

# OWL RESEARCH & INNOVATION

## MOVING

PEOPLE AND CARGO,  
SAFER AND FASTER

*Transportation Research  
Excellence Gives Rise to  
New Programs*

## BRAINS ILLUSTRATED

*Illuminating Neuroscientists' Work*

## FEET FIRST

*Homeless Get Care  
from the Bottom Up*

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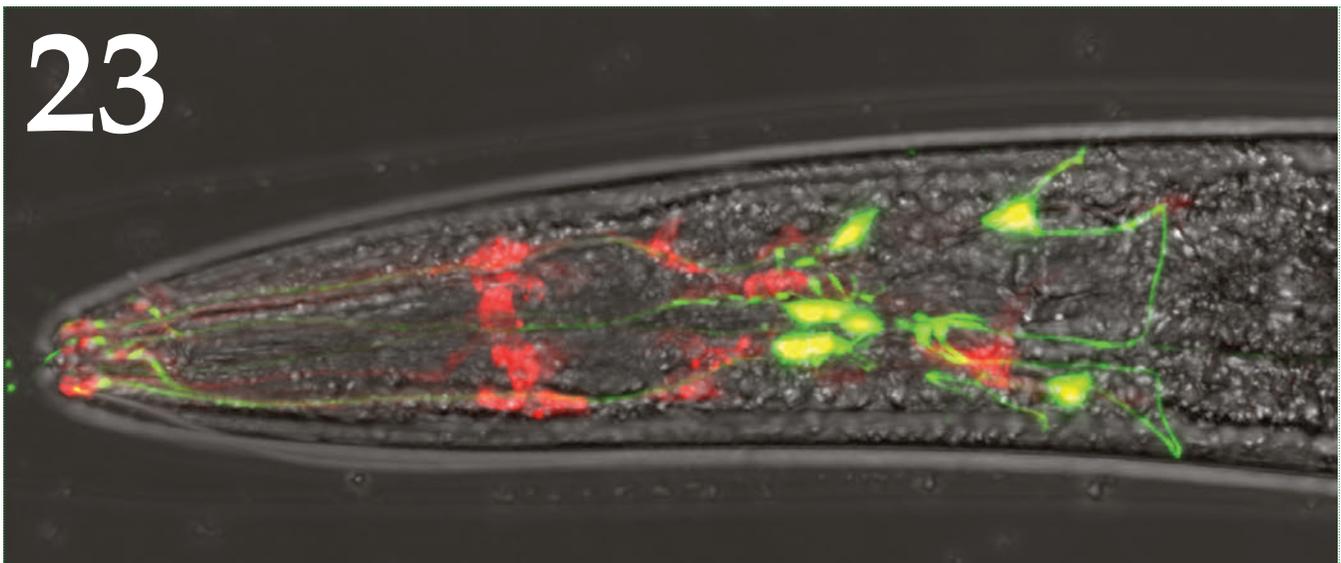


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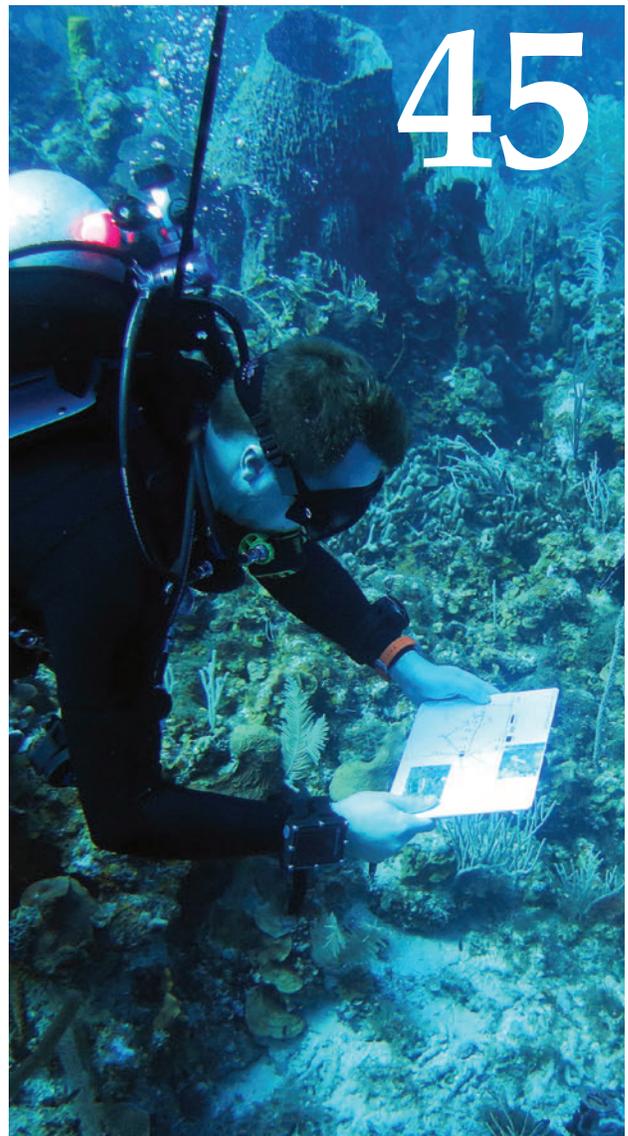


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On the cover: Traffic whizzing by on Interstate 95 near the Boca Raton campus. Photo by Gina Fontana



Member of the University Research Magazine Association

# President's Message

JOHN KELLY, PH.D.



## No Longer Diamond in the Rough

**W**hen I first arrived at FAU, I talked about the hidden gems across the university. Our job was to take those unknown or little-known areas of excellence, polish them and show them off to the world. Now people are taking notice, as we continue to focus our resources on those areas of research strength and building on them.

We have had some significant research and scholarly wins recently, some of which you can read about in this edition of *Owl Research & Innovation*. The U.S. Department of Education recently named FAU a Hispanic-Serving Institution, affirming our commitment to serving our diverse communities and opening an important strategic avenue to further our science, technology, engineering and math offerings to an underserved population.

Nikon Instruments Inc. named the FAU Brain Institute on our Jupiter campus a Nikon Center of Excellence, making it one of just eight such centers in the country and one of 21 internationally. The designation gives our scientists and students access to the latest high-end research microscopes, allowing them to peer into the workings of the brain and nervous system as never before. You can see the vivid imagery those microscopes can produce in a picture story on pages 23-27. The images are not only colorful, they provide our researchers with unmatched insights into how the brain works and potential pathways to fight diseases that afflict so many of our loved ones.

The U.S. Department of Transportation has also recognized FAU's growing research stature, recently awarding two major grants that leverage our faculty expertise in transportation studies. One of those awards — with which state and private contributions could amount to more than \$10 million — funds our new Freight Mobility Research Institute. It's the kind of program that builds upon the work faculty have been doing, and helps grow our research enterprise. ♦

# Vice President's Message

**DANIEL C. FLYNN, PH.D.**

## Our World-Changing Potential

The depth and breadth of the research programs at the university continues to grow. And as we build the infrastructure to support our expanding portfolio, our scientists are rising to the challenge of shaping FAU into a preeminent research institution.

They're putting in for more research grants, and winning more of them. They're investigating novel ways to solve problems facing our society. Some are turning the intellectual property they're creating at FAU into business ventures. It's a cycle that builds on itself, and with each achievement we breed other successes that can change the world we live in. Some of those accomplishments are highlighted in this edition of *Owl Research & Innovation*.

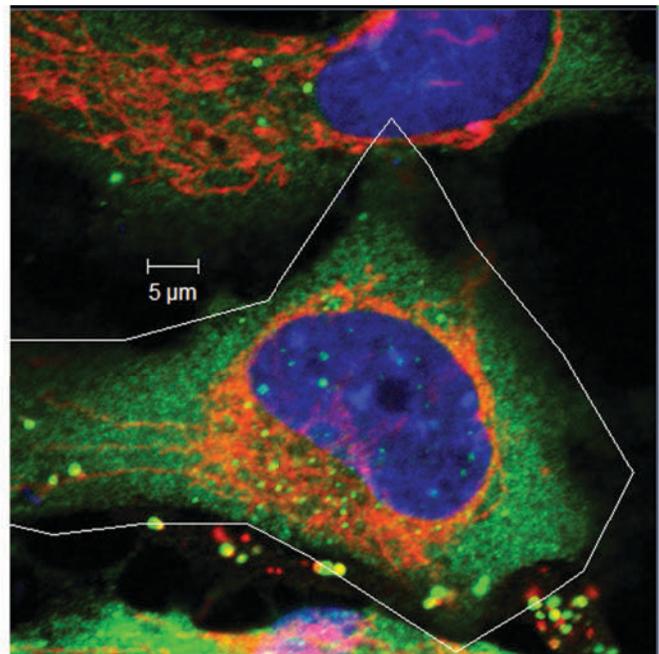
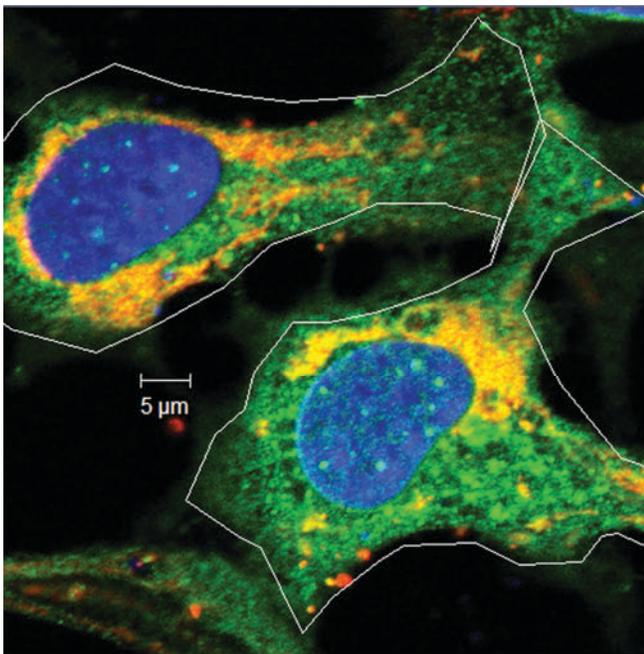
There may be no greater threat to our world than the impacts of climate change on our aging cities and infrastructure. Local leaders understand that, and they're turning to our faculty to help them plan for the future. The cities of Hollywood and West Palm Beach are working with faculty members who recently launched the Incubator for Sustainable & Resilient Communities, which will help shape the future development of our cities. The story on pages 39-40 details some of the issues the center and city officials are tackling together.

Our economic vitality as a country depends on innovation, and FAU contributes to that not only through discoveries made by our scientists, but by fostering an ecosystem of entrepreneurship. The university is an engine of economic growth. The FAU Tech Runway program fuels that growth by transforming faculty inventions into companies. It also acts as an entrepreneurial hub, attracting some of the more promising start-ups from across the region to accelerate their development. You can read about some of the exciting companies to enter Tech Runway's latest class in the following pages.

There's much more happening here than can ever be covered in any publication. But we hope this magazine provides a glimpse into some of the exciting initiatives happening at FAU that have world-changing potential. ♦



# NEWS BRIEFS



Cells producing the normal Parkin protein (left) compared to cells making the dysfunctional Parkin protein.

## Groundbreaking Research in Age-Related Degenerative Disorders

**R**esearchers have discovered new cellular function for the Parkin protein and are examining how the loss of this protein could contribute to cataracts, certain forms of early onset Parkinson's disease, and other age-related neurodegenerative disorders.

A recently published study is the first to demonstrate the important role Parkin plays in helping cells survive damage caused by free radical formation in the body. Marc Kantorow, Ph.D., professor of biomedical science and assistant dean of graduate programs in the Charles E. Schmidt College of Medicine, and Lisa Brennan, Ph.D.,

associate research professor, engineered eye lens cells that produced either normal or mutant forms of Parkin.

They discovered that the activation of the Parkin protein could prevent cell damage and death associated with age-related cataracts and death of neurons associated with Parkinson's disease. The break-through potential is that drugs or genetic methods that increase Parkin levels could help prevent cataracts and other age-related degenerative diseases, Kantorow said. ♦



## Real Estate's Real Deal

Research faculty at Florida Atlantic University are 24th in the world for their intellectual contributions to the real estate industry, according to the Real Estate Academic Leadership (REAL) rankings.

"Real estate has long been an integral component of the Florida economy, and FAU has made this an area of strategic emphasis and potential growth for the university," said Daniel Gropper, Ph.D., dean of the College of Business.

According to the *Journal of Real Estate Literature*, faculty received the REAL ranking based on the number of published articles that appeared in the top three peer-reviewed, finance-based real estate journals: the *Journal of Real Estate Finance and Economics*, the *Journal of Real Estate Research* and *Real Estate Economics*.

"These rankings reflect FAU's dedication to the community through top-flight real estate research," said Ken Johnson, Ph.D., the Investments Limited professor in finance and associate dean of graduate programs at the College of Business. ♦

## Steering the Way to Safer Roads

Researchers at the Christine E. Lynn College of Nursing have developed an app to help steer patients with dementia in the right direction when it comes to safe driving.

The Fit2Drive app calculates the likelihood that a driver will pass an on-road evaluation by using results from cognitive tests. Alzheimer's disease and related dementias often cause physical and cognitive changes that affect driving skills. The information the app gives can assist drivers in deciding when it's no longer safe for them to be behind the wheel. "Driving safety is a major concern for the aging population," said creator Ruth M. Tappen, Ed.D., professor and eminent scholar from the college.

Tappen developed Fit2Drive with colleague David O. Newman, Ph.D., and Jamie Zahava Ramos, a graduate student from the Charles E. Schmidt College of Science. It was featured as a cover story in *Today's Geriatric Medicine* and presented at the Gerontological Society of America Annual Scientific Meeting. The app is expected to be available soon for Android and iOS. ♦



## Sustainable Seafood on Land

Leading researchers from agencies, academia and organizations across the nation recently gathered at an FAU Harbor Branch Oceanographic Institute (HBOI) workshop to identify critical research needs, knowledge gaps, and goals for bolstering domestic fish aquaculture. The meeting was part of an effort to one day establish a center of excellence in aquaculture research.

"Aquaculture accounts for 50 percent of the seafood that's consumed worldwide," said Megan Davis, Ph.D., associate executive director of HBOI. "We are on the cutting edge of aquaculture research and development in the U.S. to produce healthy, safe and delicious seafood. By creating a new center of excellence, we believe we can help grow the industry."

More than 90 percent of the seafood Americans eat is imported, which results in an annual trade deficit of more than \$11 billion. To bridge this gap, HBOI researchers are developing sustainable sources of seafood that can be grown on land.

"The popularity of seafood as a healthy food option is on the rise — people want to know where it's coming from and that it's sustainably sourced," said Anton Post, Ph.D., HBOI executive director. "The workshop addressed these and other issues that are key to the future of this industry." ♦



# Snail Spit as Medicine

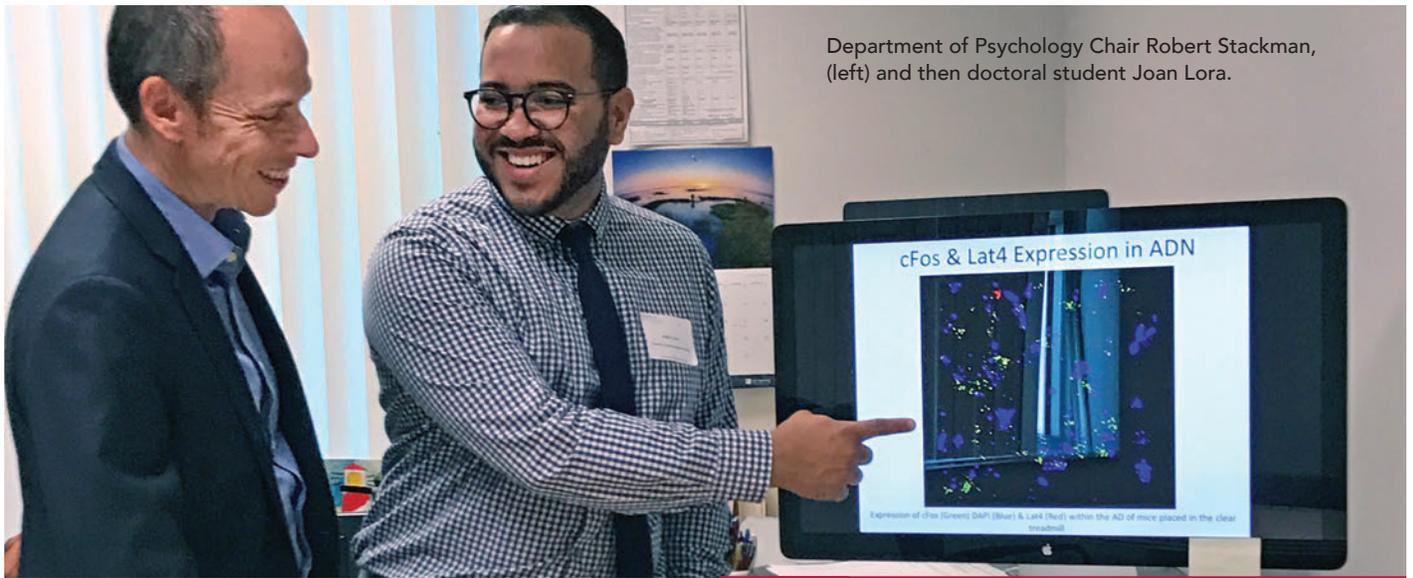
**M**ickelene Hoggard, a Ph.D. candidate in the Department of Chemistry and Biochemistry, studies snail spit and its potential therapeutic and pharmacological benefits. Of particular interest is the highly potent venom — or spit — of the cone snail species. Deployed by the snail to stun and capture invertebrate prey, the converted spit might one day be used for treating people with cancer, addiction, diabetes or chronic pain. The fast-acting venom is especially potent for receptors in the human nervous and immune system.

As part of her dissertation, Hoggard distilled years of research on the potentially life-saving properties of cone snail venom, creating a concise and compelling presentation for the Three Minute Thesis Competition — hosted locally by FAU. The international competition, held at more than 170 universities, fosters research communication skills.

Hoggard landed first place, receiving a total of \$3,500, and the chance to compete regionally in Annapolis, Md. Her success has led to an internship in a marine lab at the National Institute of Standards in Technology in Charleston, S.C. ♦



Graduate student Mickelene Hoggard studies snails, including the *Conus brunneus* pictured here.



Department of Psychology Chair Robert Stackman, (left) and then doctoral student Joan Lora.

## Seeking Sanctuary in Social Media

Seeking medical information and personal support, many people visit social media sites. Researchers in the Christine E. Lynn College of Nursing have explored this trend, when persons who received organ transplants use these sites as part of their healing process. Results from the study, published in *Computers, Informatics, Nursing*, provide an intimate and worldwide glimpse into the post-transplant experience.

To better understand why many transplant recipients turn to social media for emotional shelter and a safe space to share feelings, doctoral student Valarie S. Grumme and Professor Shirley C. Gordon, Ph.D., examined postings of members of an international transplant community website. The researchers saw the emergence of two major themes: overwhelming gratitude and finding sanctuary.

“Social media support sites provide a window into the world of transplant recipients, offering the opportunity to discover what matters most to them and identify gaps in care related to those needs,” said Gordon. ♦

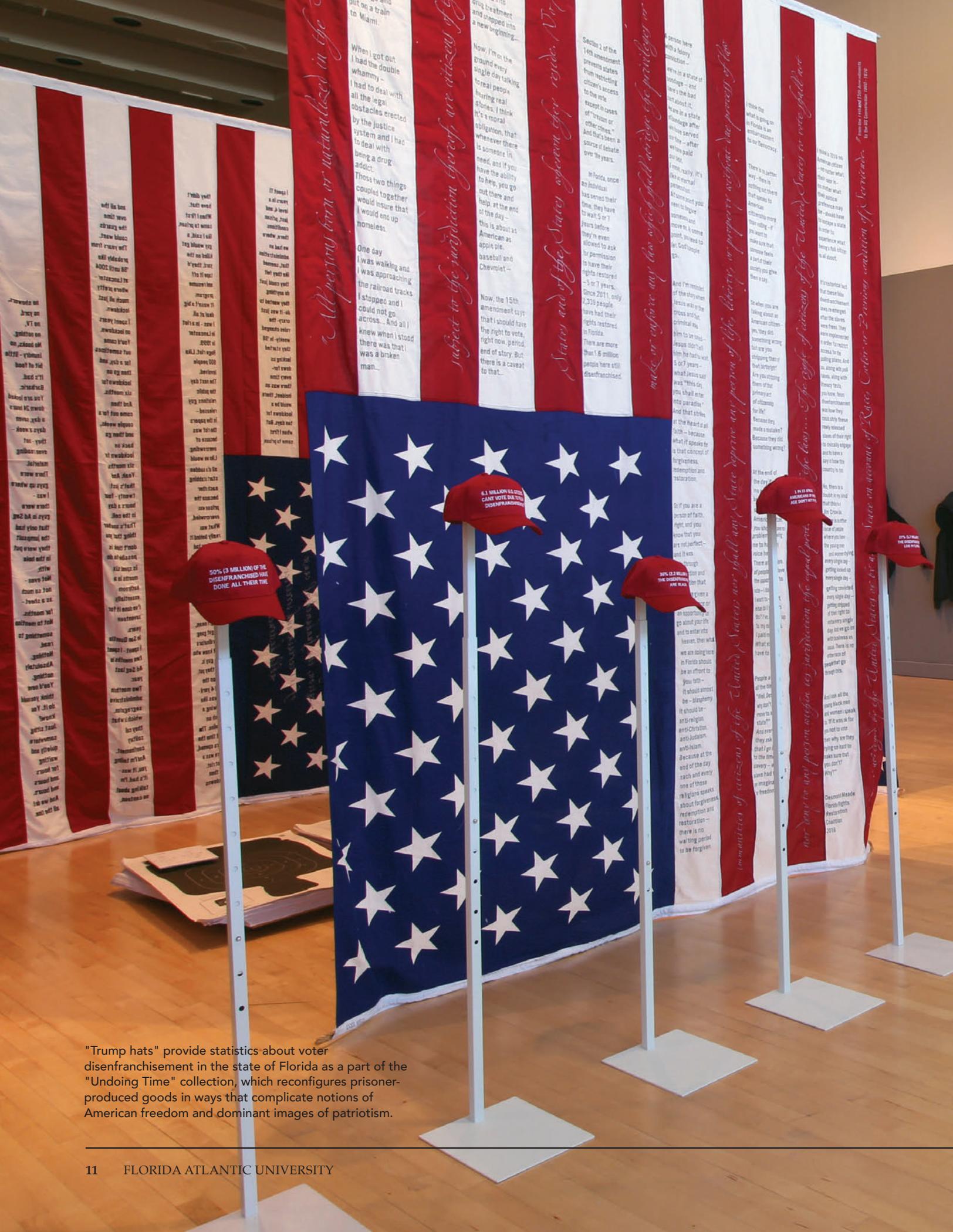
## Discovering How Fear Memories Form

Scientists, including Department of Psychology chair Robert Stackman, Ph.D., and then integrative biology-neuroscience doctoral student Joan Lora, have pinpointed a part of the brain that consolidates long-term fear memories. The research was conducted in collaboration with Scripps Florida.

The team discovered that a mild stimulus given to a rodent would result in the production of a protein synthesis in the medial prefrontal cortex of the brain. If the new protein synthesis was inhibited immediately after fear conditioning, fear memories did not form. However, if the protein was inhibited a few hours later, memories took hold. Thus, the study identified a critical time window of fear memory encoding in the prefrontal cortex.

Until this study, published in *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, this region of the brain had never been associated with the early encoding of long-term fear memories. The study can serve as a launching point for research in Alzheimer’s disease and Huntington’s disease.

“Our results are important because they establish for the first time the critical involvement of the prelimbic region of the prefrontal cortex in encoding fear memory,” said Stackman. ♦



*All persons born or naturalized in the United States and of the age of majority are citizens of the United States, except the Indians not taxed.*

*subject to the jurisdiction thereof, are citizens of the United States and of the age of majority they reside. No State or Territory may deprive any person of the right to vote on account of race, color or previous condition of servitude.*

*States and of the United States, except the Indians not taxed, who are not taxed, are citizens of the United States and of the age of majority they reside. No State or Territory may deprive any person of the right to vote on account of race, color or previous condition of servitude.*

*make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.*

*committees of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.*

*committees of citizens of the United States; nor shall any State deprive any person of life, liberty, or property without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.*

When I got out I had the double whammy - I had to deal with all the legal obstacles erected by the justice system and I had to deal with being a drug addict. Those two things coupled together would insure that I would end up homeless.

One day I was walking and I was approaching the railroad tracks I stopped and I could not go across... And all I knew when I stood there was that I was a broken man...

Now, the 15th amendment says that I should have the right to vote, right now, period end of story. But there is a caveat to that...

50% (3 MILLION) OF THE DISENFRANCHISED HAD DONE ALL THEIR TIME

6.1 MILLION US CANT VOTE BECAUSE OF DISENFRANCHISEMENT

30% (2.3 MILLION) ARE BLACK

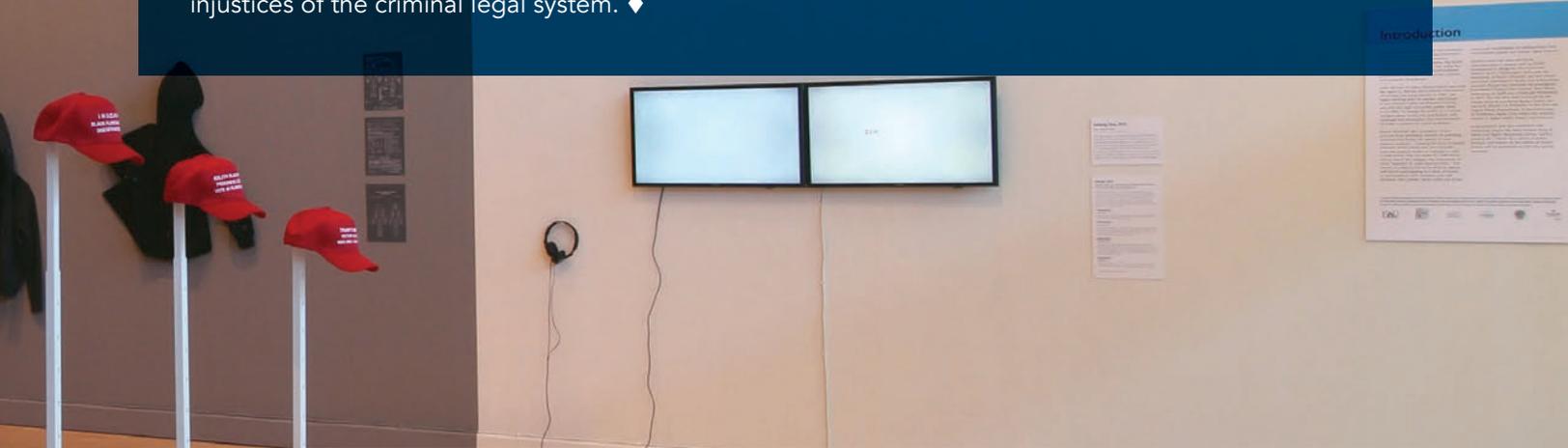
"Trump hats" provide statistics about voter disenfranchisement in the state of Florida as a part of the "Undoing Time" collection, which reconfigures prisoner-produced goods in ways that complicate notions of American freedom and dominant images of patriotism.

# Exploring Imprisonment Goes Digital

The University Galleries in the Dorothy F. Schmidt College of Arts and Letters presented an exhibition titled, "Sharon Daniel: Secret Injustices 2007-2016." Using digital technology for the presentation of research and scholarship allows artist Sharon Daniel to engage with the public. Related faculty works were displayed in the Schmidt Center Gallery public space.

Opening up dialogue about crime and punishment, the exhibition challenged the assumption that imprisonment provides a solution to social problems. Daniel collaborated on the exhibition with Wendy Hinshaw, Ph.D., associate professor in the Department of English, and with a multidisciplinary group of faculty members in the college.

The multimedia exhibition featured four interactive works. Themes included incarcerated women; poverty and addiction in America; victim and offender mediation practices; and resistance to the injustices of the criminal legal system. ♦





# NEW FACES

## Facing Down Funding Challenges as a Team



Karin Scarpinato is the new associate vice president in the Division of Research.

**K**arin Scarpinato, Ph.D., a molecular geneticist, was recently appointed associate vice president of the Division of Research. She will help lead the university's growing research enterprise.

A native of Germany, Scarpinato comes to FAU from the University of Miami (UM), where she served as the assistant provost for research. In this role Scarpinato helped shape and advance UM's research program by creating a collaborative

research support structure and network of South Florida research scientists.

Prior to UM, Scarpinato served as associate dean for research at Georgia Southern University. She was on the faculty of the Wake Forest School of Medicine for the previous nine years. As a postdoctoral fellow, she researched DNA repair at the National Institute of Environmental Health Sciences in Durham, NC.

We asked Scarpinato about her background, research interests and how she plans to help investigators navigate the challenges of securing external research funding.

### **Q. What inspired you to become a scientist?**

**A.** I have a life-long interest in science and processes in nature. This interest was further supported by a high school teacher who challenged me to go beyond ordinary school work and immerse myself in the study of biology. Based on this experience, I made the decision to turn these interests into a life-long career.

### **Q. Tell us about your key area of research.**

**A.** My specialty is DNA repair. There are a lot of chemicals and factors that can damage DNA. Our cells have a system that can, to some extent, repair these damages. If the repair system is defective, it's one of the ways you can get cancer.

### **Q. What interested you about joining FAU?**

**A.** I feel very in step with the university's research efforts, and am very impressed with the organizational efforts put in place, and leadership that is behind FAU's growth as a public research university. I believe this is an excellent time to be part of this movement.

**Q. How do you deal with the myriad of funding challenges and competition for grant money?**

**A.** Because the competition is strong, the Division of Research is holding workshops for faculty on the cusp of writing grants. It is our goal to provide these faculty members with support to guide them through the grant-writing process. I've set up writing bootcamps that are eight-10 weeks long. They will hopefully introduce young faculty to the basics of grant writing, and serve as a refresher for those faculty members who wish to get back into writing grants.

**Q. What has most impressed you about FAU?**

**A.** The teamwork. Everybody works really well as a team here. It's very invigorating to me and I enjoy that.

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## Biostatistician Zooms in on Healthy Aging

**K**athy Freeman Dr.P.H., entered college planning to become a doctor. It was the start of a journey that took a detour, and recently landed her at FAU. Freeman saw her future in medicine as an intellectually stimulating and humane pursuit, and knew that by becoming a doctor she would be following a long family tradition.

All plans changed for Freeman when in her senior year of college, after finding time spent in the lab unsatisfying, she came to the conclusion that she didn't want to be a physician. As a mathematics major, now in search of a career, she sought the advice of her department chair. She was instructed to look through a large university course catalog until she found a subject that interested her. When she came across the field of epidemiology, she knew she had found her calling. As an epidemiologist, Freeman would be applying mathematics to search for the causes of diseases in defined populations, prevention strategies and treatment. For Freeman, epidemiology was a perfect fit for a math major with a strong sense of altruism.

After acing the graduate school exam, she received a training grant from the U.S. Public Health Service, in exchange for her commitment to work in biostatistics, an offshoot area of epidemiology that applies mathematics to analyze disease patterns. Freeman went on to earn a master's degree from the University of Massachusetts Amherst, and a doctorate from Columbia University, both degrees in biostatistics.

**Q. What advice do you give faculty pursuing research careers?**

**A.** To actually utilize our services and not just try to do their own thing. Nowadays, you have to go out and find collaborators and get as much assistance as you can in writing your grants. And don't give up. It's quite difficult to get grants now because of the numerous funding cuts over the last decade. Any health-related research is where most of the grant funding goes, particularly in the area of biomedical research. ♦



A biostatistician, Katherine Freeman will be providing support to researchers university-wide.

Freeman spent 25 years at New York's Montefiore Medical Center, where she served as director of biostatistics and a professor in the Albert Einstein College of Medicine's Department of Epidemiology and Population Health. Freeman has been the principal and co-investigator on many federally funded studies. Now, a part of the research faculty at FAU, Freeman recently started working at the Institute for Healthy Aging and Lifespan Studies. She plans to use her expertise to develop collaborations and write grants to advance the institute's mission.

"Healthy aging sounds like a pat phrase, but if you can preserve quality of life for as long as possible, it means a lot," she said. Thinking about her mother, who at age 96 continues to exercise, socialize and keep her mind active by playing bridge four-times-a-week, Freeman says, "It's too easy to say it's all about good genes. Lifestyle is a large component as well." ♦



## Sensing Success

Three recent additions to I-SENSE, or the Institute for Sensing and Embedded Network Systems Engineering, bring vast amounts of knowledge and expertise to the institute's growing research enterprise.

Sensing and smart systems are a key priority designated to boost the university's sponsored research projects — and these new hires are highly regarded researchers in computing, communication and sensing technology, according to I-SENSE director Jason Hallstrom, Ph.D.

"All three joined us recently and all are currently funded through external awards," he said. "That level of success for new hires is uncommon. They've been extremely active in pushing their research programs forward and active in adopting the spirit of the strategic plan."



### REZA AZARDERAKHSH, PH.D.

Azarderakhsh has a computer engineering and mathematics background, both key components when dealing with his area of expertise, cryptography, the science of ensuring data security through mathematic code. Think bank information, health records, cell phone and online conversations. With the dawn of quantum computers, which can solve mathematical equations much more quickly than current systems, Azarderakhsh, a cryptographic engineer, designs complex algorithms that hackers cannot infiltrate.

"Online transactions and data are not secure," he said. "Every single connected device is the target of an attack. The National Institute of Standards and Technology is planning to set standards for the security of data."

Azarderakhsh joined I-SENSE from the Rochester Institute of Technology, where he was an assistant professor and the founding director of the Applied Cryptography and Information Security Lab. He's now an assistant professor in the Department of Computer and Electrical Engineering and Computer Science (CEECS).



### BEHNAZ GHORAANI, PH.D.

Ghoraani's area of interest lies in understanding human physiology by analyzing information transmitted from the human body.

She completed her Ph.D. and post-doctoral work in Canada before becoming an assistant professor in the Department of Biomedical Engineering at Rochester Institute of Technology, where she founded and directed the Biomedical Signal and Image Analysis Lab.

She's an expert in digital signal processing and techniques and is applying that knowledge to healthcare. With deep understanding of atrial fibrillation — an irregularity in the heartbeat — Ghoraani has worked with cardiac specialists to develop new techniques for guiding a catheter in the heart during ablation procedures and predicting and understanding infant seizures.

Her research on Parkinson's disease involves using sensors connected to a patient's body to develop an algorithm to predict adequate dosing of medication.

Ghoraani, an assistant professor in CEECS, is beginning research on wearable sensors to measure motor cognitive performance as a biomarker for neurocognitive disorders, such as Alzheimer's disease.



### YUFEI TANG, PH.D.

After completing his doctorate in electrical engineering at the University of Rhode Island, Tang brought his expertise in ensuring the reliability of power systems, smart grids, computational intelligence and cyber-physical systems to the institute.

Historically, power plants use coal and water to generate power. But smart grids use renewable energy, such as wind power. Tang was part of a team that developed the first off-shore wind farm in the country, which provides power to a regional power grid in Rhode Island.

An assistant professor in CEECS, Tang is collaborating with FAU's Southeast National Marine Renewable Energy Center and the Department of Civil, Environmental and Geomatics Engineering.

He's also working with a University of South Florida researcher on proactive defense against cyber-physical smart grid attacks.

Tang completed his undergraduate and graduate studies in his native China before coming to the United States to earn his Ph.D. ♦

# FEATURES

*Taking On*

# TRANSPORTATION

*Challenges*

**T**ransportation research has long been a pearl of the university. Two recent major grants building on that history are now moving the study of traffic, highways, safety and freight mobility forward as a crown jewel of research at FAU. Transportation studies touch on every part of our daily lives from commuting to work to where we go for vacations, from where we choose to live, to our personal and national economic vitality. Faculty have taken on the challenge of discovering new ways to break through gridlock and improve traffic safety, performance and the movement of freight. Their work has the potential to better the quality of life for people nationally and globally.

***Freight Mobility:  
Increasing Efficiency, Lowering Costs***

The U.S. Department of Transportation (DOT) has earmarked millions in grant money to FAU for separate studies addressing road safety and freight mobility, boosting the university's research efforts to an elite level.

The College of Engineering and Computer Science will be the recipient of \$1.4 million per year for five years for its Freight Mobility Research Institute, housed in the Department of Civil, Environmental and Geomatics Engineering.



Evangelos Kaisar, director of the Freight Mobility Research Institute.

With a combined match from the state and private sectors, the total award exceeds \$10 million. The money will fund research to address critical issues affecting the planning, design, operation and safety of U.S. intermodal freight transportation systems with the goal of strengthening the country's economic competitiveness.

"Efficient and safe freight movement is inextricably linked to the economic vitality of a local area, state, region and even beyond," said Evangelos Kaisar, Ph.D., director and principal investigator of the Freight Mobility Research Institute.

Of the more than 200 proposals submitted to the University Transportation Center Program, the federal agency funded and designated 20 institutions, including FAU, to be a Tier 1 center. "This center has the potential to greatly impact people's life by improving freight transportation systems, reduce transportation costs by millions of dollars for delivery of goods and services; and support faster, more reliable transportation from

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*"Efficient and safe freight movement is inextricably linked to the economic vitality of a local area, state, region and even beyond."*

— **EVANGELOS KAISAR, PH.D.**

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one place to another," Kaisar said. "Beyond lower dollar costs to shippers, reductions in transit time and/or increases in schedule reliability can be expected to also have significant impacts."

The institute will lead a consortium of experts from universities throughout the nation to address the DOT's strategic goal of improving mobility of people and goods. Information technology, freight network modeling and operations, intermodal logistics, and freight and supply chain sustainability will be implemented by the team to address priorities of the Fixing America's Surface Transportation Act, a bill governing U.S. federal surface transportation spending.

"The goal is to promote smart cities, improve multimodal connections and minimize cargo transit time, including optimizing intermodal transfer efficiency (i.e., transfers at terminals), and first- and last-mile deliveries," Kaisar said.



Eric Dumbaugh, associate professor, School of Urban & Regional Planning and associate director, Collaborative Sciences Center for Road Safety.

### **Collaborative Sciences Center for Road Safety**

The transportation department also awarded up to \$15 million for five years to create the Collaborative Sciences Center for Road Safety housed at the University of North Carolina, Chapel Hill. FAU is co-directing this National University Transportation Center.

With the goal of improving road safety, researchers in the College for Design and Social Inquiry will collaborate with four other designated centers based at the following institutions: University of North Carolina, Duke University, University of California, Berkeley and University of Tennessee, Knoxville.

"We're speaking with transportation officials from all major cities to identify safety needs, run focus groups and collect safety-related data for conducting research," said Eric Dumbaugh, Ph.D., associate director of the new Collaborative Sciences Center for Road Safety.

"We need to get an understanding of where the gaps and needs are so we can address safety in an interdisciplinary manner," said Dumbaugh, who is known for his expertise in transportation and urban design. ♦



Aleksandar Stevanovic, associate professor and director of the Lab for Adaptive Traffic Operations & Management. A driving simulator, in the lab, will share traffic signal messages with drivers allowing the traffic signal to sense approaching vehicles so that the light turns green sooner. It uses Oculus Rift glasses, common in video games. Virtual pedestrians will be able to interact with a virtual car in traffic streams along with pedestrians, cyclists and others.

## TRAFFIC LAB'S SOLUTIONS to Nationwide Gridlock

In 1990, some 193 million registered vehicles traveled U.S. highways; by 2014, according to the Department of Transportation, that figure soared to 260 million. The Sunshine State ranked third with 15.5 million registered vehicles, behind Texas (20.8 million) and California (28.6 million).

The increase in vehicles coupled with a booming population have created a perfect storm for traffic congestion. The Laboratory for Adaptive Traffic Operations & Management (LATOM) in the College of Engineering and Computer Science is hard at work researching ways to mitigate roadway gridlock.

The lab is doing research related to traffic operations and management, and trying to help government agencies better manage traffic in urban areas on roads that have traffic signals. The lab's research seeks to optimize capacity on existing main roadways to avoid gridlock, while forestalling investing millions of dollars in additional infrastructure.

"Such an expenditure increases carbon footprint, occupies precious space in urban settings and further increases urban sprawl," said Aleksandar Stevanovic, Ph.D., director of the lab. On the other hand, shifting people to other modes of transportation is costly, takes years to build and may limit commuting flexibility and convenience.

"Before we have to move to other alternatives we need to ensure we fully utilize capacity of the urban road network that already exists," Stevanovic said. "Current systems don't necessarily fully utilize capacity. That's where the lab's research comes in to play." ♦

*Some of the leading transportation experts at FAU.*

### Eric Dumbaugh, Ph.D.

Title: Associate professor

College: Design and Social Inquiry

Research focus: Planning, policy, engineering and design of urban transportation

### Evangelos Kaisar, Ph.D.

Title: Associate professor

College: Engineering and Computer Science

Research focus: Logistics and transportation system design, transportation system security and efficiency, traffic modeling, simulation and safety, traffic engineering and design and freight logistics

### Louis A. Merlin, Ph.D.

Title: Assistant professor

College: Design and Social Inquiry

Research focus: Integrating transportation and land use through the development of accessibility-based performance measures and tools

### John Renne, Ph.D.

Title: Associate professor

College: Design and Social Inquiry

Research focus: Creating sustainable, resilient and livable cities

### Aleksander Stevanovic, Ph.D.

Title: Associate professor

College: Engineering and Computer Science

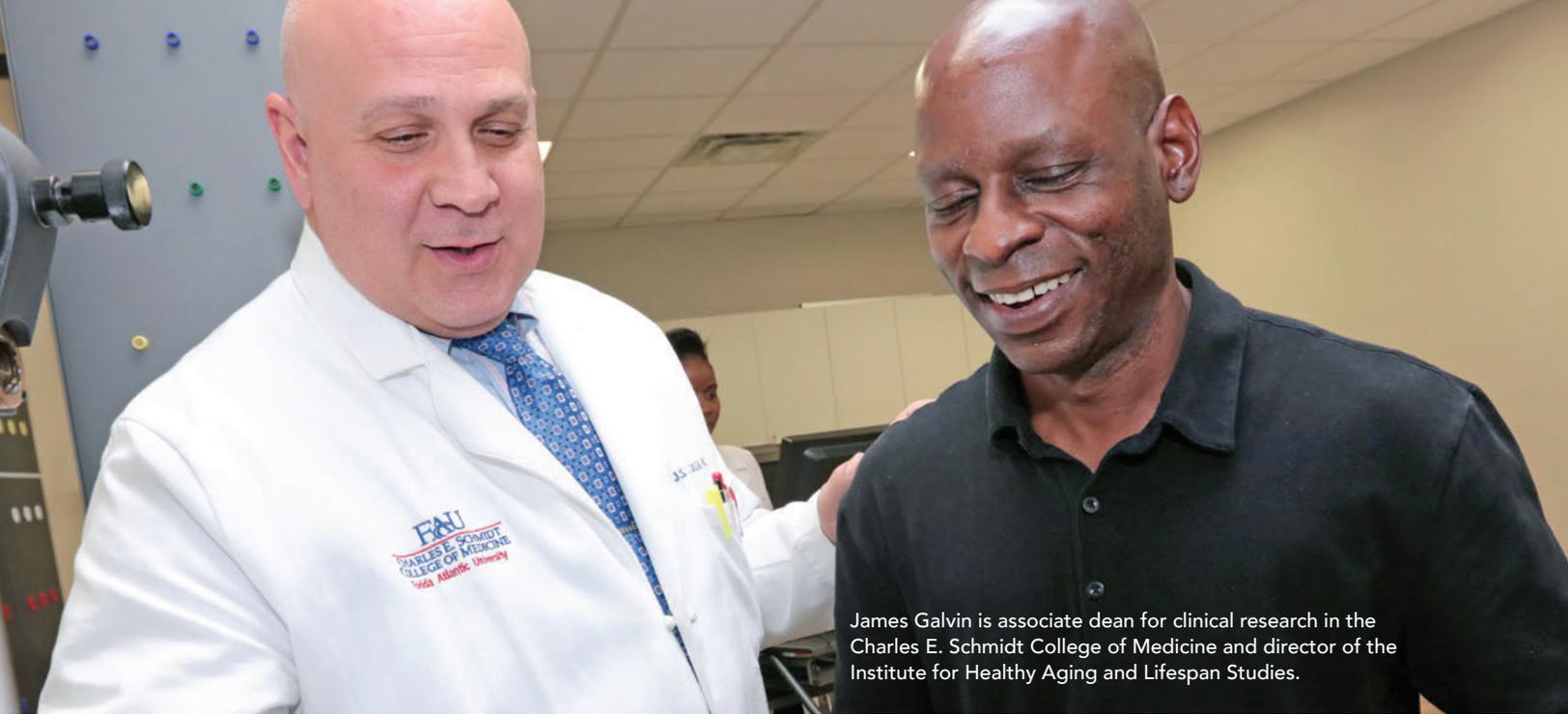
Research focus: Intelligent transportation systems, sustainable and multimodal transportation operations, traffic signal control systems and transportation engineering and planning

### KwangSoo Yang, Ph.D.

Title: Assistant professor

College: Engineering and Computer Science

Research focus: GIS analysis with transportation applications



James Galvin is associate dean for clinical research in the Charles E. Schmidt College of Medicine and director of the Institute for Healthy Aging and Lifespan Studies.

# Advancing UNIVERSITY

## Research Priorities

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Launched in 2015, four areas of strength — referred to as pillars — represent the cornerstones of the university's 10-year Strategic Plan for the Race to Excellence, with a goal of making FAU the nation's fastest-improving public research university. Progress has occurred at a rapid-fire pace since President John Kelly, Ph.D., fast-tracked the university's key priorities.

### Neuroscience

Since joining FAU as the Brain Institute's founding executive director about a year ago, molecular neuroscientist Randy D. Blakely, Ph.D., has assembled a top-notch team of scientists to support cutting-edge research, education and community outreach.

Blakely's research team of 20 scientists is comprised of undergraduate and graduate students, postdoctoral faculty and technicians, including 12 lab members that relocated with him from Vanderbilt University.

Currently, 50 faculty associated with the institute are spread across the colleges of science, medicine, nursing, engineering and education, the Harriet L. Wilkes Honors College and FAU Harbor Branch Oceanographic Institute. The Brain Institute works closely with the Max Planck Florida Institute for Neuroscience and Scripps Florida.

"We're a unit that isn't explicitly clinical," Blakely said. "It's about the discovery of fundamental elements and principles of brain operation, and how that understanding impacts our understanding of brain disorders."

"We have diverse opportunities in neuroscience that are already very strong, but now we're positioned for explosive growth," he added.

### Ocean and Environmental Sciences

Oceanographer and phytoplankton researcher Anton Post, Ph.D., heads the Harbor Branch Oceanographic Institute (HBOI), a pivotal component of the university's focus area of ocean and environmental sciences — including ocean engineering.

Ecosystem health and how it equates to human health is a top priority, along with global climate change and sea level rise. Post said he'd like to see science translated into policy that will "provide communities with solutions to improve quality of life and develop economies."

The initiative will work to mitigate coastal erosion, develop sustainable aquaculture, create engineering



Randy D. Blakely is a professor in the Charles E. Schmidt College of Medicine and executive director of the FAU Brain Institute.



Anton Post, executive director and professor, leads FAU Harbor Branch.



Jason O. Hallstrom is a professor and the director of the Institute for Sensing and Embedded Network Systems Engineering.

solutions to adapt to climate change, and understand how to preserve natural resources and protect habitats. Post assumed his role in January.

### **Sensing and Smart Systems**

The Institute for Sensing and Embedded Network Systems Engineering is the coordinating hub of the university's sensor and smart systems focus. It's led by Jason Hallstrom, Ph.D., a professor in the College of Engineering and Computer Science who joined FAU in 2015.

Having known President Kelly from Clemson, Hallstrom said he knew what the president could achieve, but the speed at which he has done it is amazing. "The change I've seen in the last two years is the sort of thing you could not predict."

Much of the institute's research involves the Internet of Things — the infrastructure of the information society — initiatives that are multi-disciplinary.

"We've had a really great year," said Hallstrom, who hired three assistant professors in August, each funded through external awards.

The group has secured grants from institutions such as the National Science Foundation, the Department of Energy and the National Oceanic and Atmospheric Administration.

"We've formed new collaborations with a number of industry partners," Hallstrom said. "It has been a productive year."

### **Healthy Aging**

Under the direction of James Galvin, M.D., the creation of the Institute for Healthy Aging and Lifespan Studies is underway, with a focus on advancing patient-oriented aging research by building research capacity and developing collaborative research programs involving all 10 colleges.

"We already have a wealth of talent, from geriatricians at the College of Medicine, to outstanding researchers at the College of Nursing and School of Social Work, to health economists at the College of Business," Galvin said. "Instead of focusing on research programs that improve lifespan — living longer — the institute promotes the concept of healthspan, living better. The art of pillar building is engaging those who are here and doing co-recruitment with different colleges to attract new talent."

Galvin has launched the Clinical Translational Research Unit, a lab to study patient populations. It's there that new treatments, therapies and diagnostics are tested in clinical and observational studies.

Programs under the institute's umbrella, including geroscience (the biology of aging), health promotion, health care infrastructure, and cognitive and functional aging, will foster vibrant research and garner federal funding. ♦

*The  
inner  
workings of* **BEAUTIFUL**

**BRAINS**

**T**he work of neuroscientists takes them deep into the structures of the brain, exploring neurons, nerves, neuronal circuitry and even single synapses. They do this work with high-powered microscopes that allow them to peer into what drives everything from memory formation to the development — and possible treatments — for many diseases of the brain. The images produced by these microscopes are often vivid and colorful, and can be considered works of art in and of themselves.

The FAU Brain Institute was recently named a Nikon Center of Excellence, making it one of eight designated centers in the United States and 21 worldwide. Nikon partners with select universities and research centers, providing their scientists and trainees access to high-end imaging technology. We asked scientists of the FAU Brain Institute to share some of the images that they are generating in their studies of the brain.

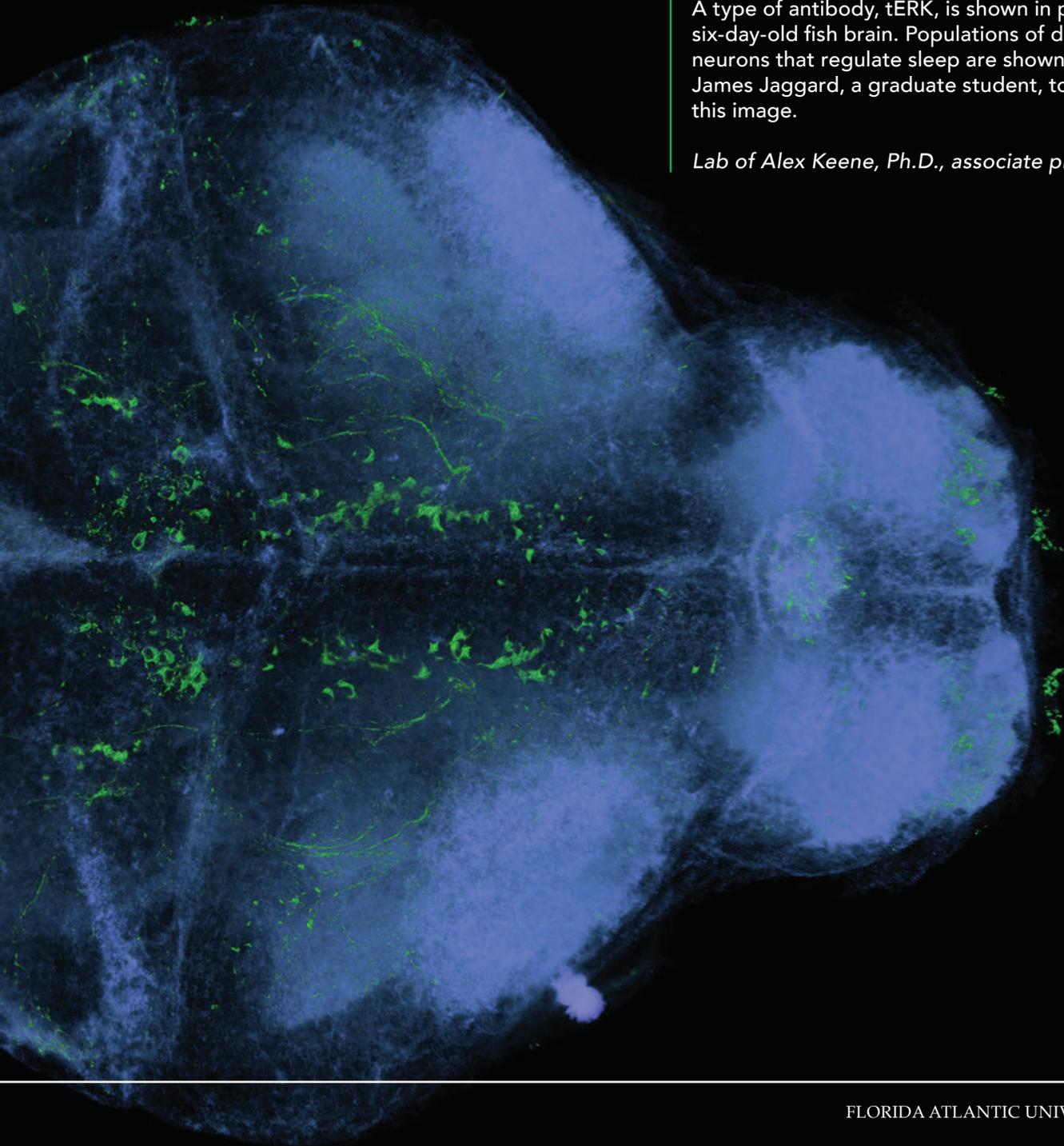
The original images, gathered by Jana Boerner, Ph.D., managing director of the Brain Institute Cell Imaging Core, have been enlarged for publication.

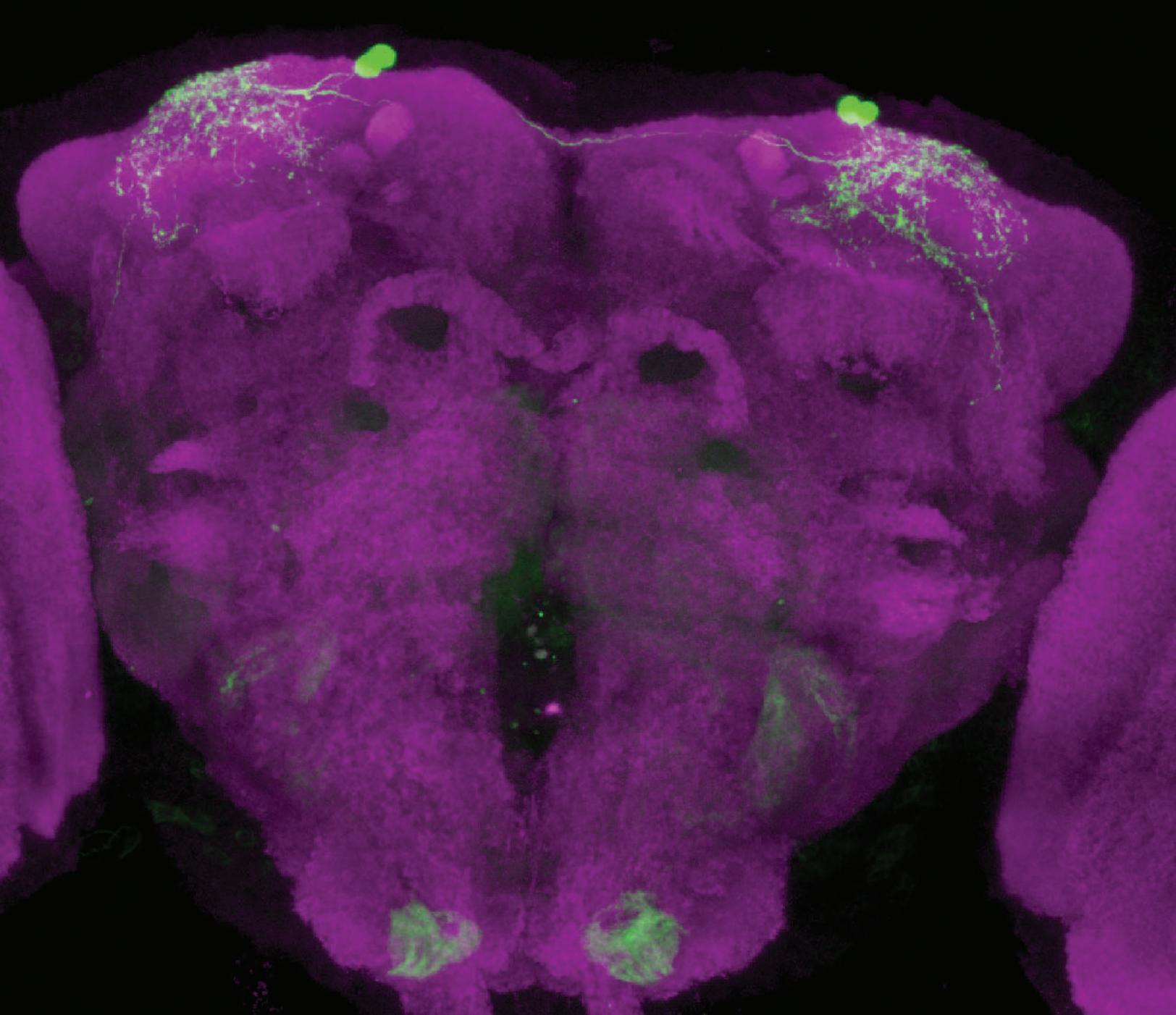
### FISH BRAIN

Sleep is an ubiquitous behavior throughout the animal kingdom, yet the role and amount of sleep required varies greatly among species. The Keene lab uses Mexican cavefish to study the evolution and neural circuits that underlie the role of sleep.

A type of antibody, tERK, is shown in purple in a six-day-old fish brain. Populations of dopamine neurons that regulate sleep are shown in green. James Jaggard, a graduate student, took this image.

*Lab of Alex Keene, Ph.D., associate professor*

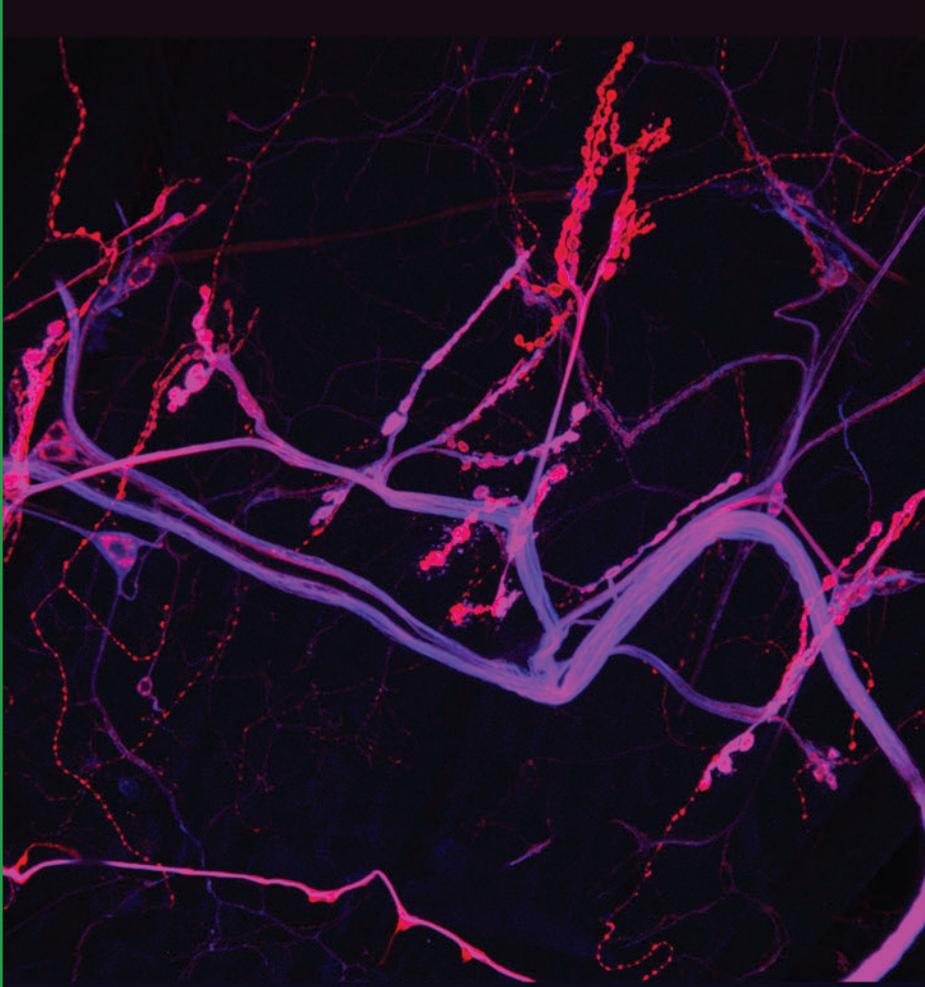




### FLY BRAIN

The fruit fly is a powerful genetic model used to study nervous system development and function, as well as learning, memory and behavior. Maria Yurgel, a graduate student who took this image, studies the interaction between fly metabolism and sleep. Brain synapses with an antibody are shown in magenta. Neurons expressing a leptin homolog that regulates feeding are shown in green.

*Lab of Alex Keene, Ph.D., associate professor*



### FLY LARVAE

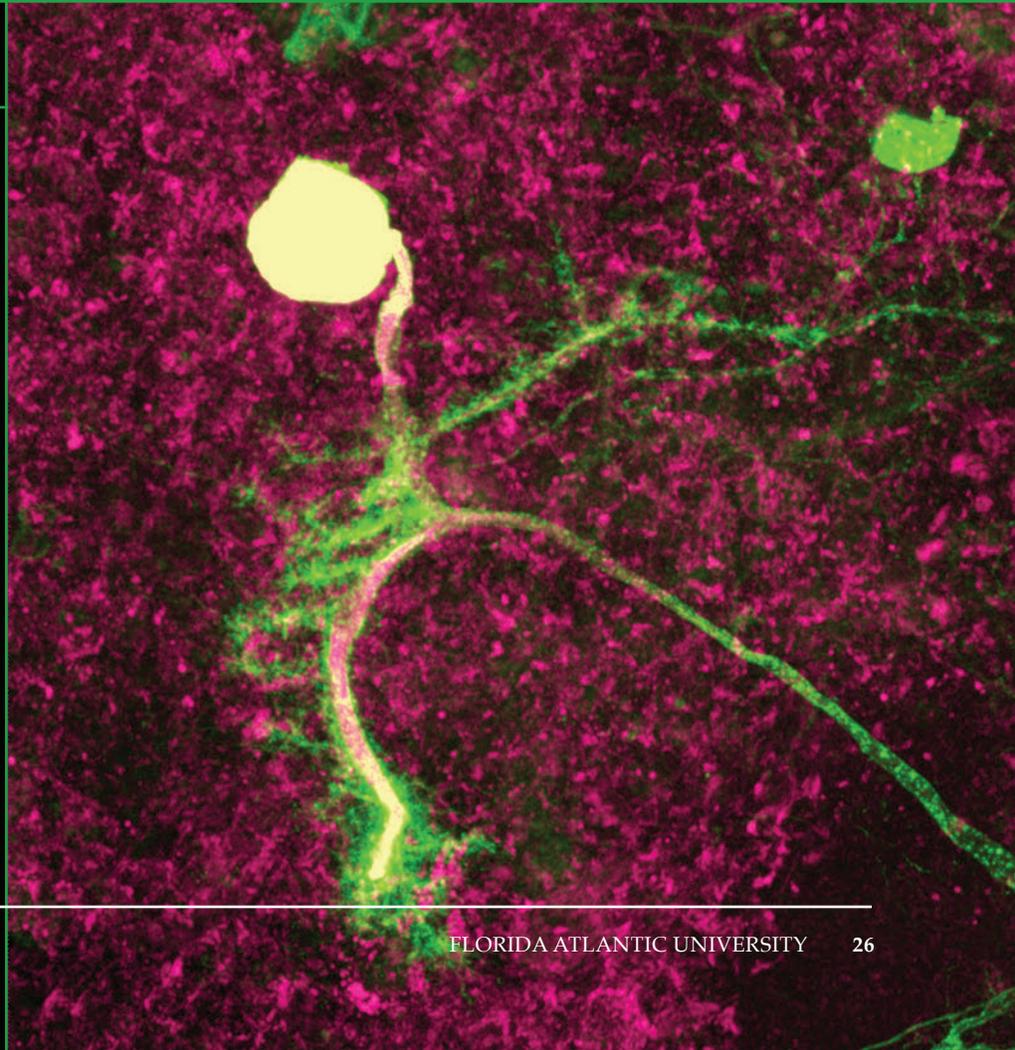
This image taken by Sirisha Madem, Ph.D., a postdoctoral fellow, shows the neuromuscular junction of a *Drosophila melanogaster* (fruit fly) larva. The larva nerve terminals are shown in red, while the protein neuroglian appears blue. The overlap of the two shows up in purple. Neuroglian is similar to the human protein, L1CAM, which is associated with several human neurological disorders.

Lab of Tanja Godenschwege, Ph.D.,  
associate professor

### FLY BRAIN

A single neuron, shown in yellow, is seen in a developing brain of a fruit fly, *Drosophila melanogaster*. The nerve cell synapses are shown in magenta, some of which are in contact with the green dendrites — extensions from the cell. Long and thread-like nerve cell axons are also shown in green. This neuron is part of a powerful model system used to study synapse development and function — or how nerve cells communicate. This image was taken by Jana Boerner, Ph.D., a postdoctoral fellow.

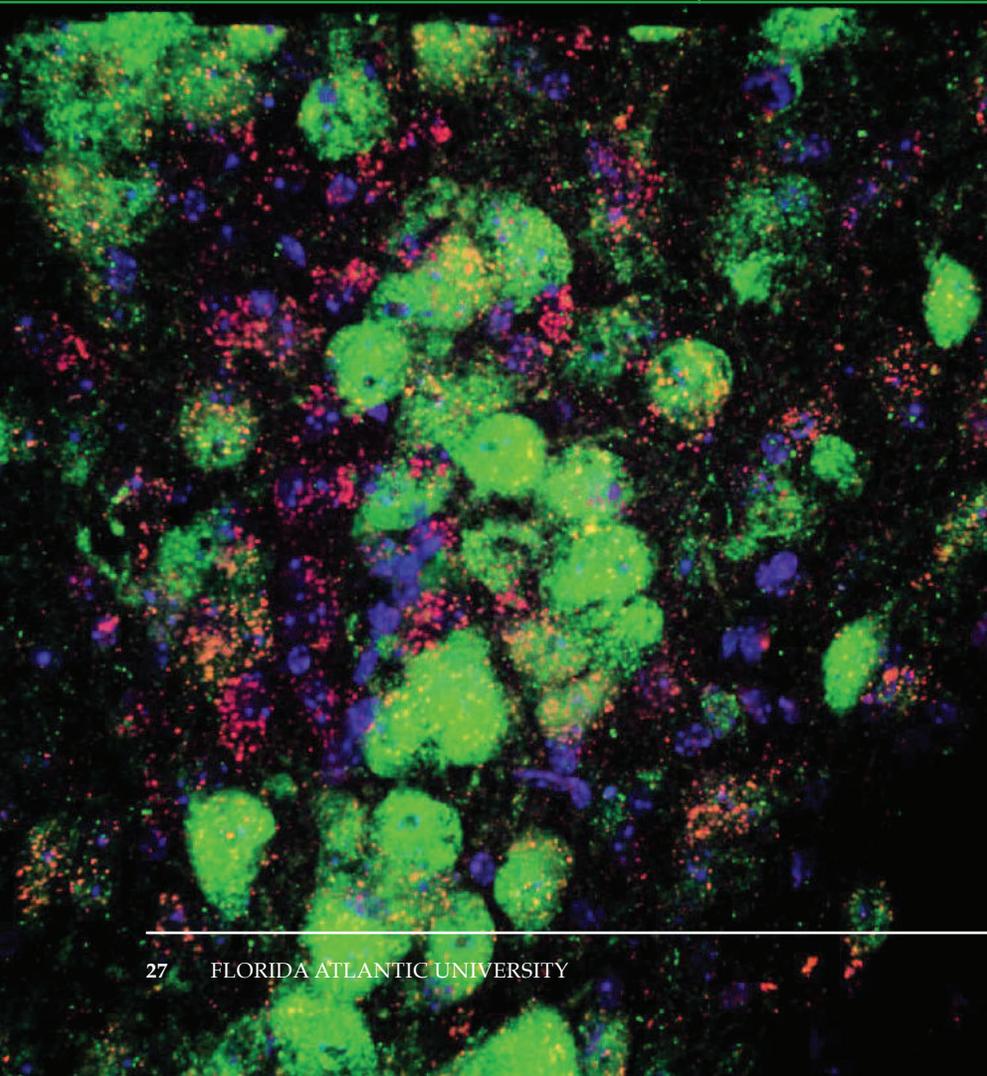
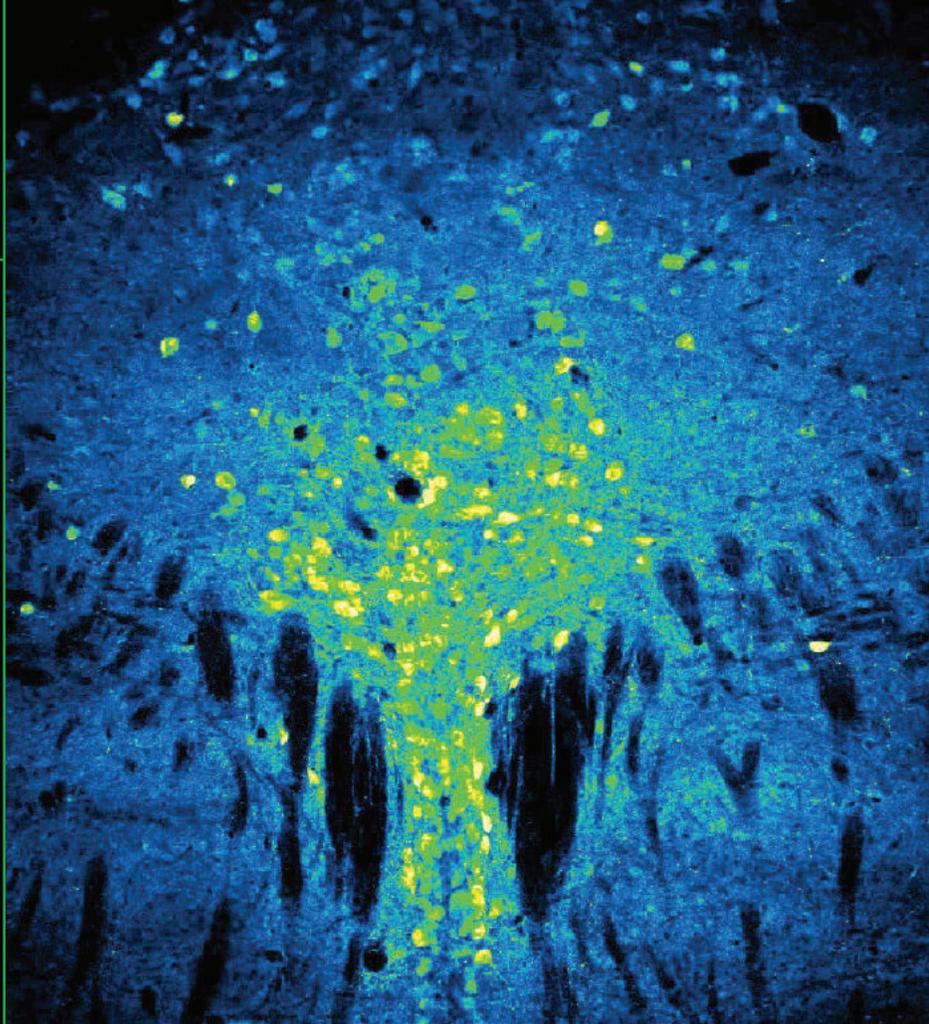
Lab of Rod Murphey, Ph.D.,  
professor and biological sciences  
department chair



## MOUSE MIDBRAIN

Shown in green, neurons in the mouse midbrain synthesize neurotransmitter serotonin. These neurons send dense projections to other brain structures to modulate mood, appetite and reward. Matt Robson, Ph.D., took this image as part of his work revealing new ways serotonin neurons are regulated by inflammation.

*Lab of Randy D. Blakely, Ph.D.,  
professor and FAU Brain Institute  
executive director*



## MOUSE BRAIN

A high-power image of a mouse brain shows serotonin neurons in green, juxtaposed with signaling enzyme (p38alpha MAPK) stained in red. The enzyme regulates serotonin and coordinates the ability of immune pathways to alter mood. The cells' nuclei are stained blue. Matt Robson, Ph.D., took this image.

*Lab of Randy D. Blakely, Ph.D.,  
professor and FAU Brain Institute  
executive director* ♦



## Quality, Quantity of Start-ups Rising at FAU TECH RUNWAY

The cutting-edge technologies developed by the winners of the 2017 FAU Tech Runway Launch Competition have significantly raised the bar of the quality and breadth represented in this year's Venture Class. The program awards up to \$100,000 in cash grants, entrepreneurship instruction, structured team mentoring, no-cost workspace and introductions to potential sources of investment capital, according to Rhys L. Williams, associate vice president for research and managing director of the program.

### Meet The Cash Winners of Venture Class 5

**Tap2Open** eliminates call box aggravation in gated communities.



Created by FAU computer science graduate Mark Grosberg, Tap2Open grants entry to residents and invited guests via smartphone, tablet or computer.

The system is ideal for regular visitors, like weekly pool service staff, delivery drivers and other expected guests. It also works for one time visitors.

"There's a lot of options for the community and how they choose to deploy the system," Grosberg said. "The product can be tailored to meet the specifics needs of the community."

Call boxes would still be available for guests without smart devices.



**Hubspring Health** is the brainchild of technologists and physicians Frank Gencorelli, M.D. and Andrew Rosendahl, M.D., Ph.D.

During his residency, Gencorelli, whose undergraduate degree is in engineering from FAU, became frustrated at how much time was wasted struggling to access even the most basic resources and communicate with his team.

When time was critical to a patient's outcome, he had to login to a desktop computer, access the hospital's intranet, locate a shared folder and, with some luck, find the information he needed.

"Things that seem easy outside of health care were incredibly time consuming in the hospital, where patients' lives lie in the balance," Gencorelli said. He and Rosendahl, a medical colleague, co-founded Hubspring to solve this pervasive problem in the industry.

The Hubspring software platform — "The Hub" — puts all mission critical content and communication tools in one place, making it accessible from any device or location, eliminating delays in care.

"The Hub has been transformative" in the medical departments using it, including the University of Miami, University of Texas, University of Tennessee and many others, according to Gencorelli.

**Ridgeback Network Defense**



founder Tom Phillips spent decades working on technology in national security for the U.S. government.

Phillips and co-CEOs, Raj Kulkarni and Scott Fogarty, created Ridgeback, a security platform that defeats malicious computer network invasion in real time. Ridgeback dramatically shifts the odds in favor of the enterprise to detect and eliminate hackers, a \$75 billion global problem, according to Fogarty.

The technology performs by populating a company's network with the appearance of billions of "IT assets" — computers, servers, copiers — fake resources that act as landmines when hackers try to infiltrate a network.

"The minute the hackers scan the network they're scanning fake resources," Fogarty said. "Every decoy is a landmine, and every time it's tripped, the compromised computer is taken offline and the threat is stopped. Our product sends confusing and irritating information back to the hacker."

For national security uses, Ridgeback maintains an open connection to the hackers, meaning the hackers' machines are susceptible to being exploited.

Unlike many cybersecurity solutions on the market, which require hardware, bandwidth and human management, Ridgeback can be downloaded and made operable within 10 minutes.

## Venture Class 5 Winners

### Community Track



- Hubspring Health
- Land of Zorth
- Renal Trkrr
- Ridgeback
- Network Defense
- ScaleWize
- Two Degrees
- WAHspace

### Faculty Track

- Idle Automation
- Intercept TeleHealth Solutions
- MMP Biopharma
- PQSecure Technologies
- Tap2Open
- Videopura
- Voxel Rx

### Student Track

- Bacon Boxes
- Dead Ringer Society
- Gaming Frog
- Oceanus
- PAPER
- SLIDEMAP
- STAX Mobile App



**Videopura** is a cloud platform that halves the file size of videos streamed on the Internet.

Hari Kalva, Ph.D., professor in the Department of Computer & Electrical Engineering and Computer Science, developed software to discard what's not visible to the viewer, based on principles of human vision.

"When we watch videos and process information, there are certain aspects you see and others you don't see," Kalva said. "Our software can analyze a video, identify what is happening and encode only the portions of the video that are relevant for perception." For example, when a movie cuts from scene to scene or a camera angle changes, "our eyes do not see many details in up to five to 210 frames before the cut," according to Kalva.

During trials, users compared video streamed on local news channels' websites to Videopura's reduced file size version. "In all cases, we found our video is the same or better quality than what's out there," said Kalva.

By reducing file size, consumers use less data and videos load faster. This results in a cost savings for consumers, and service providers benefit by lowering the costs of storage and streaming. ♦

## UPDATE FROM A VENTURE CLASS 4 COMPANY



Matt Edick (left) and Rion McCauley.

As the new class of companies is getting started at FAU Tech Runway, Venture Class 4 graduated this Spring. The graduating companies have had many successes that are an inspiration to the incoming group. Here's an update from one of them:

**Squeeze**, a budgeting and expense aggregator app — think Expedia for your bills — has expanded rapidly in its first year, now employing nearly 20 people: nine in Boca Raton including one FAU graduate, two FAU interns and several global subcontractors.

The company is building a partnership with LendingTree and recently launched daily deals and digital coupons so users can "squeeze other things," said CEO and founder Elias Janetis. Squeeze is also teaming up with the Penny Hoarder and its more than 19 million monthly visitors.

The free Squeeze app launched in 2017 without any paid advertising. In the first 90 days, more than 12,000 users downloaded the app. After incorporating user feedback, Squeeze is launching its next iteration and a website with a coupon and deals engine, giving users access to up to 10,000 merchants to identify the best deal. The app is available for Android and iOS devices, and at [Squeeze.com](http://Squeeze.com).

"The Tech Runway physical facilities were a great help and allowed us to focus our cash burn on product development instead of physical overhead," Janetis said. He plans to stay headquartered in South Florida after graduating from the Tech Runway space. ♦



# INSIGHTS

## First Video Recording of Rare Monkey

Thanks to the work of primatologist Kate Detwiler, Ph.D., FAU is at the epicenter of ground-breaking research involving the Dryas monkey, an endangered species located in one of the world's most remote regions — the Democratic Republic of Congo's Lomami National Park.

For the past three years, Detwiler, an assistant professor of anthropology in the Dorothy F. Schmidt College of Arts and Letters, has been collaborating with the Lukuru Foundation to investigate this little-known species, believed to be at risk of extinction. The Lukuru Foundation, known for their conservation efforts on behalf of great apes and their natural habitat within the Congo Basin, was introduced to the species when notified that a dead monkey, believed to be a Dryas monkey, was apparently killed by a local hunter. "Extremely elusive, the Dryas monkey moves stealthily through the shrubs on narrow branches and vines without being detected by humans," said Detwiler. "The Lukuru field teams have been conducting patrols and biological surveys for nearly 10 years in the region, yet had never found a living Dryas monkey in the forest."



Two Dryas monkeys in the Democratic Republic of Congo.

Detwiler recruited Daniel Alempijevic (pictured left), now a master's degree candidate in the Environmental Sciences Program, to take on the formidable task of attempting a field study of this rare species of guenon. Together, they designed methods for installing remote camera traps that would be triggered by heat and motion to capture footage of the monkeys. The cameras were to be strategically placed on the ground, mid-level and in the rainforest's canopy. To prepare, Alempijevic earned a tree-climbing certificate in Panama and practiced his skills in a dense mangrove near the Fort Lauderdale airport, home to a population of Vervet monkeys.

After spending three months in the dark, dense and rainy Congo Basin, climbing trees as high as 100-feet-tall to place the 30 remote camera traps, Alempijevic recorded the first video footage of the Dryas monkey. Detwiler and Alempijevic have determined that there is more than one social group living in the buffer zone of the park. The high canopy cameras are picking up other monkeys and mammals as well.

The hunter, who has joined the research team, donated Dryas monkey remains to the Lukuru Foundation. Detwiler traveled to Kinshasa to meet with the foundation's directors and wildlife officials to export tissue samples from the monkey to FAU and the Yale Peabody Museum of Natural History. "As far as we know, the FAU samples, which are being used to conduct genetic research, are the only high quality tissue samples of Dryas monkeys anywhere," Detwiler said. Along with the Lukuru Foundation, Detwiler and her team want to better understand

the Dryas monkeys and their habitat since so little is known about the biology of this animal.

"The threat for this species is that it's hunted and the hunting is not regulated," Detwiler said. "If we can identify social groups living within the new Lomami National Park, we can take steps toward monitoring and protecting these groups from overhunting." ♦

### In search of the elusive Dryas monkey

FAU researchers locate rare African monkey. The monkey avoided detection by researchers in the Lomami National Park area for nearly 10 years.

**Kate Detwiler, Ph.D.**, traveled to Kinshasa to transport found monkey tissue to FAU and Yale.

**Daniel Alempijevic**, master's degree candidate, spent three months climbing trees to record video footage.



Democratic Republic of the Congo

SOURCES: Lukuru Wildlife Research Foundation; United Nations, Department of Field Support



## Stellar Research Draws Outstanding Students

**F**or the next three summers, FAU will host visiting science-technology-engineering-math (STEM) undergraduate students from across the country. The students will participate in the National Science Foundation (NSF)-sponsored Research Experiences for Undergraduates (REU) program, held at institutions selected for their strong research initiatives in a variety of innovative areas. Students are chosen based on academic excellence and research interests.

While FAU has regularly mentored individual undergraduate students through the NSF REU Supplement program, becoming an REU Site gives the university added distinction. The program

exposes the university to highly talented STEM students who might one day consider attending the university for their graduate studies.

As the recipient of two separate REU Site grants, FAU received more than \$345,000 each for three years. The grants will support program expenses, including student stipends, on-campus housing, training and field trips. Funding will ensure that each summer, 10 students will be placed at each site.

One REU Site will be based at the Institute for Sensing and Embedded Network Systems Engineering (I-SENSE); the other site will be

located at the Southeast National Marine Renewable Energy Center (SNMREC). There will be programmatic crossover and opportunities for interdisciplinary research between the two sites. Jason Hallstrom, Ph.D., director of I-SENSE and principal investigator of one of the two REU Site grant applications, is keenly aware of the highly competitive process that the university went through to qualify for site status.

"I believe that FAU stood out because of our mentoring strength, history of funded work and current research opportunities," said Hallstrom. "Having solid institutional support from the university will allow us to successfully run a project of this scale."

I-SENSE brings together computer, electrical, ocean, mechanical and civil engineers to explore the emerging class known as the "Internet of Things." With I-SENSE's overarching research initiative covering the program areas of infrastructure systems, marine and environment, and health and behavior, REU participants will have, according to Hallstrom, "a transformative research experience across many domains. I believe there isn't another REU site in the country that offers a more diverse research portfolio than what we are offering through I-SENSE."

SNMREC will give science and engineering undergraduates the opportunity to conduct research in ocean current-based electricity production, using the Straits of Florida as a living laboratory. Each student will be assigned to a different project under the direction of a faculty mentor. James VanZwieten, Ph.D., a three-time FAU alumnus, serves as principal investigator and program manager.

"I see this as an exciting program for students and a perfect opportunity for faculty collaboration," said VanZwieten. "With ten different projects taking place simultaneously on the Boca Raton campus and at Harbor Branch Oceanographic Institute, we will be growing as a research community, and readying ourselves for larger grant awards. As an REU Site, FAU will be able to make its mark on STEM research by shaping the researchers of the future." ♦



# Gathering Acclaim for New Civil War Insights

**S**tephen Engle, Ph.D., professor in the Department of History at the Dorothy F. Schmidt College of Arts and Letters, is garnering national acclaim with his most recent book, "Gathering to Save a Nation: Lincoln and the Union's War Governors." In it, Engle examines the role of Union governors in securing victory in the Civil War while providing detailed and engaging portraits of them, their state-level actions and their collective cooperation.

The publication earned him the prestigious Barondess/Lincoln Award, and an invitation to speak at Ford's Theater for the Abraham Lincoln Institute's "The Latest in Lincoln Scholarship" symposium, which aired live on C-SPAN. We asked Engle to speak with us about his book and what all the recognition means to him.

## **Q. What prompted you to explore Union governors and their role in the Civil War?**

**A.** I've been interested in the political history of the 19th century for most of my career, but the Civil War presents a rare opportunity to study just how cooperative federalism worked in the nation's critical era. Our national political leaders demonstrated how to work together to save the nation from itself.

## **Q. This book was many years in the making. What motivated you to keep going?**

**A.** Yes, this volume took nearly 20 years to complete, both in terms of research and writing. I cast my net wide to study history on a grand scale. I traveled extensively in the northern states and conducted research in a variety of repositories that allowed me to gain some perspective about the political culture of the period. The major struggle was making sense of all that I uncovered in less than 1,000 manuscript pages, as the initial draft was about 1,400 pages.

## **Q. What's the major significance of "Gathering to Save a Nation"?**

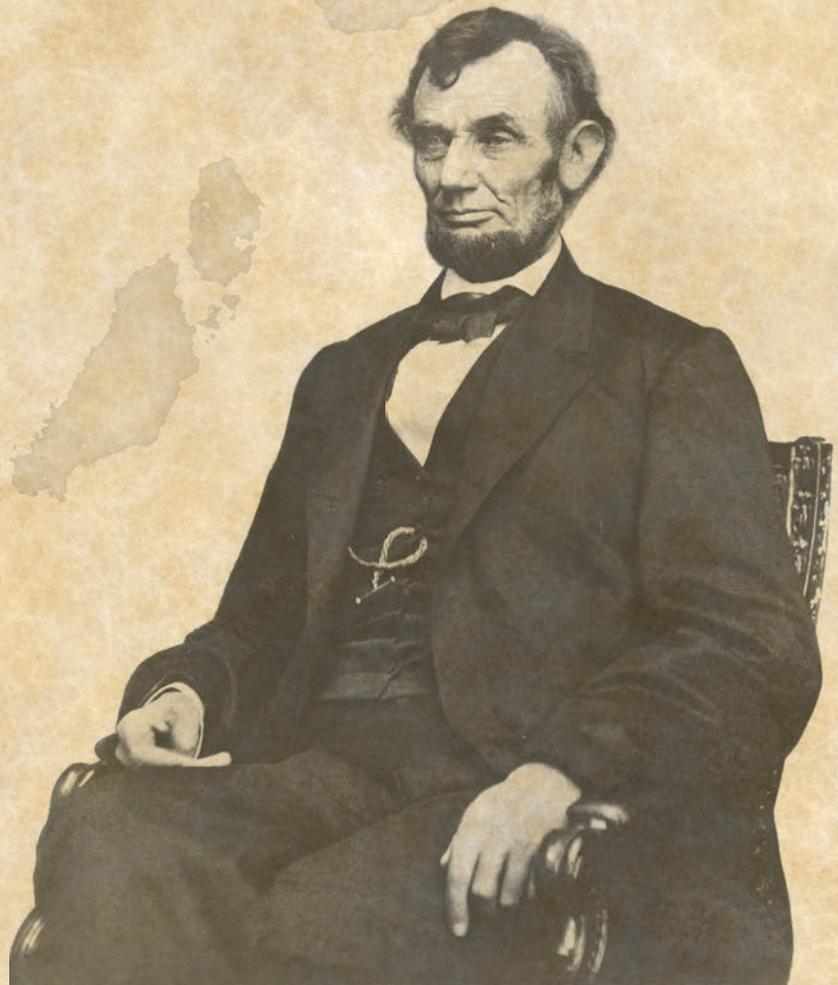
**A.** I think it provides new insights about how federalism worked 150 years ago, and continues to work in war and in peace. Our democracy is a work in progress, so perhaps there is something in the past that could prove useful or even instructional to our political leaders of the modern era.

## **Q. How does it feel to be receiving so much attention for your book?**

**A.** I am humbled by the recognition the book has received. It's quite gratifying to know that people think I've done something in political and Civil War history that is worthy of such acclaim. Given that more than 17,000 books have been written about Abraham Lincoln, I'm glad to have contributed something critics believe is new.

## **Q. What does your book add to the scholarly conversation about the Civil War?**

**A.** I want readers to understand just how difficult saving the United States truly was for a generation of Americans who struggled several long and fatiguing years to preserve the Union that afforded them many freedoms. ♦



# Fortifying Research Infrastructure

**A**s part of FAU's quest to become a world-class research institution, it is establishing core facilities — shared access to instruments, technologies, services and experts available for use by internal and external scientists — that will advance the university's four key research areas: neuroscience, sensing and smart systems, healthy aging, and environmental and ocean sciences.

"Principal investigators are researching cutting-edge topics, and they need certain equipment and services to make them competitive among global scientists," said Gabriel Alsenas, director of core facilities.

According to the National Institutes of Health, core facilities "provide opportunities to be hubs of innovation at an institution, connecting scientists with the tools and expertise that can take their research projects to the next level."

be responsible for developing collaborations and writing grants to advance the institute's mission.

The FAU Brain Institute already has two facilities. One is a Cell Imaging Core that has costly and sophisticated equipment, including a \$500,000 laser confocal microscope that provides 3-D views of nervous systems and whole organisms. This facility is a designated Nikon Center of Excellence, one of only eight in the United States and 21 worldwide.

The other is a Mouse Neurobehavior Core, which provides automated instrumentation to assess the behavior of normal and genetically altered mice that have similar molecular changes to those seen in humans with brain disorders.

"Cores can be a very effective recruiting tool and make FAU researchers more competitive when seeking federal grants," Alsenas said.

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*"Cores are an excellent tool for forging large-grant collaborations and bringing together researchers who otherwise would not have the opportunity to work together."*

— **KARIN SCARPINATO, PH.D.**

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Costs incurred for operating the core facilities will be offset by charging user fees. Alsenas said rates will vary; internal investigators might pay a much lower rate over than that offered to external investigators.

Setting up a research core program involves developing an application process, ensuring that cores are compliant with federal requirements and establishing rates for investigators to use the equipment, according to Alsenas. Complying with federal regulations is a key component since most research funding comes from the federal government, he noted.

The university has hired a biostatistician, Kathy Freeman, Dr.P.H., who is working closely with James Galvin, M.D., director of the Institute for Healthy Aging & Lifespan Studies. Freeman will

When awarding grants, the federal government strongly encourages networking and collaboration, according to Karin Scarpinato, Ph.D., associate vice president for research. "Cores are an excellent tool for forging large-grant collaborations and bringing together researchers who otherwise would not have the opportunity to work together."

FAU has core facilities reciprocity agreements with its strategic partners, Scripps Florida and Max Planck Florida Institute, both located on the Jupiter campus. The university will seek partnerships with other research organizations to ensure investigators have access to all of the expertise and tools needed to become world leaders in research. ♦

# Expanding Advanced Medical Training to Address Physician Shortfall

Florida is facing a shortage of physicians in nearly every specialty, especially primary care, a shortage that will be greatly felt in our growing and aging population. This shortfall results in overworked physicians, setting off a cascade of consequences in patient care, including longer wait times, shorter appointments, and often lower quality of care. In response, the Charles E. Schmidt College of Medicine is building programs in residency training and developing pipeline programs to provide opportunities for local students to attend FAU's medical school.

In 2014, the college launched its first residency program to train medical school graduates in internal medicine. In 2016 and 2017, it inaugurated residency programs in surgery and emergency medicine, creating training opportunities for 159 physicians in the three specialties. Initial accreditation was recently granted for residency programs in psychiatry and neurology to launch in 2018, building on the university's expansion of graduate medical education.

Lee A. Learman, M.D., Ph.D., senior associate dean for Graduate Medical Education and Academic Affairs, attributes the program's successful growth



to the "can-do" attitude of participating faculty and hospital administrators. "I really appreciate their pioneering spirit as we navigate the natural uncertainties associated with beginning new programs," he said.

Experts agree that one of the most effective ways to fight the physician shortage is to provide residency programs, as graduates frequently choose to practice in the same state they trained in as residents. The college's first cohort of internal medicine residents recently completed their training; more than half are staying in Florida to practice or continue their training — a substantial step in addressing the physician shortage in South Florida.

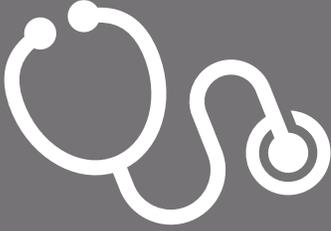
## ***Building a Diverse Talent Pipeline***

The U.S. Census Bureau projects that Hispanics, African Americans and Asians will be the majority by 2044. Yet students of these backgrounds continue to be underrepresented in medical schools compared to their numbers in the general population. To address this racial disparity and create a physician workforce whose makeup more closely mirrors the general population, the college's pipeline programs incentivize local minority students to pursue college and medical school at FAU.



**2014**

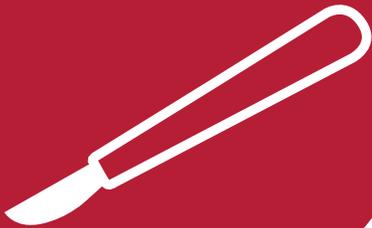
Launches the first residency program in internal medicine



The Healthcare Careers Outreach Program is an intensive college-access science, technology, engineering and math (STEM) enrichment program that reinforces high school curriculum through experiential learning. The program exposes students to role models, cutting-edge technology and college classrooms. Activities include medical students teaching in the public schools and high school students visiting campus to observe cases

**2016**

Inaugurates residency program in surgery



in the gross anatomy lab and test their hand-eye coordination in the Simulation Center. The program has served 1,155 students in the past two years. FAU High School, a public, dual enrollment high school embedded on campus, and the Medical Scholars Program, in partnership with Florida Agricultural and Mechanical University,

attract exceptional high school students to FAU. Lastly, collaborative efforts with FAU's Harriett L. Wilkes Honors College, the Charles E. Schmidt College of Science — and targeted programs such as Star MD, for athletes to earn their B.S. and M.D. at the university — all pave the path for high-achieving students to attend FAU.

**2017**

Inaugurates residency program in emergency medicine



"Collectively, these programs are fulfilling our mission of attracting the best and brightest students from a diverse array of backgrounds and training them to become future physician leaders who can provide the highest quality healthcare to residents of Florida," said Phillip M. Boiselle, M.D., dean of the Charles E. Schmidt College of Medicine. ♦

**2018**

Plans to open residency programs in psychiatry and neurology





Hunter Beebe, managing principal, Healthcare Real Estate Capital, addresses incubator participants, including FAU faculty and local government officials.

## Incubating Solutions to Community Challenges

Local communities challenged by the effects of climate change and aging neighborhoods are getting expert input thanks to FAU's new Incubator for Sustainable & Resilient Communities.

The incubator is a forum for developing action plans to address complex land use and infrastructure problems. It links the Center for Urban & Environmental Solutions, directed by John Renne, Ph.D., and the Florida Center for Environmental Studies, headed by Colin Polsky, Ph.D.

The stakes are high: Florida's 8,436-mile coastline hosts a population of 14.4 million. Coastal hazards cost the state \$43 billion from 1980 to 2016, according to the National Oceanic and Atmospheric Administration Office for Coastal Management.

West Palm Beach and Hollywood city officials, resource experts, and FAU faculty and staff recently gathered to conduct site visits and brainstorm short- and long-term solutions.

### **Revitalization Advice**

In West Palm Beach, economic revitalization is the focus. Experts discussed the developing Warehouse District's nexus of industry, entertainment and food vendors, and ways to ensure the project's success.

According to West Palm Beach Mayor Jeri Muoio, one possibility is an innovation zone for experimenting with mixed-use land development. City officials are considering a mixed-use area akin to an innovation zone or pink zone "where

you can experiment with doing something very creative, but not be held back by the zoning code," she says.

Muio praised the assistance provided by the Incubator for Sustainable & Resilient Communities, saying the discussions "gave us an opportunity to look at an area of our city with exciting potential beginning to be developed and to present that to experts who help us think about what we should or shouldn't do moving forward."

### **Preparing for Sea Level Rise**

In Hollywood, participants and city officials discussed updating aging infrastructure to mitigate sea level rise and flooding. "Tidal flooding is impacting several of the city's coastal areas and is increasing in frequency and area," said Hollywood Mayor Josh Levy.

There also are storm water flooding and septic drainage field concerns as the groundwater rises, potentially increasing negative impacts to critical infrastructure.

"Building sea walls and levies are important short-term solutions in addressing climate change effects," said Renne. "But, they will not mitigate the long-term problem because water will eventually infiltrate underneath those structures."

He cites one incubator expert who pointed out how some homeowners will be the last to occupy houses in areas that may not be climate-viable in

the future. Renne believes the challenge is not only protecting the existing population, but where to locate future residents.

"Resilience bonds are gaining traction as an option for encouraging land development in potentially risky areas," said Polsky. "Other financing options may include taxes and private-public partnerships." The private market will drive solutions. Some Hollywood homes worth \$1 million or more are experiencing sea level rise flooding on their front doorstep more than 40 days a year.

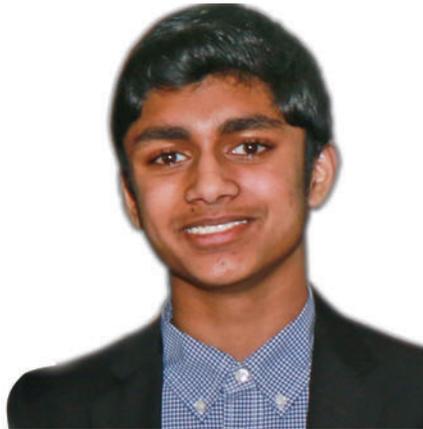
"That could mean the loss of private insurance and a decrease in market value and tax revenues," said Renne. "Municipalities might consider creating special benefits districts to finance the improvements necessary to protect the home values."

Another option would be for a city to sell coastal space for business development such as a marina, mandating the private developer make the necessary flood improvements.

As officials consider financing options and conduct a vulnerability assessment, "the worst case scenario projections assume that we do nothing," notes Levy. "Taking steps to mitigate our contribution to the underlying causes of sea level rise and proactively adapting to the effects, we can reduce the severity of the impact on our community." ♦



# Five Innovators



**Vithulan Suthakaran**

**Major:** Environmental Engineering

**Innovation:** SEA Skimmer: The Development of a Sustainable Environmental Accumulation Skimmer in Order to Extract Marine Pollution from a Variety of Geographical Locations

**How it helps:** Cleans up oil pollution from aquatic environments three times faster than current methods

**Inspiration:** Seeing animals in marine life centers as a result of oil pollution

**What's next:** Obtain a bachelor's degree in 2020, conduct research on major environmental problems



**Alexis Base**

**Major:** Ocean Engineering

**Innovation:** Developing an Image Recognition and Motor Control Algorithm for *Pterois volitans*' (Red lionfish) Population in South Florida

**How it helps:** Using a blob detection program to identify invasive red lionfish to mitigate the negative impacts to marine life and ecosystems

**Inspiration:** Middle school national underwater robotics competitions led Base to research remotely operated underwater and autonomous underwater vehicles

**What's next:** Continue ocean engineering research, get involved with the Marine Robotics Club, graduate from FAU High School and FAU

**T**he FAU Wave program is an undergraduate student research and entrepreneurial competition that brings students with diverse backgrounds and interests together to solve real-world problems and fill needs in the business marketplace. Students are given seed funding to transform novel ideas and technologies into research projects or products, as they compete for monetary prizes. In the second year of the competition, students helped other students by creating programs and platforms on topics such as HIV, autism, cancer, foreign policy and social justice.

# Worth Watching



## Benjamin Coleman

**Major:** Electrical Engineering

**Innovation:** Transient-Image Density Evaluation System (TIDES)

**How it helps:** Using cell phones to rapidly diagnose disease in resource-poor environments

**Inspiration:** The potential to use engineering to make healthcare more accessible in resource-constrained settings

**What's next:** Continue with bioengineering research, publish on TIDES and other projects



## Hannah Herbst

**Major:** Biology

**Innovation:** Protecting Civilians and Public Service Personnel through an Early Identification and Warning System for Airborne Chemicals

**How it helps:** An early identification system for airborne chemicals to facilitate evacuation of people before harmful impact

**Inspiration:** Learning about the extremely harmful effects of airborne chemical exposure, such as paralysis and lung poisoning

**What's next:** Graduate from FAU High School and FAU; pursue medical school and conduct research to help improve patients' quality of life



## Pedro Flores

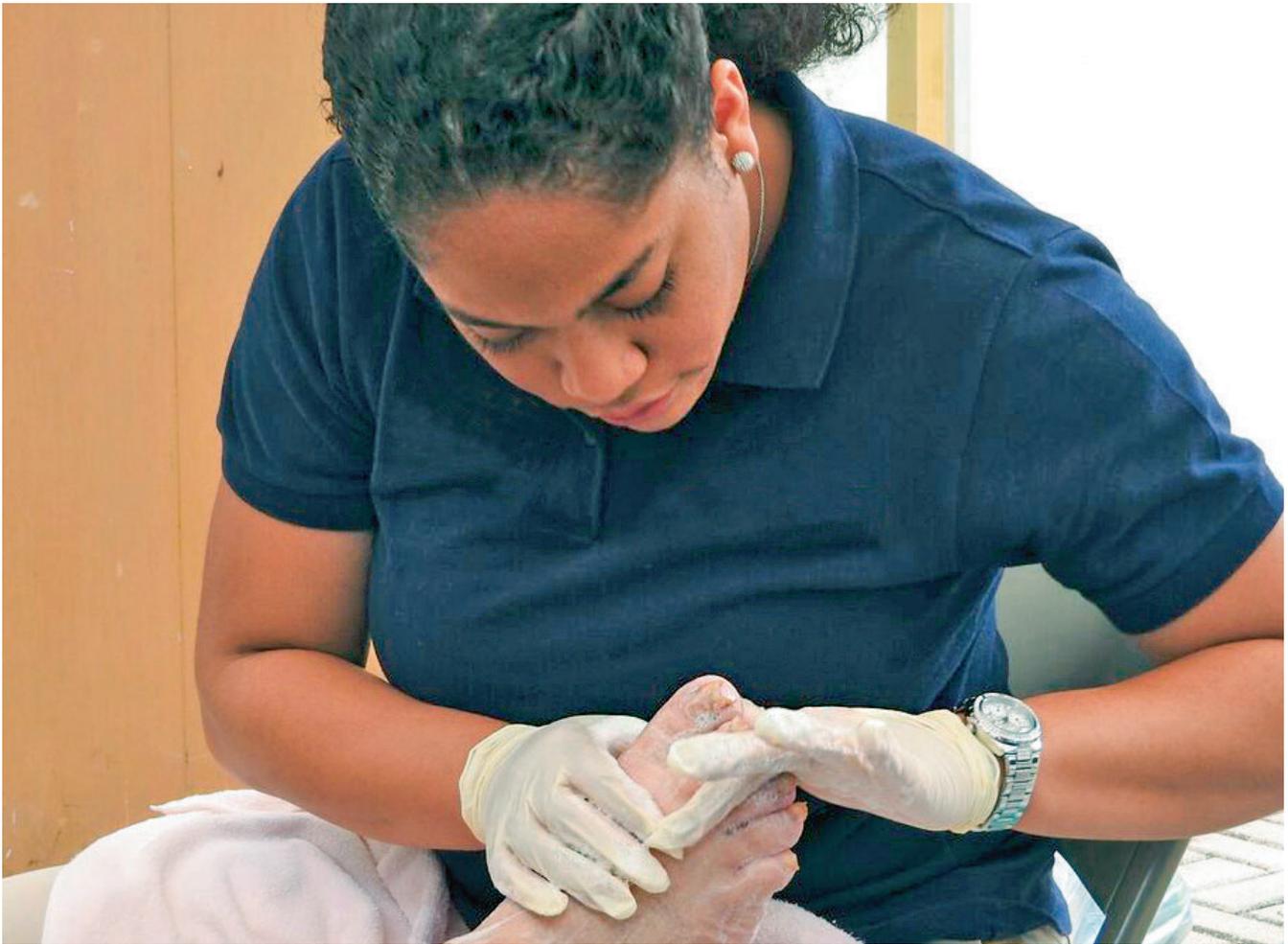
**Major:** Physics

**Innovation:** Algorithmic Music Composition

**How it helps:** Turns math into music

**Inspiration:** Shape our emotions with music

**What's next:** Merging man and machine using brain computer interfaces ♦



## Focusing on Feet Leads to Human Connections

What began as a health event to better understand foot care challenges in the homeless community has evolved into a study of human connections. The interprofessional collaboration of Andra Opalinski, Ph.D., Susan Dyess, Ph.D., both of the Christine E. Lynn College of Nursing, and Nancy Stein, Ph.D., of the Department of Anthropology, is bringing the issue into focus — using photography as the lens.

Foot problems are a common concern among people without permanent housing. To address this, the research team partnered with Holy Cross Hospital to develop a foot care event at Christ Church United Methodist in Pompano Beach that provides washing, assessments, basic care, clean socks and new shoes. Nursing students and volunteers assist with the program, serving approximately 175 individuals each year.

Along with providing much-needed services, researchers request permission to take photographs of participants in order to capture individual moments. The initial images produced findings of specific foot health challenges, such as sun exposure. Another theme that quickly emerged from the pictures was the importance of human connection.

“A visual anthropology approach has allowed for photo analysis that further informs our research, but also tells a story,” said Opalinski. “These individuals can feel very isolated and the fact that someone wasn’t afraid to touch them had an incredible impact. That was an overall phenomenon reflected in the images and also in discussions.” Dyess added, “Hearing from them that ‘it was nice being treated like a human being’ was powerful.”



To further explore the role of human connection, data collection tools for participants have been incorporated into this yearly outreach activity.

"Moving forward we'll continue to explore how we can impact feelings of human connection and health through this forum and community care events like these," said Opalinski.

Additionally, a portable exhibit with 50 photographs is being used as a creative way to foster a more compassionate view of people experiencing homelessness. Funded in part by FAU's Peace, Justice and Human Rights Initiative, the display provides snapshots of the experience that translates the fieldwork of the foot care clinic into an artistic forum. This allows it to be shared with people who may not be exposed to the team's work in traditional research avenues, such as academic articles or the book Stein co-edited, "Images and Human Rights: Local and Global Perspectives."

"I'm intrigued by how this visual medium has an affect on different audiences and can change perceptions and soften viewpoints almost immediately," Opalinski said. ♦



Students and community volunteers care for the feet of people without permanent housing.



# POSTCARDS

from the field



Hello Owls,

Nothing like taking a dip in the Everglades on a hot sunny day. Never mind the alligators. Ph.D. candidate Matt McClellan and graduate student Mario Job collected peat samples to measure greenhouse gas production and emissions in the laboratory.

Come join us on our next trip!

Xavier Comas, Ph.D.  
Associate Professor  
Department of Geosciences  
Charles E. Schmidt College of Science




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Dear Friends,

I'm offshore near Fort Pierce doing the initial sea tests for an Unobtrusive Multi-static Serial LiDAR Imager, the latest state-of-the-art sensor to hatch out of the Ocean Visibility and Optics Lab. Starting this coming July, our recent U.S. Department of Energy three-year \$944,444 grant will support further testing, validating, performance enhancements and more.

I'm collaborating with Bing Ouyang, Ph.D., Anni Vuorenkoski Dalgleish, Ph.D., Gabriel Alsenas, and the University of Florida. Ben Metzger (pictured to my right) and Brian Ramos contributed, too.

Regards,  
Fraser Dalgleish, Ph.D.  
Associate Research Professor  
Visibility and Optics Laboratory  
Harbor Branch Oceanographic Institute




Greetings from the beautiful Boca Raton campus, Undergraduate and graduate student researchers in FAU's Institute for Sensing and Embedded Network Systems Engineering are developing new technology for real-time environmental sensing. The team is busy installing new weather stations throughout South Florida in support of the National Oceanic and Atmospheric Administration's National Mesonet Program, which is providing the data necessary to improve national weather forecasting models.

Take Care,  
 Jason O. Hallstrom  
 Professor and Director  
 Institute for Sensing and Embedded Network  
 Systems Engineering



Greetings from the twilight zone!

Graduate students Ryan Eckert, Daniel Dodge, Alycia Shatters, and Michael Studivan have joined me for a week of intensive scuba diving, surveys, and coral sampling at the Smithsonian Institution's Carrie Bow Cay field station in Belize.

Challenging dives and long hours of sample processing are part of our NOAA-funded research project assessing coral reef connectivity and symbiosis on shallow reefs, and those in the "twilight zone" from 30 to 150 meters deep.

Yours, deeply,  
 Joshua D. Voss, Ph.D.  
 Assistant Research Professor  
 FAU Harbor Branch Oceanographic Institute



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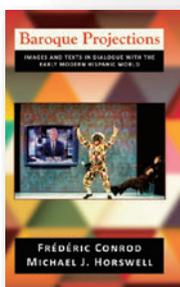
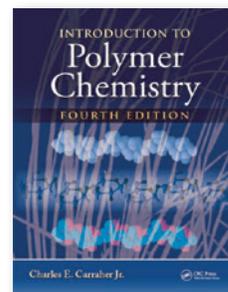
# OFF THE SHELF

## BOOKS

### **"Introduction to Polymer Chemistry, Fourth Edition"**

Charles E. Carraher, Jr., Ph.D., professor,  
Charles E. Schmidt College of Science (CRC Press, 2017)

The fourth edition of this undergraduate polymer textbook covers synthetic, inorganic and natural polymers with emphasis on sustainability, green materials and chemistry.



### **"Baroque Projections: Images and Texts in Dialogue with the Early Modern Hispanic World"**

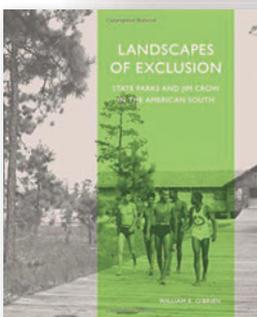
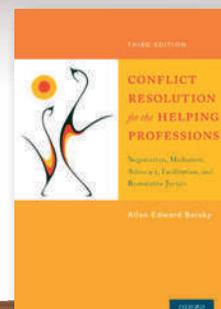
Frédéric Conrod, Ph.D., associate professor, and Michael J. Horswell, Ph.D., dean,  
Dorothy F. Schmidt College of Arts and Letters  
(Juan de la Cuesta, 2016)

This volume of essays by leading scholars in the field explores the "projections" of early modern Baroque motifs in modern and postmodern cultures of the Hispanic world.

### **"Conflict Resolution for the Helping Professions: Negotiation, Mediation, Advocacy, Facilitation, and Restorative Justice, Third Edition"**

Allan E. Barsky, J.D., Ph.D., professor, College for Design and Social Inquiry  
(Oxford University Press, 2017)

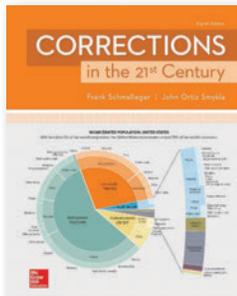
This textbook provides helping professionals with the theory, strategies, and skills they need to manage conflict in a respectful, collaborative, and constructive manner. Barsky illustrates how helping professionals can incorporate evidence-based models of conflict resolution to work more effectively and enjoyably with clients, coworkers, supervisors, and others.



### **"Landscapes of Exclusion: State Parks and Jim Crow in the American South"**

William E. O'Brien, Ph.D., professor, Harriet L. Wilkes Honors College  
(University of Massachusetts Press, 2016)

Winner of the Foundation for Landscape Studies' John Brinckerhoff Jackson Book Prize for 2017, this first-ever study of segregation in southern state parks reveals an untold facet of Jim Crow history by underscoring inequality in the number, size, and quality of state parks provided for African American visitors.



### "Corrections in the 21st Century, Eighth Edition"

John Ortiz Smykla, Ph.D., professor and director of the School of Criminology and Criminal Justice, College for Design and Social Inquiry (McGraw-Hill, 2017)

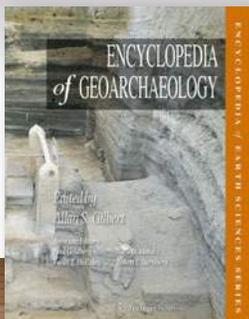
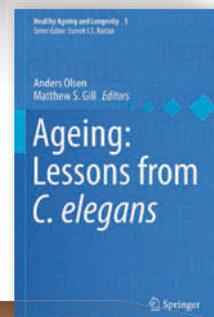
This textbook uses a practical approach to introduce students to the ideas and practices characteristic of modern corrections, including a thorough description of correctional ideology and a comprehensive overview of correctional practice and evidence-based practices. It was co-authored with Frank Schmalleger, Ph.D.

## CHAPTERS

### Dauer Formation and Ageing, chapter in "Ageing: Lessons from *C. elegans*"

Kailiang Jia, Ph.D., associate professor, Charles E. Schmidt College of Science (Springer, 2017)

This book addresses the current state of ageing research in the nematode *Caenorhabditis elegans*, a type of worm, while placing this topic in the context of human ageing, describing how and why basic discoveries in this simple organism have impacted our prospects for intervention in the ageing process. Jia's chapter was co-authored with Pedro Reis-Rodrigues, Ph.D., and Matthew S. Gill, Ph.D.



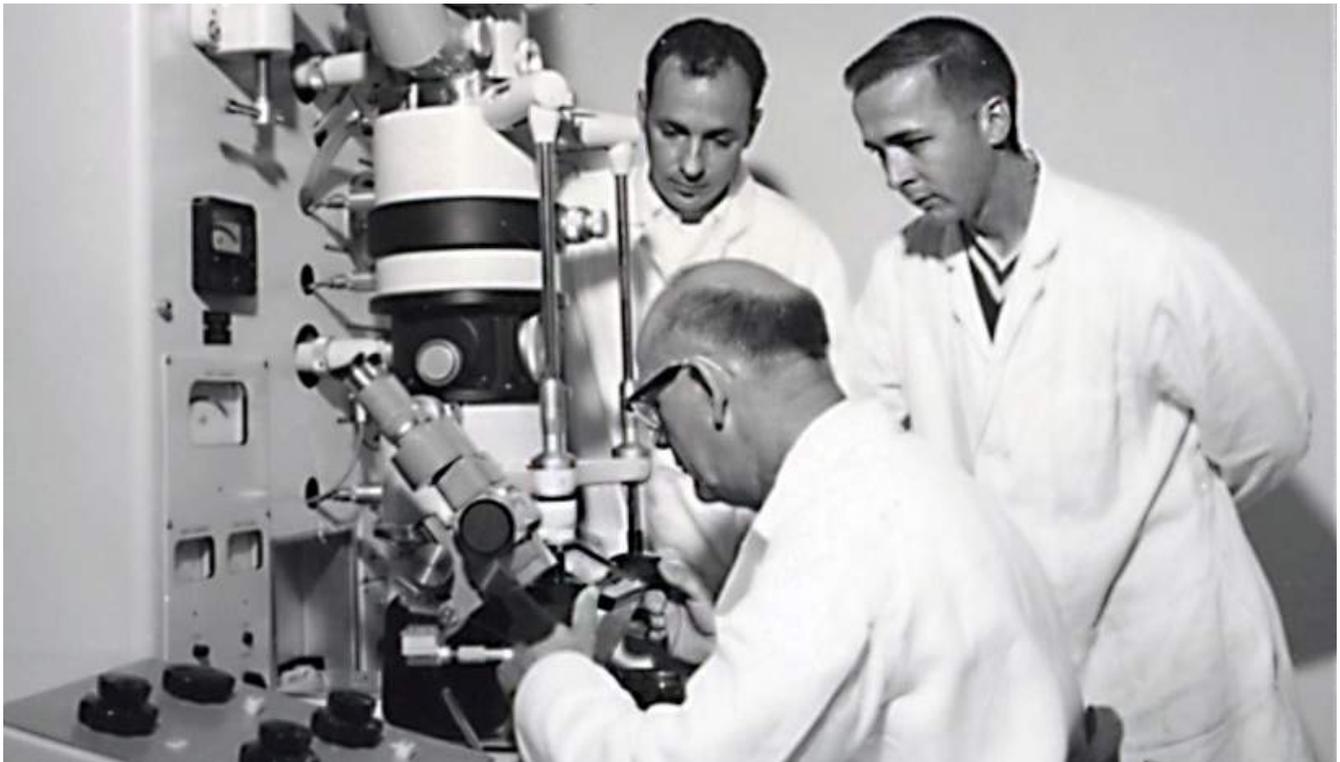
### Forensic Geoarchaeology, chapter in "Encyclopedia of Geoarchaeology"

James M. Adovasio, Ph.D., director of archaeology, Harbor Branch Oceanographic Institute (Springer, 2017)

This encyclopedia defines terms, introduces problems, describes techniques, discusses theory and strategy and covers subjects in environmental archaeology, dating, materials analysis, and paleoecology while remaining accessible to the public as well as practitioners.

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Left to right: Max Linto and Jim Rowe, with Raymond Privee, lab mechanic and machinist in foreground, 1967.  
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