

Research **Leader**

Shaping the technology of tomorrow®

UDRI
UNIVERSITY
of DAYTON
RESEARCH
INSTITUTE

Spring 2018

Faster than a speeding ... Ramping up hypersonics research

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Research Institute
300 College Park
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Phone: 937.229.3268

Editor/Feature stories:

Pamela Gregg
pamela.gregg@udri.udayton.edu

Proofreaders:

Lisa McCaffrey
Danita Nelson
Lauren Robbins
Sarah Shanks
Sylvia Shimmin



Aerospace Mechanics researcher Steve Olson with a model of a hypersonic aircraft

The University of Dayton Research Institute has been awarded a \$9.8 million, three-year contract from the Air Force Research Laboratory for research and development in materials and structures for reusable hypersonic vehicles.

Hypersonic vehicles, which travel at speeds faster than five times the speed of sound, experience significant thermal and aerodynamic loads, said **Steven Olson**, group leader for Structures in UDRI's Aerospace Mechanics division, who will serve as principal investigator on the program.

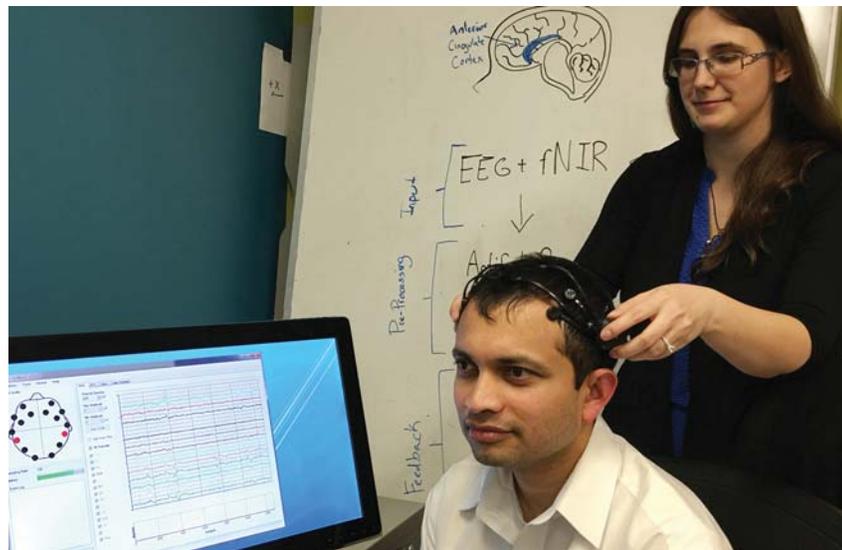
"Designing vehicles that can survive extreme environmental stresses is critical but challenging, requiring unique structural configurations and advanced materials" Olson said. "Our role will be to focus on understanding the mechanical and thermal loads experienced by hypersonic vehicle structures, (*continued pg. 7*)

Battling addiction with brainpower

The University of Dayton Research Institute has won a \$10,000 Ohio Opioid Technology Challenge award for a program that will teach people with opioid addictions how to reduce their cravings by regaining control of their brains.

UDRI software engineer Kelly Cashion, who wrote the winning proposal and will lead the program, will develop and use a system of neurofeedback therapy designed to help people "recover control of their minds and bodies and accelerate the path to recovery," Cashion said.

Cashion's was one of five winning proposals—two from Ohio, two from Massachusetts and one from Utah—selected (*continued pg. 9*)



Sensor systems researchers **Kelly Cashion** (right) and **Niles Power** show devices that can be used in neurofeedback

UDRI

Holidays

Memorial Day
Monday, May 28

Holiday in Reserve
Friday, June 29
(Government sites only)

Independence Day
Wednesday, July 4

Welcome aboard!



Conor



Cole



Griffin



Priscila



Daryl



Amber



Jeremy



Monica



Andrew C



Andrew H



Joy



Michael M



Brett



Nichole



Luis



Sean

Family matters

Congratulations to **Tony Bergman** (Aerospace Mechanics) and his wife, Jessi, on the birth of son Simon Oct. 11. Simon joins siblings Josie, 11; Grant, 8; Elias, 4; and Rosa, 2; in the Bergman household.

Congratulations also to **Danny Milling** (Purchasing) and his wife, Jackie, on the birth of their first ~~child~~ children! Twin daughters June and Bexley joined the Milling family Oct. 27.

Darren Landoll (Sensor Systems) and his wife, Lura, welcomed baby Allison Feb. 2. Allison joins big sister Alaina, 3, in the Landoll family.

Yulie Jones (Sensor Systems) and her husband, Chris, are celebrating the birth of their first child, Audrey, Feb. 12. (cont. p. 6)



Simon



Bexley

June



Allison



Audrey



Emmett

Conor McCormick ('17) joined the Software Systems group in Sensor Systems Oct. 01 as an associate research software engineer. He specializes in mathematics and computer science.

Cole Ward ('06) joined the Robotics & Lasers Technologies group in Energy Technologies & Materials Oct. 9, as a cost analyst. He specializes in cost benefit analysis.

Griffin Roberts joined the Fuels Engineering group in Energy & Environmental Engineering Oct. 9 as a hydrocarbon fuels catalyst engineer. He specializes in fuels and catalysis.

Priscila McCarty joined the Manufacturing/Technology Solutions Accelerator office Oct. 10 as a manufacturing growth specialist. She specializes in process engineering. (continued page 8)

Supporting air-launched, unmanned sensing

The University of Dayton Research Institute has been awarded a \$15 million contract from the Air Force Research Laboratory to support its efforts in Air-Launched Off-Board Operations (ALOBO). The five-year program, managed within AFRL's Aerospace Systems Directorate, will focus on the development of small unmanned aircraft systems (SUAS) that can be launched from larger host aircraft in flight — effectively extending the mission reach and capabilities of the host vehicle.

Charles Lockhart, group leader for UAS and Embedded Systems in UDRI's Sensor Accelerated Processing and Exploitation office, said small unmanned systems equipped with advanced sensing capabilities can fly away from, but communicate with, the host aircraft, effectively serving as a second set of eyes remotely from the host craft or in envi-



Charles Lockhart will use satellite imagery to view the results of a UAV controlled through autonomy software features.

ronments where it is not prudent for the host craft to fly, such as under clouds or weather. "ALOBO allows the Air Force to quickly and affordably add or change sensors on the small systems that then seamlessly integrate with and bring new capabilities to the host aircraft's platform," Lockhart said.

Researchers will support sensors development, integration of hardware and software for host platform systems and small unmanned aircraft systems, and integration of host aircraft mission tactics, techniques and procedures.

We're #1 — again!

The University of Dayton performs more *federally* sponsored materials research than any other college in the nation, according to the most recent National Science Foundation statistics on research and development in higher education. Allan Crasto, director of UDRI—which performs 90 percent of research at UD—attributes the Institute's great diversity in the types of materials research it pursues as one of the key factors in the na-



tional ranking. "Although materials is a legacy area for us, we're also good at identifying emerging fields in materials, such as alternative fuels and additive manufacturing," he said. "And we have always been adept at finding creative solutions to challenging materials problems." Additional rankings are in the Research Rankings document in

the Logos & Marketing section of UDRI's internal website.

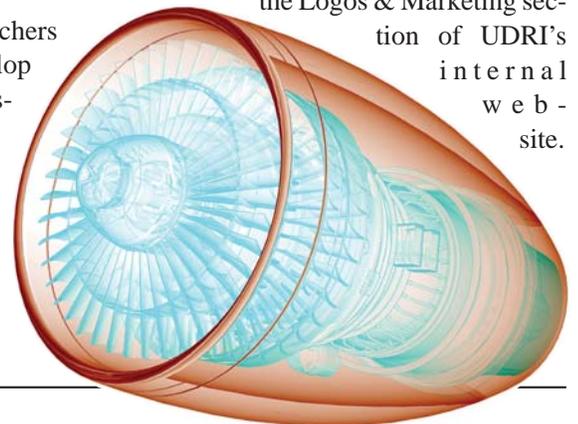
Advancing coatings, improving efficiency

UDRI has been awarded a \$1.5 million Air Force contract for evaluation, testing and development of improved turbine engine component coatings that could increase aircraft fuel efficiency and cost savings. The award is part of a \$49 million, indefinite-delivery, indefinite-quantity contract for research in alternative energy, energy efficient and environmentally safe technologies to benefit Air Force installations, equipment and aircraft.

Turbine engines operate for prolonged periods of time and in a wide variety of environments, which can lead to degradation of components and a resulting decrease in engine efficiency and increase in fuel use, said Alex Morgan, group leader for Applied Combustion

and Energy in UDRI's Energy Technologies and Materials division. "UDRI will work to identify and develop coatings designed to limit corrosion and other environmentally induced damage to turbine compressor components, which will help maintain airfoil surface quality and increase engine performance," Morgan added.

Under the contract, researchers will evaluate and further develop commercially available compressor coatings with the potential to deliver performance improvements and affordably and efficiently be transitioned to meet military demands. Researchers will also demonstrate the improved coatings for effectiveness.



Happy anniversary!

November

Gloria Hardy	43
Richard Reibel	34
Richard Striebich	31
Art Safriet	29
Tom Whitney	29
Dan Knapke	26
Larry Sqrow	24
Norm Schehl	24
John Chumack	21
G.P. Tandon	18
Dale Osborne	18
Steve Patton	18
Cheryl Castro	17
Hung Nguyen	17
Christopher Joseph	16
George Huff	15
Zachary West	13
Loryn Bowen	12
Susan Mueller	11
Raymond Townsend	8
James Reinert	6
Brian Czapor	5
Danny Milling	5
Bill Beglin	5
Michael Stuebner	4
Zhenhua Jiang	4
Candise Powell	4
Amy Allen	4
Eric Lang	3
Steven Schafer	3
Sara Schebo	2
Dakota Evans	2
Gabriel O'Reilly	2
Jacob Crafton	2
Jeffrey Monfort	2
Kenneth Steiger	2
Matthew Stuthers	2
Joseph Naguy	1
Richard Taylor	1
Solomon Duning	1
Mark DeFelice	1

December

Benny Connally	40
Gibby Dombroskie	31
Bang Tsao	18
Thao Gibson	18
Victor McNier	18
Danita Nelson	17
Patrice Miles	15
Curtis Hayes	13
Brian Redmon	12
Lee Beyerle	9
Sarah Browning	9
Peter Phillips	9
Liliana Martinez	8
Marylee Dunphy	7

Thusitha Gunasekera	6
David Claiborne	6
Jon Groenewegen	6
Brian Little	5
Christopher Buck	3
Dan Hart	3
Virginia Meeks	3
Charles Lockhart	2
Joshua Horn	2
Olivia Dorland	2
Sean Miller	2
William Miller	2
Todd Brown	2
Amanda Snodgrass	1
Hannah Easton	1
Mark Redden	1
Lindsay Davis	1
Jennifer Sanderson	1
Melisa Dungan	1
Richard Ryman	1
Luke Siko	1
January	
John Murphy	39
Tom Held	37
Claudette Groeber	33
John Stalter	33
Ollie Scott	32
Kevin Roach	25
Scott Stouffer	22
Cindy O'Brien	20
Timmie Campbell	20
Matt Davies	19
Chenggang Chen	18
Bob Olding	17
Bill Barnes	15
Nick Gagliardi	14
Dan Kramer	14
Frank Smith	13
Carl Sjoblom	13
Rhonda Cook	11
Patrick Hytla	10
Tom Fitzgerald	10
Colleen Dansereau	10
Martin DeSimio	10
Victor Tsao	9
Carrie Roemer	7
Hondo Imwalle	5
Christopher Northenor	5
Timothy Dale	3
Jacob Freeman	3
Douglas Johnson	3
Marianne Shreck	3
Claron Ridge	2
Emily Berrett	2
James Trzeciak	2
Kari Howard	2

Michael Hess	2
Nihad Alfaysale	2
Noah Calderon	2
Jhadae Richardson	2
Travis Jackson	2
Andrew Keller	2
Justin May	1
Richard Nilson	1
Daniel Prindle	1
Jeffrey Lipscomb	1
Judith Lovejoy	1
Alexander Hoffman	1
Kendra Daly	1
Kyle Hosler	1
Laura Stevens	1
Mark Srnoyachki	1

February

Mark Ruddell	39
Marlene Houtz	38
Kevin Poormon	29
Rhonda Diehl	27
Takahiro Yamada	19
Katherine Holley	18
Adam Long	17
Jennifer Durbin	16
Sirina Safriet	13
Michael Nickell	11
Gary Martin	11
Lisa Brown	10
Kathleen Weisenbach	10
Charles Ebbing	8
Daniel O'Brien	8
Richard Beblo	8
Douglas Johnson	7
Qihong Zhang	7
Rebecca Glagola	7
Tyler Hendershott	6
Yulie Jones	6
Albert Vam	4
Jessica Orr	3
Sead Uruci	3
LaNay Barley	3
Christopher Venturella	2
Colin Leong	2
Cory Bucksar	2
Giacomo Flora	2
Michael Barnard	2
Joshua Kaster	2
Matthew Rothgeb	2
Vikram Kuppa	2
Jacob Carter	2
Jared Speltz	1
Kevin Geary	1
Shaun Morton	1
Sushant Jha	1
Adam Williams	1

Happy anniversary!

March		Kristy Johnson	31
Ron Trejo	31	Joseph Mantz	30
Pete John	30	Bill Braisted	30
Gerald Landis	30	Doug Toth	28
Shamachary Sathish	22	Steve Olson	26
Dave Gasper	18	Scott Hornick	23
Ashil Higgins	15	Susan Hill	23
Paul Childers	15	Ray Ko	18
Christopher Klingshirn	12	Philip Blosser	16
Samuel Tanner	12	Zongwu Bai	15
Kevin Klawon	10	Jacob Lawson	14
David Walker	9	Eric Zhou	13
Andrew Bogle	8	Alejandro Briones	11
Joshua Cory	7	Thomas Mooney	10
Megan Pike	7	Thomas Migely	7
Joshua Handwerker	6	Chad Turner	7
Dave Hurtubise	5	SherylAnn Jackson	7
Jeremy Cain	5	Kelly Riggin	6
Johanna Aurell	5	Max Tsao	5
Sergei Shenogin	5	Darren Landoll	4
Philip Roth	4	Timothy Mock	4
Dan Bethel	4	Joseph Salyers	4
Travis Whitlow	3	Alexander Graves	3
David Burris	3	Francis Dutmers	3
Bryan Pavlich	2	Matthew Feeser	3
Chris Marcum	2	Jennifer Smith	3
Katie Markowitz	2	Steve Russell	3
Dale Jackson	2	Jeffrey Gross	2
Nitin Bhagat	2	Tamara Wamsley	2
Nicholas Tesone	1	Tony Rieker	2
Travis Grohoske	1	Benjamin Schepcke	1
Caleb Tanner	1	David Easterling	1
Murphy Mitchell	1	DeJuan Daniels	1
April		Jonathan Rickert	1
Karen Barnes	40	Ryan Lambdin	1

New contracts

New awards to UDRI in excess of \$500,000 in September, October and November include:

The Energy Technologies & Materials division was awarded three contracts totalling \$15.5 million from the General Services Administration for research and development in energy and new manufacturing efforts, for enterprise product support engineering, and for Air Force condition-based maintenance efforts.

Dave Dunn will serve as principal investigator on all three efforts. Dave will also serve as PI on a \$1.2 million award from E2 Technologies LLC for the development of artificial intelligence technologies to optimize the management of operational energy investments.

Eric Lang (ETM) will serve as PI on a \$1.1 million contract awarded by E2 Technologies for research, development, test and evaluation of advanced renewable energy technologies, storage and management.

Brian Stitt (ETM) will serve as PI on three GSA contracts, worth a total of \$8.5 million, for research and development in additive manufacturing, cold spray and advanced manufacturing technologies.

The Manufacturing Technology Solutions Accelerator office has been awarded \$1.2 million from the Ohio Development Services Agency for continued management of Fastlane, Ohio's Manufacturing Extension Partnership serving Western Ohio, which provides a variety of services to help area manufacturers become globally competitive. **Phil Ratermann** is the lead for Fastlane.

Dave Dunn (ETM) will serve as the PI on a \$3.7 million award through E2 Technologies for commercial off-the-shelf simulation technologies for investment decision support.

Chris McGuinness (Sensor APEX) will serve as PI on a \$4.9 million Air Force contract for advanced sensor processing research.

Dave Koukol (Energy Technologies & Materials) will serve as PI on a \$1.1 million GSA award for universal chock evaluation for the Air Force.

Leland receives ASME Lifetime Achievement

University of Dayton Vice President for Research **John Leland** was selected to receive the American Society of Mechanical Engineers (ASME)



Dayton section's Lifetime Achievement Award for his distinguished career and contributions to the mechanical engineering profession. He received the award May 22 at the joint American Institute of Aeronautics and Astronautics/ASME awards banquet.

John was named an ASME Fellow in 2002; he is also an Associate Fellow of the American Institute of Aeronautics and Astronautics and a two-time appointee by Ohio Gov. John Kasich to the Ohio Aerospace and Aviation Technology Committee.

Save the date!

UDRI annual
State of the Institute
and Picnic
Thursday, Aug. 2

Details on time and locations will be sent closer to the event.

Moving on

Rick Reibel retired from the Structural Integrity division Jan. 2 after 34 years with UDRI, working primarily on-site at WPAFB as chief technologist for the Failure Analysis and NDE Engineering groups. Supervisor Vicki Kramb said that, throughout his service, Rick was never afraid to tackle any problem in the laboratory no matter how difficult or impossible it might seem to his co-workers. “If somebody needed something, Rick would grab various parts and doodads scattered around the lab to rig something up in a moment’s notice. Afterwards, nobody knew how or why it worked, but it always did. When not building gadgets or testing new potential NDE techniques, Rick stays involved in various performing arts, including a barbershop group that has appeared on TV, radio and at many Dayton Dragons games singing the National Anthem. Behind the scenes, he served as the sound engineer for many local plays and musicals and is well known for his Halloween decorations. In retirement, Rick hopes to focus on improving his bass playing skills so he can wow audiences in a whole new way.”

Andy Phelps retired from Nonstructural Materials Jan. 5 after 27 years with the Research Institute. Supervisor Matt Rothgeb said Andy offered a unique background in geology, materials science and solid state physics, and he made significant contributions to the advancement and expansion of the Coatings, Corrosion and Erosion group’s unique capabilities. “Andy orchestrated many collaborations with the DOD and industry to form integrated product research teams to address the various needs for understanding the impact of erosion due to accelerated environmental particulates on U.S. military and commercial assets. Over the limited time I have had the pleasure of working with Andy, I have found him to be one of the most brilliant and humorous people I have met. Always willing to see the lighter side, he also has the unique capability to see solutions to problems as they arise, to envision new research

paths, and he has the intellectual means to solve these problems and develop the tools to forge said paths in both unique and innovative ways.”

Kathy Hemmerick retired from Nonstructural Materials April 30 after more than 11 years with UDRI. She worked as the chief coating technician in the U.S. Air Force’s Rain Erosion test facility at Wright Patterson Air Force Base, which has been the national and international equipment standard for testing the rain erosion resistance of a variety of aerospace materials. In addition to her responsibilities for management and maintenance of the “rain rig,” Kathy enjoyed working to improve systems and processes, including her design, build and installation of a system to safely remove and install the 300-pound, 8-foot whirling arm blade of the rain rig test stand, said supervisor Matthew Rothgeb. “We thank Kathy for her commitment to the division and our customers and wish her well on her well-deserved retirement.”

Jeff Smith will retire from Nonstructural Materials July 9 after nearly 20 years with the Research Institute. Supervisor Dan McCray said Jeff spent the duration of his career leading the manufacture and testing of structural adhesive materials at AFRL/RXSA, highlighted by numerous technical achievements that were successfully transitioned and are currently employed by Air Force aircraft maintainers today. “His career is marked by his ability to balance a large workload, executing numerous projects simultaneously, coauthoring numerous publications and reports related to adhesive bonding, and winning the 2003 UDRI Outstanding Technician Award. He will be sorely missed by his UDRI coworkers and management and AFRL customers.”



Family matters *(from p. 2)*

Congratulations to **Phil Ashbrook** (Aerospace Mechanics) and his wife, Shanda, on the birth of son Emmett March 17. Emmett joins big brothers Wyatt and Levi in the Ashbrook family.

Moving up

Congratulations to UDRI employees who were recently promoted: From Accounting: **Sara Schebo**; from Aerospace Mechanics: **Bill Braisted, Kevin Fedon, Geoff Frank, Michael Frede, Jason Kao, Pete Phillips and Brian Redmon**; from Contracts & Grants: **Lee Beyerle and Heather Peters**; from the Director’s Office: **Sukh Sidhu**; from Energy Technologies & Materials: **Johanna Aurell, Tyson Back, Miranda Conner, Michael Disch, Olivia Dorland, Marylee Dunphy, Charles Griffin, Jitendra Kumar, Christopher Venturella, Natasha Voevodin and Christofer Whiting**; from the Manufacturing Technology Solutions Accelerator: **Matt Hoyng and Mary Miller**; from Multi-Scale Composites & Polymers: **Nick Gagliardi, Bryce Laycock, Ben Naguy, Michael Pratt and Caleb Tanner**; from Nonstructural Materials: **David Claiborne, Wendy Kessen, Corey Kondash, Zachary Reed, Kathy Schenck, Ollie Scott and Sangwood Sihm**; from Purchasing and Property Records: **Jon Borgwardt and Jennifer Durbin**; from RITO: **Rebecca Jageman**; from Sensor APEX: **Steven Byrd, Timothy Dale, Jonathan Headlee, Michael Hess, Joshua Kaster, David Mundy, Ken Simone, Jonathan Skeans and Andrew Thompson**; from Sensor Systems: **Nihad Alfaysale, Kelly Cashion, Ashley Haubert, Daniel Rafferty, Kristen Velker and Michael Velker**; and from Structural Integrity: **Laura Homa, Mark Ruddell and Travis Whitlow.**



From the sponsor

Kudos to **Stefano Coratella, Kristy Johnson, Patrice Miles and Nikki Dabney**, (Aerospace Mechanics) who each received praise from an AFRL sponsor for outstanding efforts in coordinating and hosting the most recent Residual Stress Summit. While the sponsor was the main organizer of the event, the AM staff was recognized for hard work and a collective can-do spirit for making the event at Curran Place a great success.

New citizens



Congratulations to **Moshan Kahandawala** (top) and **Jitendra Kumar** (Energy Technologies & Materials), who both became American citizens earlier this year. Moshan, who was born and raised in Sri Lanka, completed his graduate studies in the Ukraine before moving to the U.S. in 1999 and earning his doctorate at UD. Jitendra, who was born and raised in India, received his graduate and doctoral degrees in Delhi before moving to the U.S. in 2007.

Hypersonics *(from p. 1)*

then work to identify the best materials and create preliminary designs for select airframe structures.” As the program progresses, researchers will perform experiments and analysis to verify performance of the aerospace structures.

UDRI has a long history of developing and transitioning advanced materials and structures for aerospace, including work in exotic materials for a variety of high-temperature applications. “There have been a number of advances in materials over the last several decades, particularly in the area of ceramics and ceramic matrix composites, that will make them particularly well suited for this type of application,” Olson said.

“The Research Institute will partner with the University of Tennessee and Purdue University, whose capabilities in aerodynamic modeling and wind tunnel testing complement our own capabilities,” Olson added.

UDRI director Allan Crasto said hypersonics is one of several targeted technology growth areas included in UDRI’s new strategic plan.

Don’t be a target

by Bill Barnes

Have you received an unsolicited email request for information from someone you didn’t know? Did they ask about details of technology that we work on, or did they ask you to refer them to a subject matter expert? Aside from the more obvious signs that an email or phone inquiry may be suspicious, there are many other methods being employed to surreptitiously gain access to sensitive information about UDRI employees and research—be it classified, export controlled, patentable, proprietary or otherwise controlled—for competitor advantage or to do harm to our country’s national security, economic security or foreign relations. So if someone you don’t know asks you to review and/or correct a paper they’re writing, asks for details about a paper you’ve published, tells you that export compliance isn’t important, asks to be an intern or guest researcher on a program involving sensitive research or otherwise requests access to information about you or your research, do not respond. Instead, contact the Government Security office at GovSec@udri.us or call Bill Barnes at 229-3004 for guidance.

Career development

Congratulations to **Sarah Brown** (Contracts), **David Green** (Sensor APEX), **Charles Keating** (Sensor APEX) and **Eric Lang** (Energy Technologies & Materials), who recently graduated from UD’s Supervisory Leadership Certificate Program. The program comprises 10 days of workshop during a six-month period and is designed to help prepare participants for leadership roles.

Nick Jacobs (Structural Integrity) has graduated from the University’s Emerging Leader program, a yearlong leadership- and business-skill development program for employees who demonstrate strong potential to become executives in corporate, government and nonprofit business organizations.

Take a powder...or two

Congratulations to **Katie Markowitz** and **Thad Kacsandy** (Energy Technologies & Materials) on winning approximately \$12,000 worth of metal powders for use in additive manufacturing efforts. The powders will be delivered by Praxair Surface Technologies, Indianapolis, via its TruForm AMBition Grant program. Katie said the researchers will select alloys not already being used in efforts to help the Air Force Life Cycle Management Center understand, utilize and transition additive manufacturing technologies into fleet sustainment, thus expanding their research efforts.

Accounts Payable move

Since UDRI’s Accounts Payable team—**Jerri Bond** and **Ashley Rutledge**—have become part of the UD AP department, their UDRI email addresses are no longer receiving mail. If you need to reach Jerri, please use gbond1@udayton.edu or call 937-229-3930; Ashley can be reached at arutledge1@udayton.edu or 937-229-5328. You are also welcome to stop by their office in room M2518 in Curran Place. “Ashley and I will continue to serve our UDRI and Wright-Patterson Air Force Base internal and external customers,” Jerri said. “Please feel free to contact us or stop by if you have any issues with an invoice or vendor, or if you just want to say ‘Hi!’”

A new standard

The following UDRI research groups: Structures and Structure & Component Characterization (Aerospace Mechanics), Composites Manufacturing & Testing (Multi-Scale Composites and Polymers), and Advanced High-Temperature Materials (Energy Technologies & Materials), along with the Sealants & Elastomers Laboratory (Nonstructural Materials), have successfully been certified to the new International Organization for Standardization (ISO) 9001:2015 scope of registration for quality management systems.

New employees *(from p. 2)*

Daryl Osterloh ('17) joined the ISR group in SSD Oct. 10 as an associate radar engineer. He specializes in electrical engineering and radar systems.

Amber McCurdy joined the Contracts & Grants office Oct. 16 as a proposal coordinator. She specializes in proposals and coordinating medical research.

Jeremy Carson ('17) joined the Aerospace Product Support Engineering group in ETM Oct. 16 as an associate mechanical engineer. He specializes in mechanical engineering and thermodynamics and combustion.

Monica Shawcross joined the Sensor APEX Office Oct. 16 as an administrative associate. She specializes in office administration.

Andrew Croftcheck joined the Aerospace Product Support Engineering group in ETM Nov. 1 as a project manager for support equipment vehicles. He specializes in project management.

Andrew Halsey joined the Software Systems group in SSD Nov. 13 as an



Becca



Gary



Matthew



Robin



Laura



Katie



John



Kaitlin



Josh



Sarah

associate research software engineer. He specializes in cognitive science and artificial intelligence.

Joy Ring joined the Aerospace Product Support Engineering group in ETM Nov. 16 as an associate graphics designer. She specializes in graphic design, print, photography and electronic media.

Michael Miller joined the Sensor Systems division office Nov. 16 as a technical communication specialist. He specializes in technical writing.

Brett Hauber ('09) joined the Structures group in Aerospace Mechanics Dec. 4 as a distinguished research engineer. He specializes in hypersonic structures and materials.

Nichole Dabney joined the Aerospace Mechanics division office Dec. 16 as a senior administrative secretary. She specializes in business administration and customer service.

Luis Estevez joined the Applied Combustion & Energy group in ETM Dec. 18 as a re-

search battery scientist. He specializes in materials and science engineering.

Sean Bradley joined the Nanochemistry & Nanoengineering group in ETM Jan. 2 as an associate mechanical engineer. He specializes in materials engineering fabrication.

Becca Craighead ('10) joined the Aerospace Product Support Engineering group in ETM Jan. 2 as an associate project analyst. She specializes in finance.

Katie Doyal ('06) joined the Applied Corrosion Technologies group in ETM Jan. 3 as an associate project analyst. She specializes in program management.

Gary Wright joined the Aerospace Product Support Engineering group in ETM Jan. 16 as a distinguished acquisition program manager. He specializes in engineering.

John Mackay joined the Director's office Jan. 16 as a proposal manager. He specializes in proposal management.

Matthew West ('15) joined the Additive Manufacturing & Repair Technologies group in ETM Jan. 24 as a manufacturing engineer. He specializes in manufacturing engineering.

Kaitlin Rigitano joined the Advanced Composites group in Multi-Scale Composites & Polymers Jan. 25 as an associate research engineer. She specializes in chemical engineering.

Robin Sutherland joined the Robotics & Lasers Technologies group in ETM Feb. 1 as a program manager. She specializes in project management.

Josh Johnson joined the Advanced Power Components group in ETM Feb. 16 as a system integration technician. He specializes in mechanical systems.

Laura Walter joined the Advanced Power Components group in ETM Feb. 26 as a senior research engineer/Scientist. She specializes in power systems and electrical engineering.

Sarah Shanks joined the Director's office March 1 as an administrative associate. She specializes in administrative support.

Battling addiction *(from p. 1)*

for funding by the Ohio Third Frontier from entries submitted by researchers, service providers and other individuals and organizations from nine countries. The Ohio Opioid Technology Challenge was developed to help engender solutions to the nation's growing opioid addiction crisis, which has hit the Midwest particularly hard. In 2016, Ohio was second only to West Virginia for the number of overdose deaths related to opioids, according to the Centers for Disease Control.

Opioids—heroin, fentanyl and other natural and synthetic opiates—are highly addictive, and the 90-percent relapse rate is as much as double that associated with other addictions, according to the National Institute on Drug Abuse. Opioid use becomes abuse—and ultimately addiction—by shutting down the brain's ability to naturally release dopamine and endorphins, so that the absence of opioids creates feelings of intense anxiety and other severe symptoms of withdrawal. Those symptoms will continue long after a person who is addicted stops using the drugs, which contributes to the high relapse rate, Cashion said.

“When a person initially consumes opioids, the experience creates a sense of euphoria caused by a release of chemicals in the brain. The pathways in the brain that are part of that experience grow stronger—forging an addiction—while other pathways grow weaker,” she said. “Over time, use of the drugs stops creating positive feelings, and their absence creates painful symptoms of withdrawal, so that a person with an addiction needs to use the drugs just to achieve a sense of normalcy.

“Using neurofeedback, we'll work with our volunteers to help them learn to regulate activity in the part of their brain associated with cravings and rewire some of those pathways, allowing them to reduce their cravings and experience a more 'normal' state even without opioids,” Cashion said.

Neurofeedback is a type of biofeedback where sensors are used in conjunction with a brainwave monitoring method, such as electroencephalography

(EEG), to help the wearer see his or her brain's electrical activity in real time. The sensors—typically noninvasive and attached to the scalp in the form of a wireless headset or a more traditional “shower cap” style with wires—also let the wearer see if and when certain behaviors alter their brain's electrical activity.

In her program, Cashion will show volunteers a graphics display—which she likened to a simple video game—on a computer monitor. By giving the volunteers tasks that require a shift in focus or other interaction with the game, they will see which activities most positively impact the signals associated with cravings. After a series of daily training sessions, volunteers will have learned the tasks they will need to perform to reduce cravings, even without use of the technology. “Their brains will remember what they had learned while doing the neurofeedback tasks, and those new pathways they created during therapy will be in place to help them avoid relapsing.”

Cashion said neurofeedback is showing promise in the treatment of nicotine addiction, depression, chronic pain, post-traumatic stress syndrome and other physiological disorders. “We'll build on that body of research and transfer known protocols to the domain of opioid addiction treatment,” she said.

Cashion said neurofeedback is not meant to be a substitute for, but a supplement to, current addiction therapies, which include medication assisted treatment and behavioral counseling. “Current treatments are not always sufficient, and medication is not always sufficiently available because of the demand on treatment centers. Even when it is, some patients reject ‘step-down’ medications, such as methadone, because they view it as replacing one addiction with another. For those patients, neurofeedback can be another avenue for recovery.”

For patients who are transitioning to recovery with the use of medication, neurofeedback can provide additional insight into the changes enabled by the

medication, Cashion added.

At the outset of her program, Cashion will work with health care professionals and other experts to help establish a baseline of neurological signals and identify which signals are associated with cravings. She'll work with other researchers in UDRI's Software Systems group to use mathematical algorithms to map the 2-dimensional baseline signal imagery to a 3-dimensional map of the brain. “From there we'll be able to tell which parts of the brain the signals are coming from,” she said.

When she is ready to begin testing, Cashion will work with health care professionals and agencies which serve people with opioid addictions to help identify potential volunteers. As the program progresses, Cashion will continue to consult with technology experts within UDRI and external medical specialists to validate results and make program adjustments as necessary.

“Ultimately our goal is to develop and demonstrate a neurofeedback system that uses off-the-shelf hardware along with software developed here at the University of Dayton Research Institute, then work with local medical technology companies to commercialize the product and make it available to treatment centers,” Cashion said.



Safety corner

by Dennis Gault

Beware in parking lots!

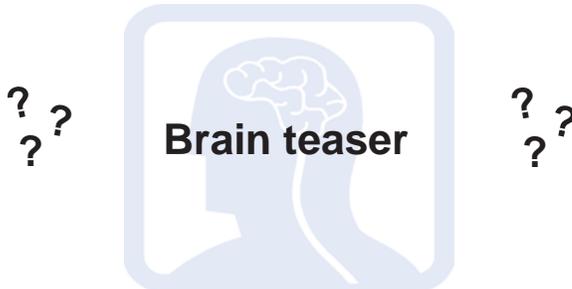
Throughout the year, parking lots are a source of danger and require special attention. Annually, there are 50,000 crashes resulting in 500 deaths and 60,000 injuries in parking lots across the country. When driving in a parking lot, stay alert and heed the following suggestions:

1. Keep within designated lanes and avoid cutting across lots.
2. Drive slowly and obey signs and signals.
3. Anticipate the actions of others.
4. Be mindful of pedestrians and other vehicles.
5. Watch for small children and people with baby strollers.

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300 College Park
Dayton, Ohio 45469-0101



Rearrange the following letters to form one word:
NEW DOOR

Please submit your answer, along with your name *and division*, by Friday, July 6, to Pamela Gregg at pamela.gregg@udri.udayton.edu.

Answer to the July-October brain teaser: 5

Thanks to **Patty Ward** (Accounting); **Mike Bouchard** and **Eddie Warrick** (Aerospace Mechanics); **Mike Woodruff** (Director's Office); **Jhoanna Alger**, **Mike Hanchak** and **Susan Mueller** (Energy & Environmental Engineering); **Mary Galaska** and **Becki Glagola** (Energy Technologies & Materials); **Adam Hicks** and **Virginia Meeks** (Multi-Scale Composites & Polymers); **Dave Phillips** (Nonstructural Materials); **Jim Blair** (Purchasing); **Monica Shawcross** and **Kelsea Sullivan** (Sensor APEX); **Michael Craft** (Structural Integrity); **Matt Willenbrink** (Technology Partnerships); and retirees **Joe Gallagher** and **Gretchen Walther** for submitting answers.

In the Public Eye

Interviews with **Kevin Poormon** (Aerospace Mechanics), who talked with all local media outlets about UDRI's work in fan blade testing related to the recent Southwest Airlines engine blade-out, were picked up by media across the country, as well as in Ireland, Wales and England.

Dennis Buchanan (Structural Integrity) explained to area reporters how experts in structural failure will work to determine what likely caused a pedestrian bridge in Florida to collapse earlier this year.

John Leland (Office for Research) talked with the Dayton Daily News about possible implications for UDRI and research had there been a government shutdown in January.

The Research Institute was featured in local and region media broadcast and print stories about its awards for ALOBO award (see page 3), hypersonic vehicles (see cover story), RATE (see page 3) and the Miami University/UD Technology Validation Start-Up Fund; the MMRTG Lab; a new record for research revenue; and its continued expansion within Daniel J. Curran Place on River Campus.

UDRI was included in a WYSO story about Dayton's legacy in innovation, a DDN story about a DOD workshop on new federal directives regarding cyber warfare, and multiple Youngstown, Ohio, media stories about AFRL's Maturation of Advanced Manufacturing for Low-Cost Sustainment program.

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