UCF

2018
OFFICE OF RESEARCH
Annual Report

VIEW

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A NOTE FROM ELIZABETH KLONOFF

Colleagues,

What a big year for UCF. We welcomed our new president Dale Whittaker and our new Provost Elizabeth Dooley. We saw another undefeated football season and made outstanding headlines for some of your great research and scholarship.

Each year we report how many projects and how much money has been generated through your efforts. I'm happy to report good news. We closed the fiscal year with $183 million in research funding, but a dollar figure doesn't really tell the whole story. Research and scholarship are not just about money. They're about the impact your work is having on our students, our community, our nation and the world.

So, this year we decided to augment the numbers with stories that demonstrate how your research is making a difference. There were hundreds of stories to choose from and limited space and resources. If we left your work out, don't feel slighted. The stories found here, are just a sampling of the amazing contributions you made in 2018.

I hope you read these stories, share them with your colleagues and feel just as proud of being part of the great research community at UCF as I am.

Reading through this report I was inspired and can't wait to see what stories your work will bring to life in 2019.

CHARGE ON,

Elizabeth Klonoff

Vice President for Research and Dean of the College of Graduate Studies

P.S. I encourage you to reach out to our communications team and share your work with them throughout 2019.

BRINGING HISTORY ALIVE THROUGH FIELD RESEARCH AND STORY-TELLING

College of Arts and Humanities / By: Zenaida Gonzalez Kotala

An interdisciplinary group of researchers led by UCF History Professor Amelia Lyons drew a lot of attention in 2017 and 2018 for a project that's personal for Lyons and thousands of military families nationwide.

The group is teaching college students how to write and share personal histories by collecting, and documenting the stories of veterans buried at Florida National Cemetery in Bushnell, FL, at St. Augustine National Cemetery, and at two American World War I cemeteries in Eastern France.

The group also creates digital learning tools, partners with area K-12 teachers, and makes the veterans' stories accessible to people nationwide. The program's webpage, vlp.cah.ucf.edu, contains biographies and a range of interactive materials and lessons plans that adhere to Florida state standards for use in K-12 classrooms.

For Lyons and the Veterans Legacy Program (VLP) team at UCF, the work with the National Cemetery Administration (an agency of the Department of Veterans Affairs) is a labor of love.

"It's a way to honor my grandfathers who served in World War II," Lyons said. "One of them was awarded two Purple Hearts and a Bronze Star. And my dad — he served in Vietnam and spent his entire life working for veterans' causes before he died of cancer four years ago. He would have been our biggest cheerleader."

In 2017, the National Cemetery Administration, awarded contracts to UCF, San Francisco State University and Black Hills State University to launch the Veterans Legacy Program. In 2018, UCF VLP is one of nine NCA contracts. https://www.cem.va.gov/legacy/.

As part of the contract, UCF's VLP hosts a field trip with area K-12 students. The day of learning, held every May, engages younger students with UCF students and faculty to learn US history through the veterans' stories. In addition, UCF's VLP team created a mobile app that allows cemetery visitors and K-12 classes to use augmented reality technology to view UCF student author biographies by scanning the headstones or photos of them.

"Learning about the lives and stories of these soldiers is also teaching our students what a historian does," Lyons said. "It makes history real for them."

Lyons, who is also the graduate program director for UCF's history department, took four graduate students to France as part of VLP's work to commemorate the centennial of World War I. They conducted field research about Florida veterans who died a hundred years ago and are buried in American cemeteries. For graduate student Kayla Campana, the trip to the American Cemetery in Suresnes, just outside Paris, was life changing.

"That pushed everything to another level for me," she said in a story published on UCF Today. "I could envision them tending to wounded soldiers, walking in the same places where we'd been, and also seeing things they could not un-see. I now understand their story as much as I can possibly understand it. This isn't just a thesis for me anymore."

The other members of the research team include John Sacher, the VLP's liaison with K-12 teachers, Caroline Cheong, who teaches public history, Barb Gannon, a military historian and US Army veteran, Scot French, a digital historian, Tiffany Rivera, a public relations and educational training specialist, and Amy Giroux, a computer research specialist in UCF's Center for Humanities and Digital Research. The team also includes graduate students and undergraduate students, several of whom are U.S. military veterans.

STUDY FINDS TESTOSTERONE LEVELS ARE RELATED TO HEDGE FUND MANAGEMENT PERFORMANCE

College of Business / By: Robert H. Wells

When choosing the right hedge fund manager, face shape is important, according to UCF Finance Assistant Professor Yan Lu.

Lu's research, which examined face shape and the link to testosterone levels in males, was one of the College of Business's most popular research stories of 2018. Lu, an expert in alternative investments and behavioral finance.

According to Lu, facial structure is a predictor of testosterone levels. By looking at face shape she found that hedge fund managers with too much testosterone tend to underperform for their wealthy clients.

Hedge funds are a form of investment for institutions and individuals with high net worth, such as $1 million or greater, and the investments are handled by hedge fund managers.

"We found that fund managers with high testosterone levels as indicated by their face shape tended to underperform in comparison to those with lower testosterone levels, by almost six percent," Lu said.

Those in the study with more testosterone tended to make more irrational investment decision such as overtrading, holding onto losing stocks and selling winning ones, Lu said.

To perform the study, Lu and co-author Melvyn Teo with the Lee Kong Chian School of Business at Singapore Management University, compared testosterone levels of hedge fund managers with their performance output.

The testosterone levels were obtained by measuring the facial width-to-height ratio in publically available photos of the hedge fund managers. In general, individuals with wider and shorter faces, have a higher facial width-to-height ratio and therefore more testosterone.

Lu said that past research has shown that high levels of testosterone could be a benefit for high-speed professions such as day traders, but not as much for more analytical professions such as hedge fund managers.

"Hedge fund managers need very different personality skill sets than day traders and CEOS," Lu said. "For day traders, they need very high speed visuomotor scanning abilities. But this is not what hedge fund managers need. What they need is superior analytical skills. So, this is the fundamental skill they need to improve or keep the good performance of a fund."

When looking at testosterone levels and hedge fund management performance in female hedge fund managers, the researchers found no relationship.

"We did not find any underperformance for the higher the facial width-to-height female managers," Lu said.

"One thing is there is not many of them," she said. "Less than three percent are female hedge fund managers."

Lu hopes the findings will help protect hedge fund investors and that investors should also consider a manager's skill set in addition to his or her appearance.

"If you want to judge a hedge fund manager if he is good or not, you really need to look at his skill set and not just his appearances," she said.

Lu has been a member of the UCF faculty since August 2015. She received her Ph.D. from the University of Florida and her undergraduate degree from Tongji University. She also obtained her MBA and Master of Science in Real Estate degree from UF.
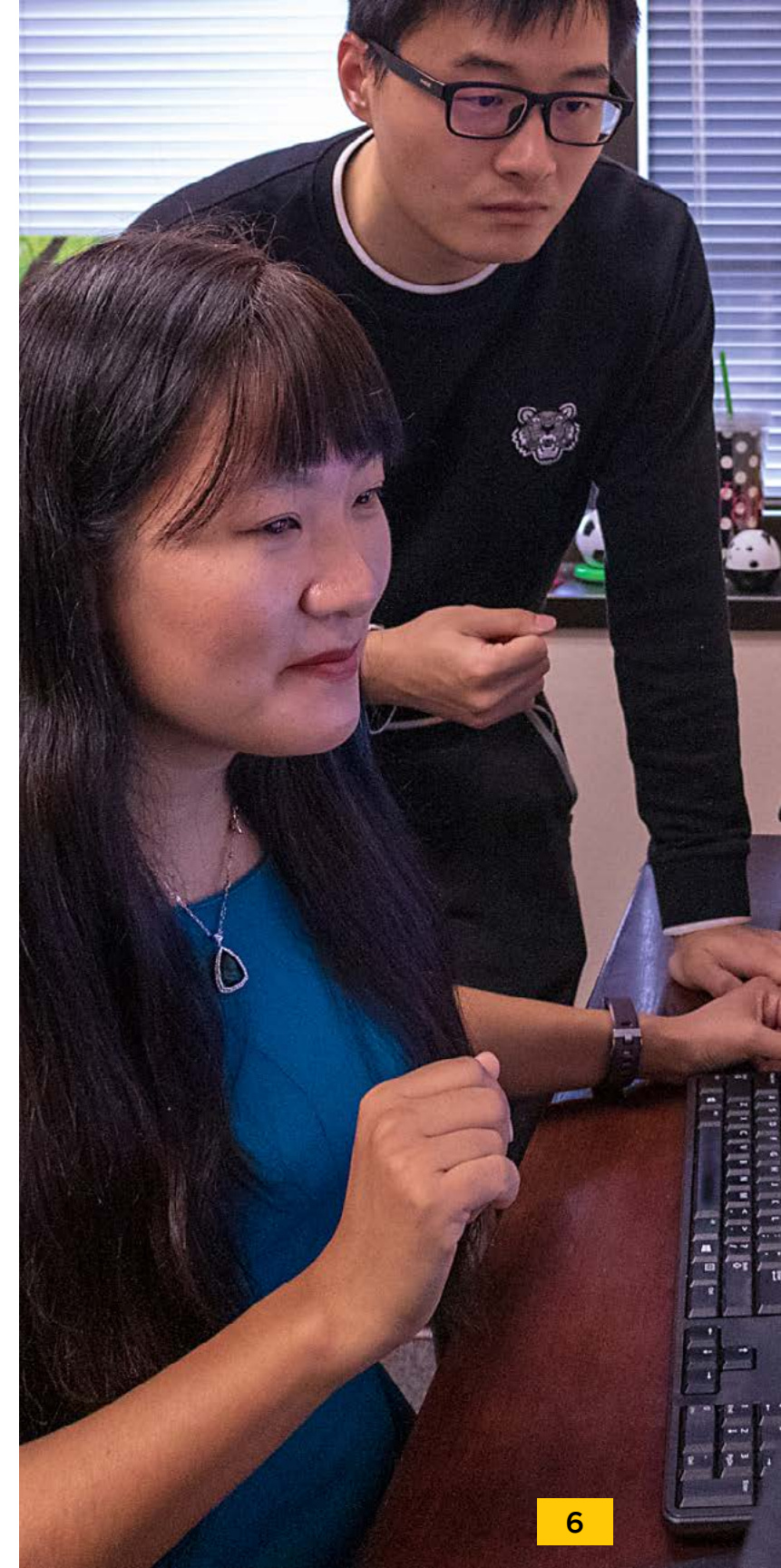
COLLEGE OF COMMUNITY INNOVATION AND EDUCATION

UCF RESEARCHERS ENHANCE DUAL-LANGUAGE PROGRAMS IN FLORIDA

College of Community Innovation and Education / By: Robert H. Wells

University of Central Florida researchers are helping to improve and expand innovative, dual language programs across Florida schools.

Research shows that dual language programs – which provide part of the day's instruction in English and a portion in the partner language, have benefits for students beyond English acquisition, which is why researchers at UCF created the project known as Dual Language Support through Technology Enhanced Programs and Strategies, or DL STEPS.

"This project is important, because there's an enormous national trend to develop and offer dual language programs because of the incontrovertible research that shows that they have a double benefit," said Joyce Nutta, a professor in UCF's College of Community Innovation and Education and principal investigator. "They enable students to achieve at the same level as monolingual programs in standardized testing and develop proficiency and literacy in two languages, which has been shown to have numerous cognitive benefits for students."

These cognitive benefits include positive impacts on attention to information and on monitoring for conflicts during information processing.

The project is funded with a $2.6 million grant from the U.S. Department of Education Office of English Language Acquisition. DL STEPS is an interdisciplinary partnership between UCF's College of Community Innovation and Education and College of Arts and Humanities.

The first 25 participants enrolled in the Fall of 2018 and are completing coursework online as well as participating in some on-campus meetings and events. The majority of the participants in the first cohort of 2018 are bilingual and will be using the DL STEPS certifications to enhance their existing dual language programs in their schools.

Earning the DL STEPS certificate means the teachers, who are already certified in elementary education, have received formal training in dual language education approaches and methods. They are also required to help facilitate the expansion of dual language education at their schools, mentor their colleagues and co-workers in dual language education and also provide outreach to their communities about dual language education.

Dual language programs are implemented in different ways, but a general approach is that the program starts in kindergarten with half of the curriculum fully in a foreign language, for example social studies and science, and the other half fully in English, like math and reading. This may take place in two of the four sections of kindergarten at a school. When the children move onto first grade, the languages for the curriculum would flip with social studies and science being fully in English and math and reading fully in that second language. The classes taught in dual languages would ideally contain about half students who speak English as their primary language and about half who primarily speak the second language. In Florida, the most popular dual immersion language is Spanish.

The success of the program will be measured by following DL STEPS graduates and comparing achievement levels of students of DL STEPS graduates to matched students in non-dual language programs.

The researchers are also using interviews, focus groups and observations to understand conceptions of dual language education and factors that could enable a dual language program to succeed at schools where the DL STEPS participants work.

Co-principal investigators of DL STEPS are Jerry Johnson, a professor in the College of Community Innovation and Education and director of the college's Department of Educational Leadership and Higher Education; Florin Mihai, a professor in UCF's College of Arts and Humanities and director of the Undergraduate Teaching English as a Foreign Language certificate; and Kerry Purmensky, an associate professor in the College of Arts and Humanities' Department of Modern Languages and Literatures.

Also assisting with DL STEPS are Laura Monroe, a postdoctoral scholar in the College of Community Innovation and Education; Susanne Peña, project manager in the College of Community Innovation and Education; and Lauren Raubaugh and Charlene Xiong, doctoral students in the College of Community Innovation and Education.

Nutta received her Ph.D. in second language acquisition cognate: instructional technology, M.A. in applied linguistics and B.A. in mass communications from the University of South Florida. She has been with UCF since 2007.
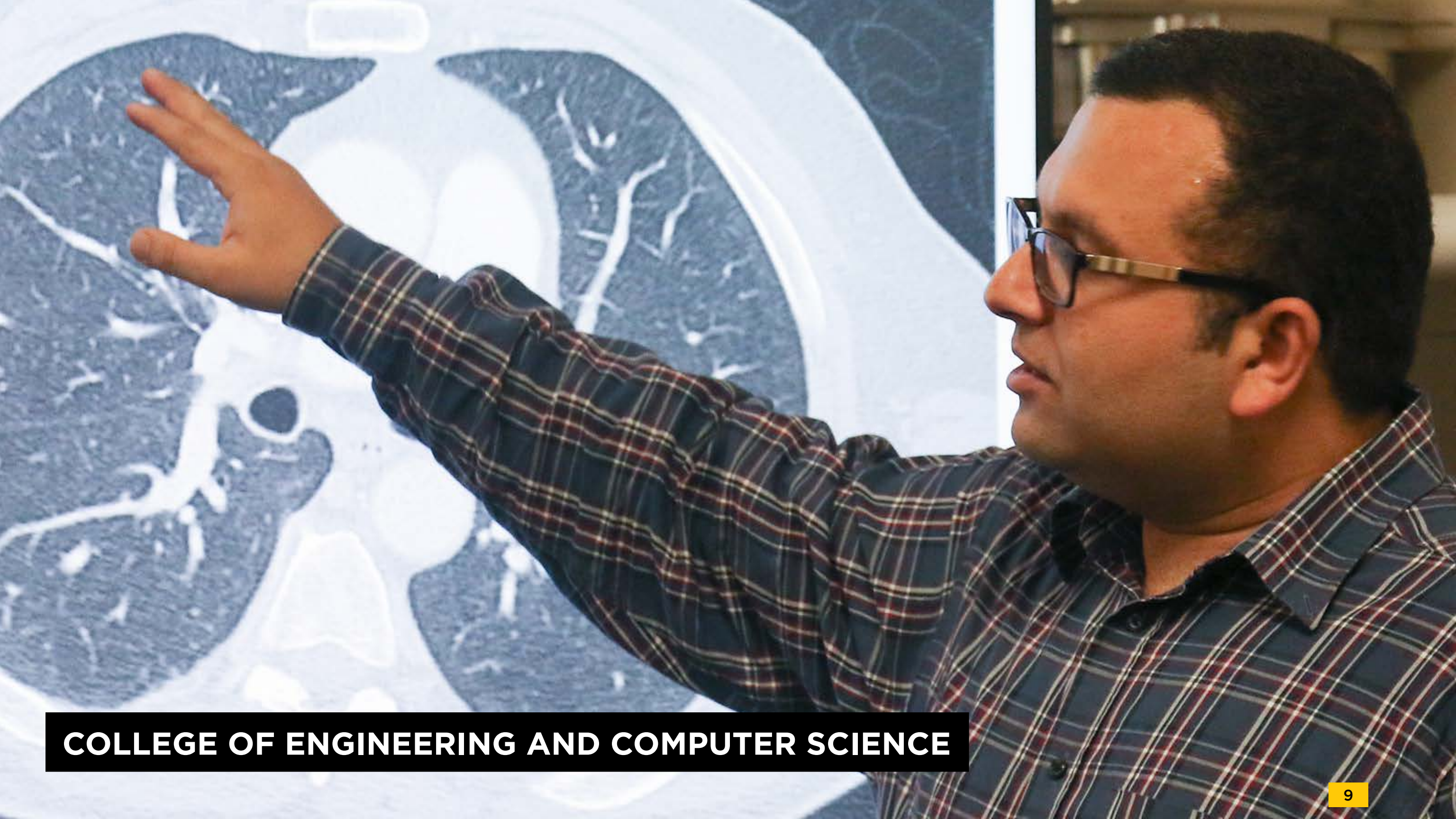
COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

ENGINEERS DEVELOP A.I. SYSTEM TO DETECT OFTEN-MISSED CANCER TUMORS

College of Engineering and Computer Science / By: Robert H. Wells

Using computer vision, University of Central Florida researchers have developed a system that is more accurate than the human eye at detecting lung cancer.

Early, accurate detection can save lives.

"Lung cancer is the No. 1 cancer killer in the United States and if detected in late stages, the survival rate is only 17 percent," said Ulas Bagci, an assistant professor of computer science with UCF's Center for Research in Computer Vision who is leading the research. "By finding ways to help identify earlier, I think we can help increase survival rates."

Through their research, engineers at the cenwter have taught a computer how to detect tiny specks of lung cancer in CT scans, which radiologists often have a difficult time identifying.

The artificial intelligence system is about 95 percent accurate, compared to 65 percent when done by human eyes, the team said.

The group fed more than 1,000 CT scans – provided by the National Institutes of Health through a collaboration with the Mayo Clinic – into the software they developed to help the computer learn to look for the tumors.

They used the human brain as a model for looking for patterns in the CT scans and spotting tiny tumors.

The approach is similar to the algorithms that facial-recognition software uses. It scans thousands of faces looking for a particular pattern to find its match.

The team presented its findings in September at the largest premier conference for medical imaging research – the MICCAI 2018 conference in Spain.

The next step is to move the research project into a hospital setting. After that, the technology could be a year or two away from the marketplace, Bagci said.

UCF RESEARCH FOCUSES ON IMPROVING SUICIDE CARE IN HOSPITAL EMERGENCY ROOMS

College of Health Professions and Sciences / By: Robert H. Wells

People who are at risk for suicide often end up in hospital emergency rooms, but until now, there has been no national strategy to equip hospital workers to help them.

University of Central Florida researchers are helping train hospital emergency staff and re-aligning procedures to screen for suicidal patients under the Florida Implementation of the National Strategy for Suicide Prevention project. The project is funded by a more than $1.4 million grant from the U.S. Department of Health and Human Services' Substance Abuse and Mental Health Services Administration.

"Many hospitals do not screen for mental health or suicide risk, and collaborative safety plans are not part of discharge planning," says Kim Gryglewicz, an assistant professor of social work in UCF's College of Health Professions and Sciences and principal investigator of the project.

"This means that post-discharge, follow-up care is nonexistent," she says. "At-risk individuals are, unfortunately, being discharged into the community without adequate mental health and supportive referrals to get them better."

"We're trying to change this by implementing system-wide, evidence-based strategies to improve suicidal care. This includes building a workforce of health care providers who are trained to compassionately care for patients who may be at-risk for suicide."

According to a 2018 report by the Centers for Disease Control and Prevention, U.S. suicide rates are on the rise with a more than 25 percent increase between 1999 and 2016. That makes suicide the second leading cause of death among youth and the 10th leading cause of death overall. The increase marks a departure from 1999 when there was a low point in the national suicide rate.

Traditionally, funding for suicide prevention has gone to behavioral health organizations; however, because of a lack of access to care, limited knowledge of where to go to get help, stigma, fears and other barriers, many suicidal people may end up in hospital emergency rooms rather than mental health agencies, Gryglewicz says.

Specifically, the project is focusing on changing how hospital emergency departments screen for mental health, assess suicide risk, plan for safe discharge of suicidal patients, and work with community providers to coordinate post-discharge care.

Hospital personnel will be trained through lectures, role play, group discussion and modeling of desired behaviors along with pre- and post-training assessments of desired outcomes including knowledge, attitudes and skill level.

Focus groups and interviews with hospital staff will also be used to understand successes and barriers of the model being implemented.

Additionally, hospital admission rates will be examined to see if there is a reduction in recidivism among patients treated for suicide risk.

The three-year project is entering its second year and is targeting a hospital in Kissimmee. Some trainings have begun and more will be implemented in the coming years. The project may expand to other locations if the strategies being implemented prove successful.

"Ultimately, the goal of the project is to improve health care standards so that we can do a better job in identifying suicide risk and connecting those at-risk to appropriate services," Gryglewicz says.

The national increase in suicides could be related to a variety of factors including stress, trauma, victimization and untreated mental illness, the researcher says.

She says that social connectedness and engagement in behavioral health services have been shown to be effective protective factors for people who are suicidal.

"I think it's very important to help people stay connected," Gryglewicz says. "Social isolation is a risk factor that can contribute to suicide risk. For individuals who feel disconnected and alone, it's really important to help these people feel supported."

STUDY FINDS BACTERIA IN INFECTED MILK, BEEF MAY BE LINKED TO RHEUMATOID ARTHRITIS

College of Medicine / By: Christin Senior

More than 1.3 million people in the U.S. suffer from rheumatoid arthritis, but doctors still don't know the cause. Now with the help of UCF researchers from the College of Medicine they may be one step closer.

The researchers discovered that dangerous bacteria found in milk and beef from diseased cows were also found in a significant number of people suffering from rheumatoid arthritis when compared to healthy people in the sample they studied.

Their results were published in February in the journal Frontiers in Cellular and Infection Microbiology.

The bacterium, mycobacterium avium subspecies paratuberculosis, or MAP, is found in more than half of U.S. dairy operations and is spread when cows, and in particular calves, are exposed to infected manure from a sick cow. This can happen during nursing, in utero, and on the farm. The bacteria can then be spread to humans through the consumption of infected milk, beef and produce fertilized by infected cow manure.

The study was a collaboration between Saleh Naser, UCF infectious disease specialist, Shazia Bég, rheumatologist at UCF's physician practice, and Robert Sharp, a biomedical sciences doctoral candidate at the medical school.

"We don't know the cause of rheumatoid arthritis, so we're excited that we have found this association," Bég said. "But there is still a long way to go. We need to find out why MAP is more predominant in these patients – whether it's present because they have rheumatoid arthritis, or whether it caused rheumatoid arthritis in these patients. If we find that out, then we can target treatment toward the MAP bacteria."

Naser had previously discovered a connection between MAP and Crohn's disease, and similarities between how rheumatoid arthritis and Crohn's disease develop and are treated led the team to investigate whether MAP could also be connected to rheumatoid arthritis.

"Understanding the role of MAP in rheumatoid arthritis means the disease could be treated more effectively," Naser said. "Ultimately, we may be able to administer a combined treatment to target both inflammation and bacterial infection."

Serum samples from more than 100 people were used for the study. Seventy-eight percent of the patients with rheumatoid arthritis were found to have a mutation in the PTPN2/22 gene, the same genetic mutation found in Crohn's patients, and 40 percent of that number tested positive for MAP.

The team is conducting further studies to confirm their findings and plans to study patients from different geographical and ethnic backgrounds.

Rheumatoid arthritis is an autoimmune and inflammatory disease that causes the immune system to attack a person's joints, muscles, bones and organs. Patients suffer from pain and deformities mostly in the hands and feet. It can occur at any age, but the most common onset is between 40 and 60 years old and is three times more prevalent in women.

Naser holds a Ph.D in Medical Microbiology from New Mexico State University and joined UCF in 1995. Bég, a board-certified rheumatologist, has been with UCF since 2011 after completing her fellowship in rheumatology at Baylor College of Medicine in Houston.

COLLEGE OF NURSING

HELPING PEDIATRIC PATIENTS THROUGH SIMULATION

College of Nursing / By: Carolyn Petgano

A child in medical crisis can be a stressful situation for the patient and their family. Proper training of healthcare professionals ensures these pint-sized patients receive the best care possible — from a timely diagnosis to effectively managing treatment and receiving emotional support along the way.

But training options in pediatrics were limited — until now. A team of researchers at the College of Nursing is developing a high-tech simulator that can mimic a pediatric patient with a new degree of realism.

The high-tech simulator blends the physicality of mannequins and the flexibility of virtual patients. The mini-patient is able to talk, sweat, breathe, exhibit a pulse, feel warm or cold on various body parts, respond to touch by humans or medical instruments, and exhibit real human emotional complexity. The mannequin not only responds like a patient, but also gives providers an opportunity to react to simulations that are particular to children. And because the technology can present all of these cues in a single integrated human form, the simulator is uniquely situated to help providers learn to recognize both common and uncommon ailments.

Gregory Welch, the Florida Hospital Endowed Chair in Healthcare Simulation at the College of Nursing leads the project. Welch and colleagues prototyped and patented the physical-virtual patient bed (PVPB), and are exploring uses for training and education.

Originally the team had developed an adult-sized prototype. This smaller-scale innovation mirrors a pediatric patient in physical size and behavior thanks to projectors and other common components controlled by sophisticated programming. Currently, only two prototypes exist in the world — both at UCF.

"Through this simulated tool, we are able to effectively bring a pediatric 'patient' to life for healthcare professionals to train in a safe environment," said Welch. "Compared to our original adult-sized PVPB, our pediatric prototypes are relatively transportable, which allows us to bring this innovative technology to area hospitals for on-site experiments and training."

In the future, the team hopes to see the technology used in universities and simulation centers around the world to train both students and healthcare providers.
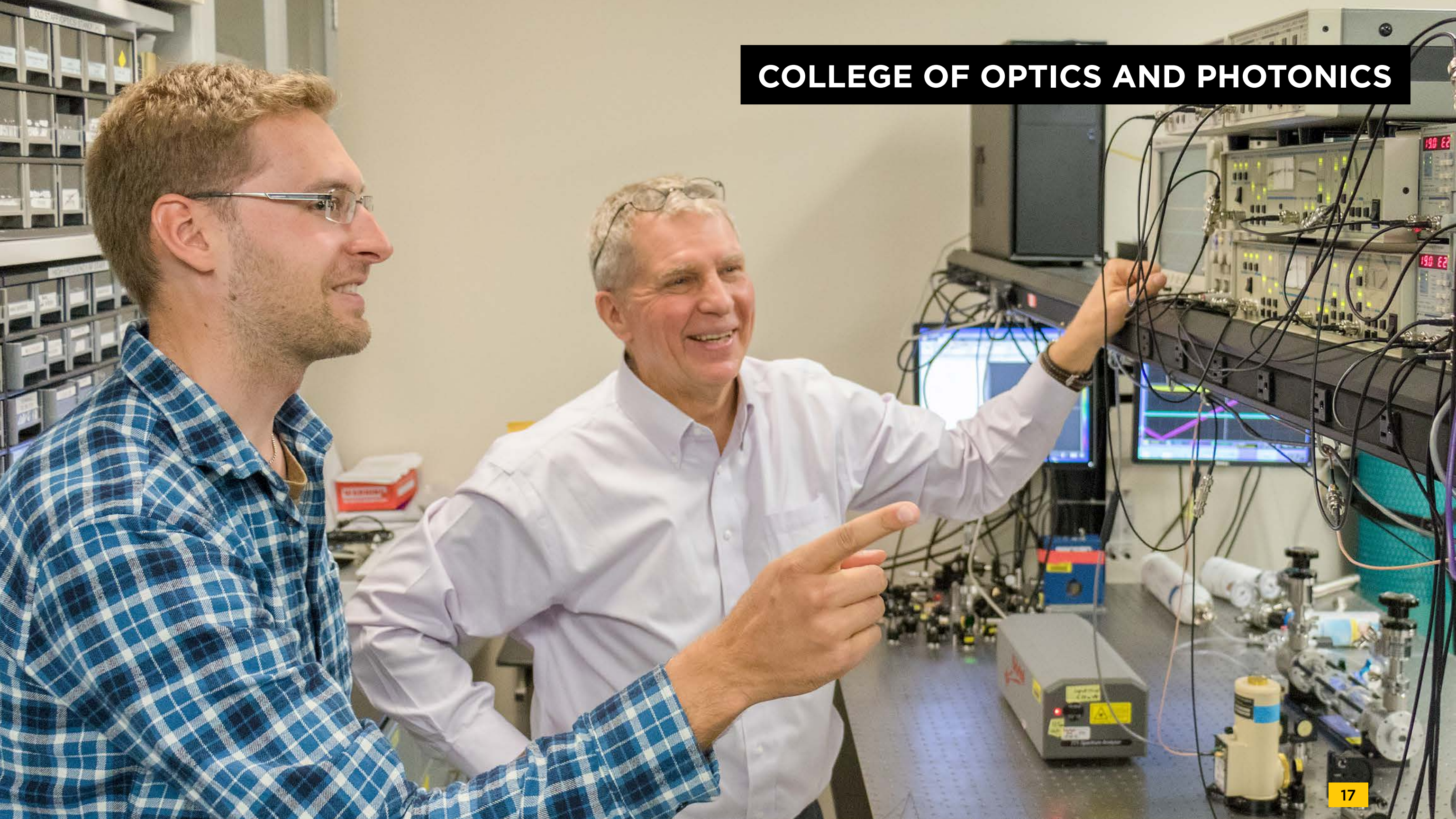
NEW LASER TECHNIQUE MAY HELP DETECT CHEMICAL WARFARE IN ATMOSPHERE

College of Optics and Photonics / By: Robert H. Wells

Ignorance isn't bliss in the arena of chemical warfare as invisible substances may be deadly and by the time they're detected by the senses, it can be too late.

That's why Konstantin Vodopyanov, a professor in UCF's College of Optics and Photonics, has developed a way to alert people to the presence of a chemical attack by using lasers that can detect even trace amounts of chemical and biological toxins in the air.

The technique is so accurate and sensitive that it can determine if there is a molecule of a chemical present even at concentrations as low as one part per billion. Vodopyanov's findings were published in Nature Photonics in March.

The method works by using infrared lasers to detect a chemical based on the unique frequency at which its molecules vibrate.

"The frequencies of molecules are very distinct," Vodopyanov said. "Think of it as a molecular fingerprint. So, when we use the laser we can detect these fingerprints with great precision."

A similar principle is used in the medical field to detect biomarkers for different kinds of health conditions, including cancer, by taking breath samples.

The approach could open the door for developing new technology, including sensors that could be used to detect traces of life by space explorers on missions to other planets or asteroids.

"We still have much work ahead," Vodopyanov said. "We are now working on broadening the range of the laser frequencies that can get the job done. If costs can be reduced and the tech made mobile, the applications could be endless."

Collaborators on the Nature Photonics paper included Andrey Muraviev at UCF's College of Optics & Photonics; Viktor Smolski of IPG Photonics –– Mid-Infrared Lasers in Birmingham, Alabama; and Zachary Loparo from UCF's Department of Mechanical and Aerospace Engineering. Vodopyanov obtained his doctorate from the Lebedev Physical Institute in Moscow and joined UCF in 2013.

COLLEGE OF SCIENCES

CREATING A NATIONAL CENTER TO HELP COMBAT THREATS TO SHORELINES

College of Sciences / By: Zenaida Gonzalez Kotala

The College of Sciences worked on countless research projects in 2018 in all areas from math and statistics to psychology and space. One of the biggest efforts for 2018 was the launch of the National Center for Integrated Coastal Research. More commonly referred to as UCF Coastal, the center is a collective approach to finding sustainable, coordinated solutions to challenges facing the nation's coastlines such sea level rise.

The timing was perfect given the number of natural disasters and national reports pointing to a desperate need to address the growing problems.

"There's a perfect storm coming," said Graham Worthy, UCF biologist and director of the National Center for Integrated Coastal Research. "We've already seen some of it. With economic constraints, environmental threats and extreme weather events becoming more and more common, now is the time to look at how we develop resilient communities that aren't constantly in expensive recovery mode."

Almost 40 faculty members from seven different colleges are part of the center. To help develop collaborations beyond UCF, the center held an invitation-only event, which drew more than 100 elected officials, corporate representatives, public employees working in city management and natural resources, representatives of non-profit organizations, and concerned citizens from Central Florida. The group discussed challenges and possible solutions to coastal threats. https://today.ucf.edu/ucf-launches-ucf-coastal-combat-sea-level-rise-algal-blooms/

"Our ultimate goal is to integrate science with societal needs and thereby guide more effective economic development and planning, environmental stewardship, hazard-mitigation planning and public policy development," Worthy said.

Members of the center published multiple scientific papers in 2018 and also spent time communicating with the general public by showing how wetlands help protect against climate change https://today.ucf.edu/how-wetlands-help-protect-against-climate-change/ and developing efforts to help communities cope with the economic impacts of red tide https://www.bradenton.com/news/local/article218193165.html.

The group worked steadily throughout the year hitting milestone after milestone, such as joining the Blue Community Consortium, https://today.ucf.edu/ucf-joins-international-consortium-aimed-helping-coastal-communities/ which aims to help develop sustainable and economically successful coastal communities worldwide. And to close out the year, the group inked a new partnership with Conservation Florida aimed at expanding "research, guidance, and a multidisciplinary voice to land and wildlife conservation to propel advancement in the greater Central Florida region."

https://today.ucf.edu/ucf-conversation-florida-join-forces-protect-natural-lands/

"We are only getting started," Worthy said. "We expect even more good things in 2019."

ROSEN COLLEGE OF HOSPITALITY MANAGEMENT

UCF'S ROSEN RESEARCHERS HELP KEEP BLUE PARADISE IN THE CARIBBEAN

Rosen College of Hospitality Management / By: Zenaida Gonzalez Kotala

Bonaire, a small island in the West Caribbean known as Diver's Paradise, depends on its natural beauty for its livelihood. Thanks to the work of researchers at Rosen College of Hospitality Management, the island is well on its way to preserving its beauty and safeguarding its economy future.

Professors at Rosen's Dick Pope Sr. Institute for Tourism Studies worked with the government of Bonaire to create a Strategic Tourism Masterplan called Blue Destination. The UCF team outlined a set of strategic objectives to ensure that Bonaire would be capable of achieving its environmental and economic goals over a 10-year period from 2017-2027, with a heavy emphasis on tourism.

"The tourism Masterplan reaffirms the island's timeless values anchored on the balance between people and the environment, and suggests moderate tourism growth to keep the island's authenticity, and to respect the island's nurturing long history with the ocean as its main livelihood source," said Robertico Croes, Associate Dean of Research and Administration at UCF Rosen College, a researcher on the project. "According to the plan, Bonaire is a true "Blue Destination" with its livelihood closely intertwined with the ocean."

Under the Masterplan, Bonaire is expected to invest $150 million into its economy to generate 2,400 new jobs by adding 600 new four-star hotel rooms. This in turn will generate 60,000 new tourists arriving by air and sea. The overall focus is to boost the island's economy by focusing on the symbiotic relationship of the island's residents and tourists to the oceans and the conscious effort to sustain them.

Bonaire has been at the forefront of preserving its natural resources since the 1970's. It is a haven for scuba divers; several fringe reefs offer excellent recreational diving opportunities.

Bonaire's Parliament wants to ensure it stays that way, while still boosting the economy through job growth and increased tourism to the island.

"Bonaire is the first Caribbean island to make an incredibly responsible step to protect and preserve a reef that helps maintain the health of the world's seas," said Kelly Semrad, a co-researcher on the Bonaire Masterplan who also teaches at UCF Rosen College. "Bonaire recognizes that the Earth's environment is finite and they are making an effort to leave a big footstep for the rest of the world to follow by striving to become the World's first Blue Destination."

The term "Blue Destination" is coined from the World Bank's concept definition of a "Blue Economy." The principles focus on the sustainable use of ocean resources for economic growth, improved livelihoods and jobs, ocean ecosystem health, tourism, renewable energy, fisheries, maritime transport, climate change and waste management.

"The people of Bonaire understand the importance of tourism in their daily lives," said Manuel Rivera, co-researcher and Assistant Dean at UCF Rosen College. "By shifting their economic development strategy towards a "Blue Economy", an initiative by the United Nations and the World Bank, the Island maintains its compromise to protect ocean resources in order to improve the livelihoods of its people. Bonaire's Blue Economy will foster economic growth that gives precedence to the sustainable use and conservation of our ocean's resources."

The Bonaire Masterplan developed by UCF Rosen College researchers in the Dick Pope Sr. Institute for Tourism Studies is part of interdisciplinary research for the tourism industry that seeks to protect the welfare of the environment so that future generations of visitors to the island will be able to enjoy this "Blue Destination."
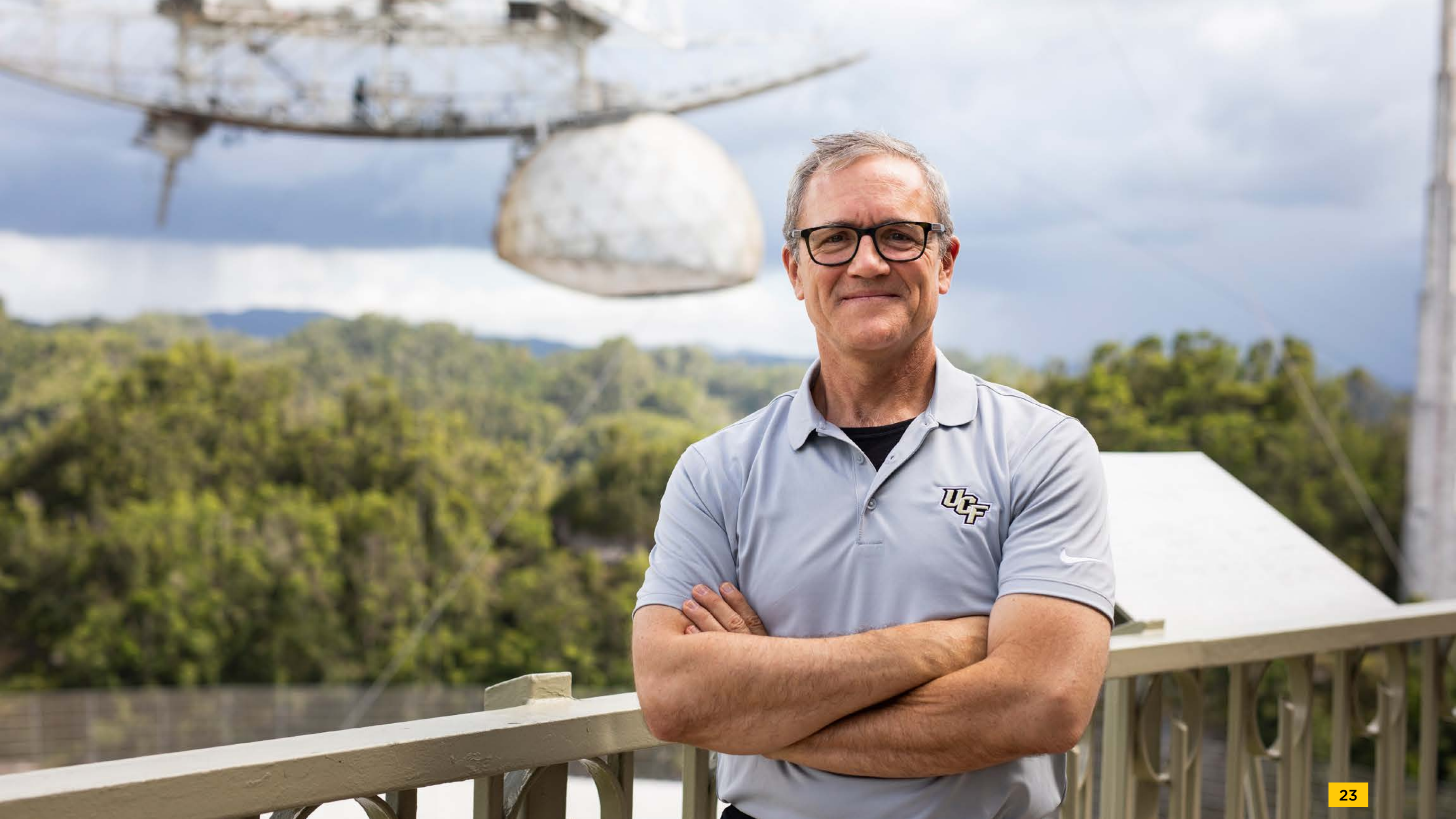
UCF CENTERS AND INSTITUTES

The Office of Research is home to several specialized hubs. Each group brings together experts to focus on specific areas of research from material sciences to energy. The centers are: Advanced Materials Processing and Analysis Center better known as AMPAC, the Florida Space Institute, The Florida Solar Energy Center, the Nanoscience Technology Center, the Center for Research in Computer Vision and BRIDG, a versatile boutique microelectronics fabrication facility.

AMPAC	$2.09M
Florida Space Institute	$12.07M
Florida Solar Energy Center	$3.40M
Nanoscience Technology Center	$3.40M
Center for Research in Computer Vision	$1.43M

This year we highlight the Florida Space Institute, which led the push to land a multi-million-dollar National Science Foundation (NSF) grant in February 2018. That grant put UCF in the driver's seat of the **Arecibo Observatory (AO)**, the world's largest and most powerful single-dish radio telescope. Under the NSF agreement, UCF manages the facility in partnership with UMET and Yang Enterprises.

Since April 2018, when the transition to UCF was complete, the Arecibo Observatory has focused on three primary things: educational outreach, repairs sustained during Hurricane Maria and science research through its own team and by supporting scientists from around the world who use the facility.

AO has been part of several major science stories since April. Even Google recognized the importance of this 50-year-old facility with a Google Doodle dedicated to the 44th anniversary of the Arecibo message - a radio message sent into deep space meant to be Earth's calling card.

Google Doodle Message

More great science contributions are expected in 2019. For now, enjoy a sampling of Arecibo news from 2018.

Astronomers Trace Radio Bursts to Extreme Cosmic Neighborhood

Einstein Is Right about Gravity Again – Even with Ultra-Dense Neutron Stars

Astronomers are totally rethinking how we should talk to aliens

Scientists zoom in on fast radio bursts, the most mysterious signals in space

Skull-shaped 'Halloween Asteroid' Will Zip by Earth Again this Month

A tale of two asteroids: The Phaetheon-Pallas connection

Supersensitive Antenna to Search for Extraterrestrials

The rebirth of radio astronomy

Astronomers Spot Rare Binary Asteroid: 2017 YE5

UCF RESEARCH CLUSTERS

UCF Faculty Clusters are a Part of the Office of Research

The Provost Office launched the faculty cluster initiative in 2015 with six clusters. Since then the clusters have grown to nine and they are now housed within the Office of Research. The goal of the initiative is to create synergies among faculty of diverse disciplines to help generate research breakthroughs, which will solve some of the world's most pressing challenges. Check out the cluster website at (https://www.ucf.edu/faculty/faculty-research-clusters/) and contact the cluster leaders for more information.

Cyber Security and Privacy

Developing world-class scholarship on the security and privacy for the Internet of Things and creating tools and methods for preventing, discovering and mitigating security and privacy breaches, while cultivating highly skilled graduates for this growing field.

Yan Solihin, 407-823-4191 or yan.solihin@ucf.edu

Disability, Aging and Technology

Taking advantage of Florida's ideal living laboratory to design, develop and disseminate practical and affordable interventions to help reintegrate people while promoting health and well-being, informing policy and creating technological innovations through interdisciplinary research, education and service partnerships.

Aman Behal, 407-882-2820 or abehal@ucf.edu

Energy Conversion and Propulsion

Creating a cutting-edge, interdisciplinary research and education framework at UCF, in which catalyst synthesis, characterization and application proceed in tandem with theoretical modeling and simulation to generate the knowledge base essential for accelerating the discovery and application of novel catalysts for energy conversion, storage and propulsion.

Talat S. Rahman, 407-823-1480 or Talat@ucf.edu

Genomics and Bioinformatics

Creating a genomics and bioinformatics cluster that will advance UCF's life sciences infrastructure, focusing on biodiversity, including in health-related research, and integrating genomics and bioinformatics into curricula at all levels.

Shibu Yooseph, 407-823-5307 or Shibu.Yooseph@ucf.edu

Learning Sciences

Unlocking the human potential within every learner will result in harnessing intellectual capital for solving society's most challenging problems and saving billions of dollars through theory, research, development and classroom practice regarding the complex process of how people think and learn.

Dave Edyburn, 407-823-3296 or dave.edyburn@ucf.edu

Prosthetic Interfaces

Establishing a critical mass of dedicated faculty to enable a viable interdisciplinary biomedical engineering program at UCF with core competency in prosthetic interfaces for implantable devices and systems.

Melanie Coathup, 407-266-7001 or Melanie.Coathup@ucf.edu

Renewable Energy Systems

Advancing UCF's work in smart energy systems and sustainable energy storage while developing and deploying distributed renewable energy resources and resilient communication networks.

Zhihua Qu, 407-823-5976 or Qu@ucf.edu

Sustainable Coastal Systems

Leading world-class efforts to understand ecosystem health and function and assessing natural and human-related impacts to coastal ecosystems, with the goal of creating decision-support models for planners, policymakers and stakeholders.

Graham Worthy, 407-823-2141 or Graham.Worthy@ucf.edu

Violence Against Women

Better understanding the complexity of violence against women to create innovative responses and guide policymaking that merges health, social welfare and social justice perspectives while increasing visibility and community awareness to reduce the experience and impact of violence.

Jana Jasinski, 407-823-6568 or jana.jasinski@ucf.edu or Catherine Kaukinen, 407-823-2356 or catherine.kaukinen@ucf.edu

COMMUNICATION HIGHLIGHTS

POPULAR STORIES

Click any link below to view a story.

- Pluto a Planet?
- Study Finds Bacteria in Milk Linked to Rheumatoid Arthritis
- UCF Selling Experimental Martian Dirt
- Engineers Develop A.I. System to Detect Often-Missed Cancer Tumors
- UCF Restores Clinic Receives $10 Million Grant to Expand PTSD Treatments

150 stories written for external media

+400 stories placed in the press

125 internal communications

Top Performers in 2018

|	
College of Engineering and Computer Science	46.26M
College of Sciences	26.14M
Institute for Simulation and Training	17.32M

BY THE NUMBERS: AWARDS BY UNIT

Academic Units	2017	2018
Advanced Materials Processing and Analysis Center	$1,810,000	$2,009,000
Center for Research in Computer Vision	$330,000	$1,430,000
College of Arts and Humanities	$770,000	$1,330,000
College of Business Administration	$950,000	$480,000
College of Education and Human Performance	$15,200,000	$8,110,000
College of Engineering and Computer Science	$33,000,000	$46,260,000
College of Health and Public Affairs	$8,450,000	$6,450,000
College of Medicine	$11,000,000	$9,430,000
College of Nursing	$740,000	$940,000
College of Optics and Photonics	$11,650,000	$16,860,000
College of Sciences	$16,850,000	$26,140,000
Division of Strategy, Marketing, Communications, and Admissions	$1,340,000	$4,940,000
Faculty Clusters	-	$30,000
Florida Solar Energy Center	$3,660,000	$3,570,000
Florida Space Institute	$9,800,000	$12,007,000
Institute for Simulation and Training	$14,330,000	$17,320,000
NanoScience Technology Center	$4,040,000	$3,400,000
Office of Research and Commercialization	$8,960,000	$10,470,000
Office of Undergraduate Studies	$240,000	$560,000
Provost's Office	$10,000	$420,000
Rosen College of Hospitality Management	$210,000	$40,000
Student Development and Enrollment Services	$4,620,000	$9,790,000
Other	$250,000	$10,000
TOTALS	**$148,790,000**	**$183,120,000**

Totals are in United States Dollars (USD)

$183.12

million dollars used to help
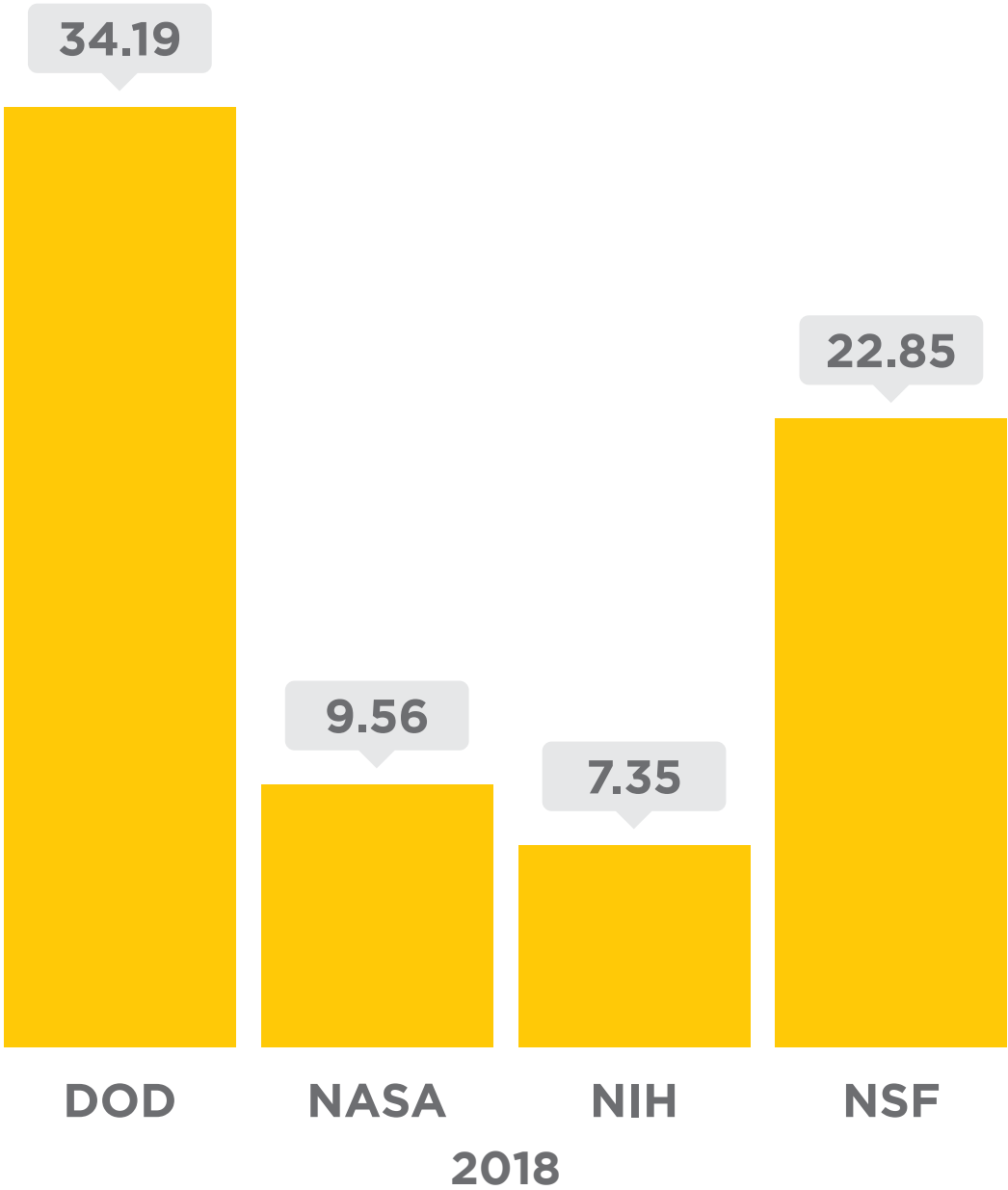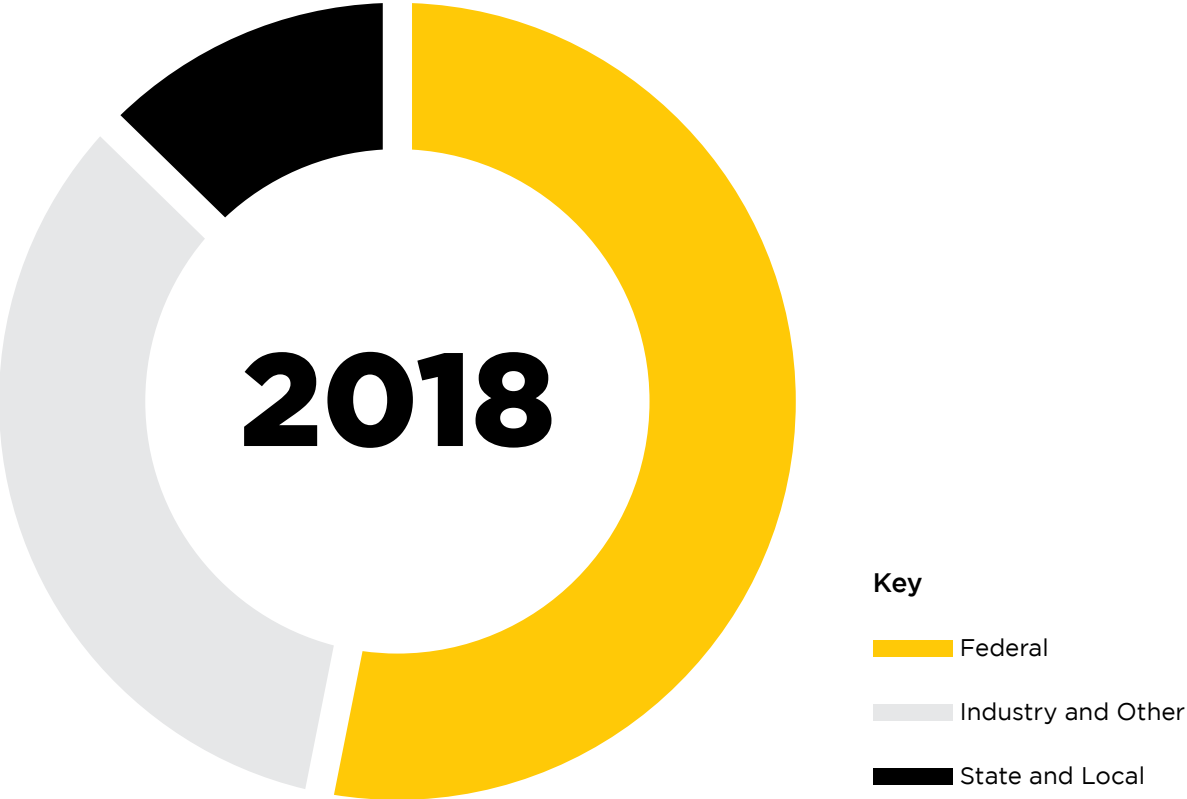fund UCF's research in 2018.

BY THE NUMBERS: RESEARCH FUNDING
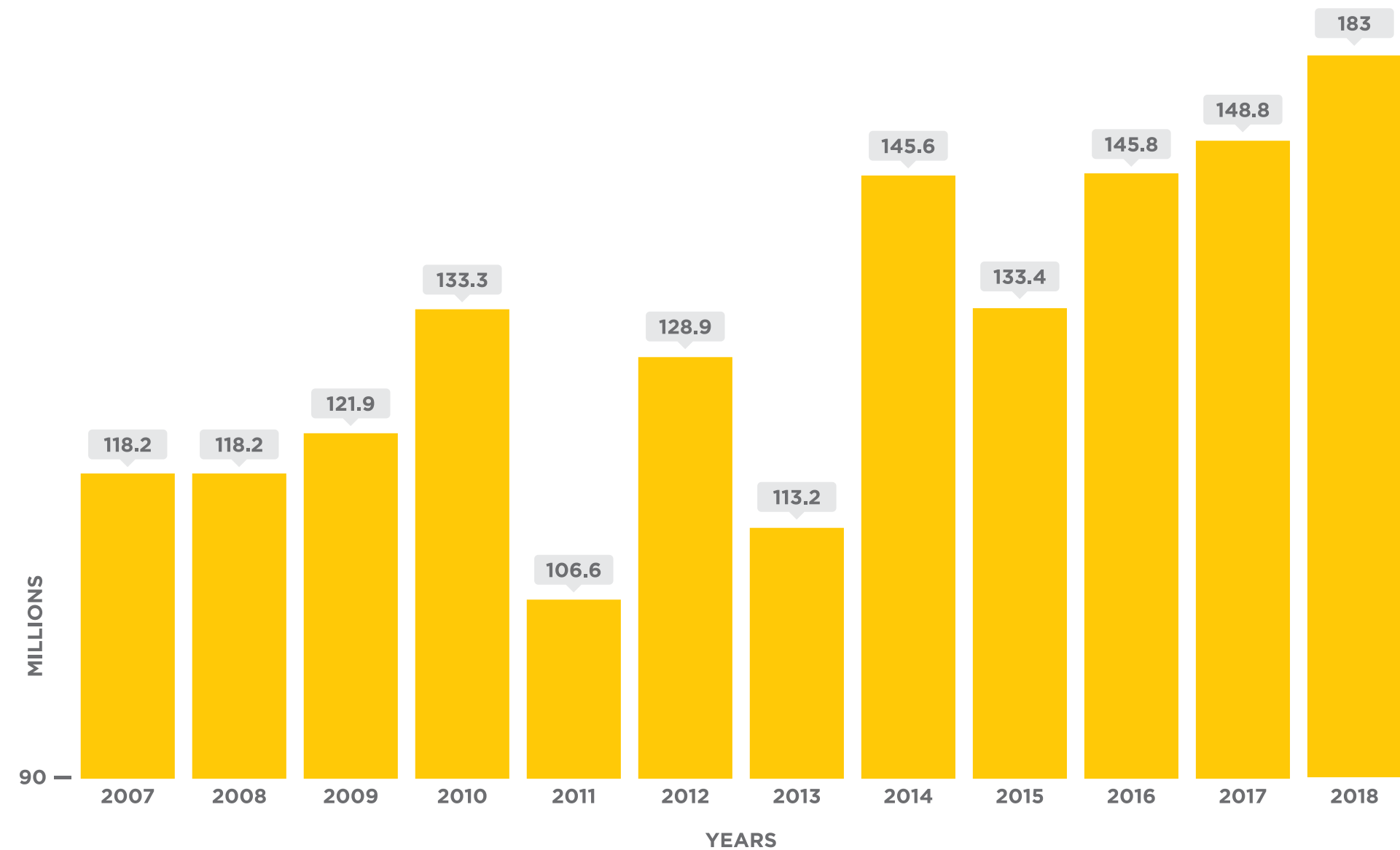
BY THE NUMBERS: KEY FUNDING SOURCES

	2017	2018
Department of Defense	22.8M	34.19M
National Aeronautics and Space Administration	12.7M	9.56M
National Institutes of Health	9.3M	7.35M
National Science Foundation	12.9M	22.85M

Totals are in United States Dollars (USD)

34.19

22.85

9.56

7.35

DOD **NASA** **NIH** **NSF**

2018

BY THE NUMBERS: TYPES OF FUNDING

2018

Key

- Federal
- Industry and Other
- State and Local

	2017	2018
Federal	73.9M	97.60M
Industry and Other	41M	62.07M
State and Local	33.7M	23.45M

Totals are in United States Dollars (USD)

ACKNOWLEDGMENTS

The Office of Research and the College of Graduate Studies Communication Team compiled the 2018 Annual Research Report.

The team works directly with researchers across campus and college communicators to share stories with our campus community and to the outside world through the press.

Your 2018 ORGS team: Zenaida Gonzalez Kotala, Carreen Krapf, Gerri Levitson, Karen Norum, Elitza Rodriguez, Grant Toranzo, Andres Torres, Robert Wells, Rachel Wimmer and Ashley Zirkle.

We want to thank all the faculty and student researchers and support staff who reached out to us with great story tips this year. If you have a story tip, please send it to Zenaida.kotala@ucf.edu or Robert.wells@ucf.edu.

A special thanks our colleagues across campus for helping us share our collective research success.

College of Arts and Humanities

Heather Gibson

College of Business

Erika Hodges

Joshua Miranda

College of Community Innovation and Education

D'Ann Rawlinson

College of Engineering and Computer Science

Kimberly Lewis

College of Health Professionals and Sciences

Karen Guin

College of Medicine

Wendy Sarubbi

Christin Senior

Suht Wong

Jonathan Gabriel

College of Nursing

Carolyn Petagno

Rosen College of Hospitality

Susan Vernon-Devlin

College of Sciences

Judy Froelich

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UCF Today

Laura Cole

Jenna Lee

Gene Kruckemyer

Marketing and Communications

Patrick Burt

Chad Binette

Heather Smith

Rachel Williams