Foundation, Local, $2,860,000. (September 2008 - August 2013).


Falkowski, S.A. National Center for Manufacturing Education, National Science Foundation, Other, $1.6M. (April 2011 - Present).

Segalewitz, S.I. Piloting the use of tablets in the STEM classroom, Glennon Family Foundation, Private, $15K. (October 2013 - Present).

Untener, J. Everyday examples in engineering, National Science Foundation, $2K. (March 2013 - December 2013).

**Department of Mechanical and Aerospace Engineering**

**PROFESSIONAL ENGINEERING SEMINARS**


**JOURNAL ARTICLES**

Geyman, Matthew, Aaron Altman, and Greg Parker. 2014. Wing/wall aerodynamic interactions in free flying, maneuvering MAVs. *International Journal of Micro Air Vehicles* 6, no. 2.


Rumpfkeil, M. 2013. Robust design under mixed aleatory/epistemic uncertainties using
University of Dayton School of Engineering Scholarship 2013-2014


**INVITED LECTURES**


**Choi, J.-K.** 2013. Integrated sustainable systems design. UD freshman seminar, Department of Mechanical and Aerospace Engineering, University of Dayton, April 5, in Dayton, Ohio.

**Hallinan, K.P.** 2014. Climate resilience economic opportunity in Dayton. Dayton Salem Avenue Peace Corridor, September 17, in Dayton, Ohio.


**Kissock, J.K.** 2013. Integrated systems plus principles approach to industrial energy efficiency. Honda Supplier Network, November 13, in Columbus, Ohio.

**Kissock, J.K.** 2013. Identifying and tracking building energy efficiency opportunities across your campus. Big Ten and Friends Mechanical and Energy Conference, October 1, in Columbus, Ohio.

**Kissock, J.K.** 2013. Portfolio energy management. Rocky Mountain Institute, June 24, in Boulder, Colorado.


**Murray, A.P.** 2014. Accurately locating and tracking the center of mass in humanoids and humans. Universita di Roma, Spaienza, Universita di Roma, December 9, in Rome, Italy.


**Murray, A.P.** 2014. Everything I know about teaching. New Faculty Orientation, University of Dayton, August 16, in Dayton, Ohio.


**PAPERS PUBLISHED AT CONFERENCE PROCEEDINGS**


Gunasekaran, S., and A. Altman. 2014. Wing performance insight from the self-preserved turbulent
wake. 52nd AIAA Aerospace Sciences Meeting and Exhibit, AIAA 14-0247, January, in National Harbor, Maryland.


Development of a spring-based automotive starter. SAE World Congress.


Boopathy, K., and M. Rumpfkeil. 2013. A multivariate interpolation and regression enhanced Kriging surrogate model. AIAA.


**PRESENTATIONS**


Memon, O., K. Wabick, A. Altman, and R. Buffo. 2014. Wingtip vortices from an exergy-based perspective. 9th Annual Dayton Engineering Sciences Symposium, October, in Dayton, Ohio.


Gunasekaran, S., and A. Altman. 2013. Identification of aircraft by their unique turbulent wake signature. 9th Annual Dayton Engineering Sciences Symposium, October, in Dayton, Ohio.
wake signature: Progress with experimental validation. 38th Dayton-Cincinnati Aerospace Sciences Symposium, March, in Dayton, Ohio.


Wabick, K., A. Altman, K. Granlund, and M. Ol. 2013. Correction to classical lift curve slope at low Reynolds number. 38th Dayton-Cincinnati Aerospace Sciences Symposium, March, in Dayton, Ohio.


Bigelow, K.E. (Presenter & Author), and K. Jackson (Author Only). 2013. The effects of rest and fatigue on balance performance in persons with multiple sclerosis. 37th Annual Meeting of the American Society of Biomechanics, September 5, in Omaha, Nebraska.


Alshatshati, S. and K.P. Hallinan. 2013. At-scale prediction of building r-value and mass density from potentially aerial thermal image. DESS 2013, Dayton Engineering Sciences Symposium, October 30, in Dayton Ohio.


balance board. 9th Annual Dayton Engineering Sciences Symposium, ASME, Wright State University, October 29, in Dayton Ohio.


2-dimensional electromagnetic perturbations of a magnetohydrodynamic flow. AIAA Dayton Cincinnati Aerospace Sciences Symposium, March, in Dayton, Ohio.


Sciences Symposium (DCASS), March 6, Dayton, Ohio.

ABSTRACTS


POSTERS

Beach, R., K. Jackson, and K.E. Bigelow. 2013. Effect of compliant flooring on postural stability in an older adult population. 37th Annual Meeting of the American Society of Biomechanics, September 5, in Omaha, Nebraska.


Brecha, R.J., K.P. Hallinan, J.K. Kisscock, R. Villoria-Siegert, B. Phil, and M. Austin. 2014. Targeting residential energy reduction for city utilities using historical utility and building data. NCSE, February 1, in Washington, D.C.

Raziei, A., K.P. Hallinan, and R.J. Brecha. 2013. Energy cost optimization for system with both solar energy and conventional energy production and energy storage, and real time pricing. DESS 2013, Dayton Engineering Sciences Symposium, October 30, in Dayton Ohio.


MAGAZINES / TRADE PUBLICATIONS


TECHNICAL REPORTS


WORKSHOPS


Bigelow, K.E. Assistive device design – spring engineering innovation project, Kettering Health Network and Neurorehab and Balance Center, Local, $4,831.43. (November 2013 - May 2014).


Bigelow, K.E. Assistive device design – kitchen devices for individuals with stroke, Kettering Health Network, Local, $9,759. (September 2012 - Present).

Bigelow, K.E. Assistive device design - spring engineering innovation project, Kettering Health Network and Neurorehab and Balance Center, Local, $7,467.61. (November 2013 - May 2014).


Bigelow, K.E., R. Beach, S. Smoot, and L. Bistrek. Improving student spatial visualization skills to increase retention and GPA, Procter and Gamble Fund’s Higher Education Grant, Private, $6K. (December 2011 - Present).


Rumpfkeil, M. DaVinci project (extension), AFOSR, Federal, $16,946. (November 1, 2013 - April 30, 2014).


Rumpfkeil, M. Research council seed grant, University of Dayton, $5K. (May 1, 2013 - July 31, 2013).


**BROTHER JOSEPH W. STANDER SYMPOSIUM**


Symposium 2013, University of Dayton, April 17, in Dayton, Ohio.


Nair, B. (Presenter & Author), and V.K. Asari (Author Only). 2013. Intrusion detection on oil pipeline right of way (row) using monogenic signal representation. Brother Joseph W. Stander Symposium 2013, University of Dayton, April 17, in Dayton, Ohio.


