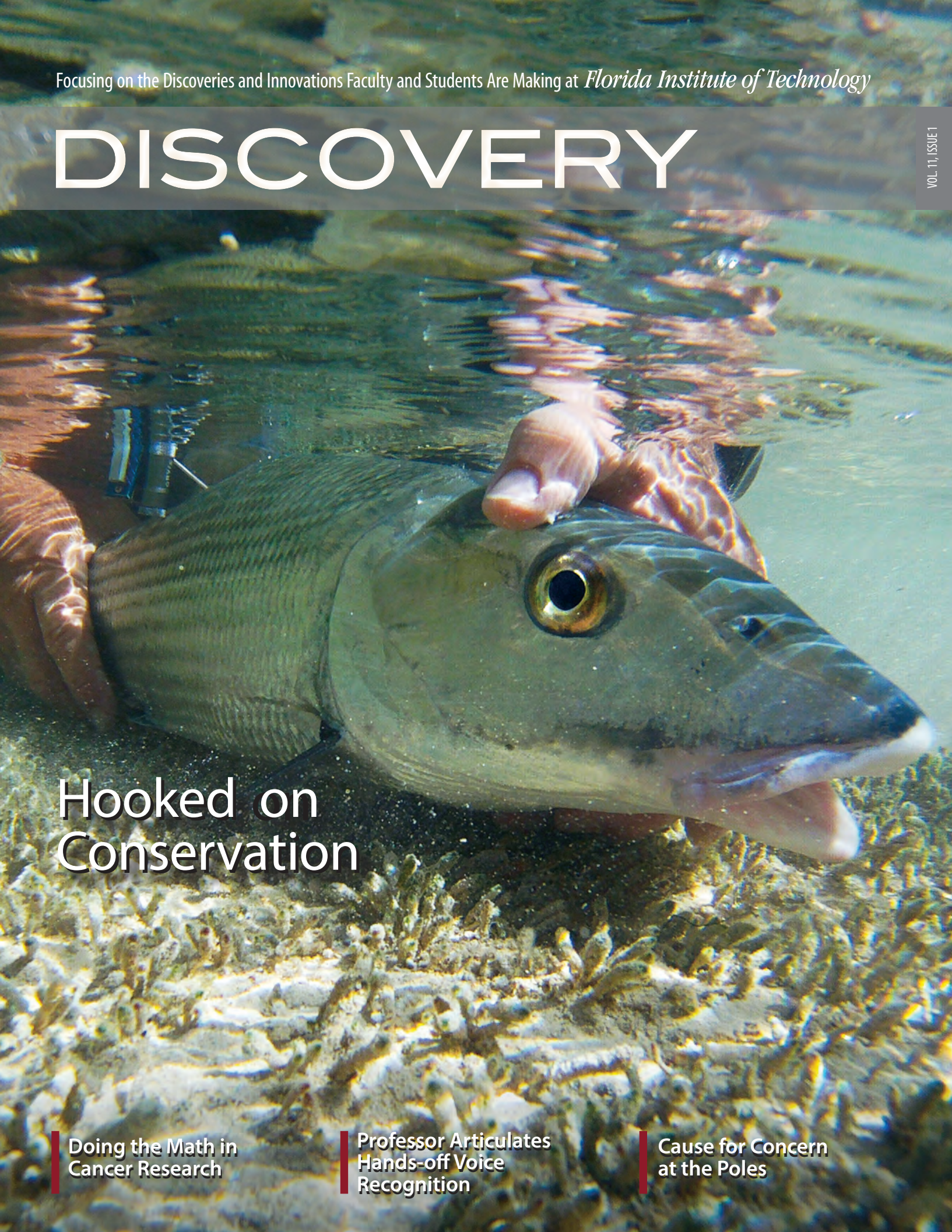
Focusing on the Discoveries and Innovations Faculty and Students Are Making at *Florida Institute of Technology*

DISCOVERY

VOL. 11, ISSUE 1



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MESSAGE FROM THE PRESIDENT AND CHIEF EXECUTIVE OFFICER

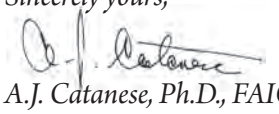
Ancient Chinese philosophy contends that a journey of a thousand miles begins with a single step. This is especially true for journeys of inquiry that expand our understanding of all things, both on the earth and in the heavens.

Discovery: Florida Tech exists to showcase important research performed by Florida Tech faculty and students. They are changing our world for the better, through an educational model that ensures high tech experience and human touch interaction.

The U.S. must increase its graduates in the all-important STEM fields—science, technology, engineering and mathematics. Florida Tech has embraced this challenge, offering students rewarding research experiences that lead to practical success upon graduation. That's part of what makes Florida Tech "The STEM University."

Thanks for taking time for Discovery.

Sincerely yours,



A.J. Catanese, Ph.D., FAICP

President & Chief Executive Officer

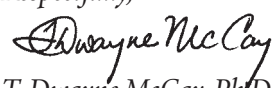
MESSAGE FROM THE EXECUTIVE VICE PRESIDENT AND CHIEF OPERATING OFFICER

I have the privilege and responsibility of traveling around the world to represent Florida Tech and its programs. I have the opportunity to negotiate with new educational partners, while also meeting with outstanding prospective students and alumni. From China, to France, to the Middle East and back again, I get to share the story of Florida Tech that is represented well in these pages of Discovery.

The reality remains that students come to Florida Tech to "do" things—to work alongside some of the best minds who conduct real research to change our world for the better. Undergraduate research experiences are the norm for our students, not the exception, and the opportunity to make relevant contributions to that research sets Florida Tech apart from other universities with similar missions.

This journey of discovery takes shape every day on our campus, in our labs, in our classrooms, and most importantly in the minds of our students. The educational foundation they form today will inform their contributions to all of our tomorrows.

Respectfully,



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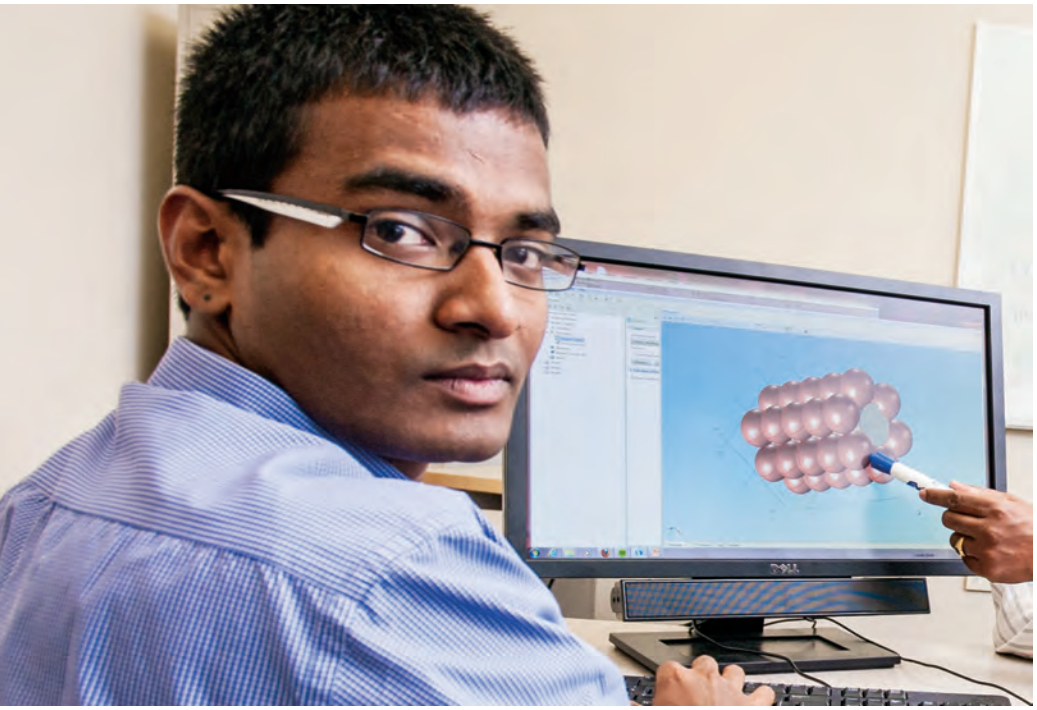

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Scientists Analyze Bone Mass Loss in Microgravity

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Master's degree student Mohit Ganguly

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WE'RE LISTENING. *Please send any comments or suggestions to Wes Sumner, wsumner@fit.edu*

Ivy Chong, The Scott Center director of autism services, at left, is joined by psychology graduate students and Ali Weigand, behavior analyst, third from left. Graduate students are Jeanine Tanz, Nicky Kline and Clare Liddon.

Learning to Live with Autism

Virtual house calls help parents of autistic children.

Early interventional services are critical in alleviating the symptoms of a condition for which there is currently no cure, yet finding the time for therapy can be a struggle for parents already challenged by the constant demands of their child.

"If you have a child with disabilities, it can be very difficult to leave your house," said Ivy Chong, director of autism services and training at Florida Institute of Technology's Scott Center for Autism Treatment.

To help caregivers of newly diagnosed autistic children easily access parent training, a pilot program of the Scott Center and the university's College of Psychology and Liberal Arts has placed behavioral intervention training literally in the hands of families.

Thanks to grants from the State of Florida's Agency for Persons with Disabilities and the Harper Family Charitable Foundation, the Scott Center developed "Learning to Live with Autism" to offer parent training via telemedicine. Using Adobe Connect teleconferencing software and laptops, the program provided real-time, face-to-face training to parents. It furnished them with the skills, tools and techniques they, as caregivers, can use to reduce problem behavior and increase functional and adaptive skills, appropriate verbal behavior and social interaction.

The pilot, completed in June, focused on 30 underserved families from throughout the state, parents with young children recently diagnosed with autism. Families received a one-day clinic evaluation and 10 weeks of training free of charge.

"I loved the focus of the training, which was to encourage parents to be active participants in their child's health," said participant Arwyn Holmes, whose five-year-old son, Drake, is autistic.

"Having a child with autism, plus a job, a husband that travels 90% of the month, another child and lots of therapies and activities, the idea of getting one-on-one time with a behavior analyst without leaving the house was really interesting to me. Having the presentation online made it significantly easier to ask questions along the way and to request specific material."

Chong modeled "Learning to Live with Autism" to be parent-centered.

"Parents are key to better outcomes in facilitating treatment and learning new skills," she said.

"There is a lot of need for early diagnosis and for reducing barriers to treatment. This is one way we can approach it."

The Centers for Disease Control and Prevention estimates that one child in 88—one million school-age children—suffers from some form of autism spectrum disorder. It is an "equal-opportunity" disorder that cuts across all racial, ethnic and socioeconomic groups and is more prevalent in children than cancer, diabetes, spina bifida and Down syndrome.

It is also extremely expensive. According to the Autism Society of America, the United States spends $60 billion a year to care for

Using Adobe Connect, the Scott Center developed the "Learning to Live with Autism" program to offer parent training via telemedicine.

individuals with autism, primarily on lifelong adult care. In a study of Pennsylvania autistic children, research found that early intervention services represented a lifetime savings of $2.4 to $2.8 million per person.

The telemedicine approach to treatment holds much promise for positive, cost-effective changes.

"There is no quick fix for these kids," said Holmes. "Everyone in their life needs to understand behavior management techniques."

Ivy Chong may be reached at ichong@fit.edu.

Maria Sonnenberg

Marketing Students Jump into International Culture

Florida Tech student Yuxi Hu successfully completed an eight-week project with five other teammates without ever speaking to any of them.

In fact, the 24-year-old MBA student has only seen pictures online of her five teammates. They've never met in person, but the group was able to work together and create a foreign market entry plan.

It was all part of a project, called X-Culture, where six students from six different countries make up one team. They are tasked with explaining the best way to introduce a product to a new country. For example: Apple selling the iPhone5 in Nigeria.

"I loved the project because this was my first time studying with people from so many different countries," said Hu, who worked with students from Spain, Colombia, Thailand, Barbados and Guyana. "We used Facebook to communicate. We didn't talk face to face so sometimes that was difficult."

She said she sometimes had to ask people to retype what they were trying to say and use simpler sentences.

The X-Culture project began in 2010. During the spring 2013 semester, more than 4,000 students from over 40 universities participated, including 35 Florida Tech students. In total, more than 100 Florida Tech students have taken part.

All Florida Tech business students are required to participate while taking an international business class.

Tim Muth, who teaches the International Business course, brought it to Florida Tech in spring 2012 after searching for a way to teach his students the real-life experiences he encountered during 25 years in the corporate world.

"You can do projects in class but until you get into that international realm, you really don't experience it," said Muth, who has taught at Florida Tech for six years. "I see them learning communication tools and cultural lessons."

Students are given a lot of flexibility and not much structure, which has its pluses and minuses. Muth encourages his students to negotiate and emphasizes the importance of being a global virtual team since there are no face-to-face in-person meetings. It is up to the students to determine when, how and how often they communicate.

"One student said he always likes to sleep in on Sunday, but for this project he had to get up early to Skype at 9 a.m. Sunday because it wasn't the middle of the night, it wasn't early in the morning, it was a time that worked for everyone," Muth said.

Another student received negative feedback from his teammates after comments he wrote about a fellow teammate's work skills.

"We might use an American term that we don't think is insulting but may be to someone from another country," Muth said.

Although one third of his students are international, he said a lot of his students have never traveled outside the U.S.

"This is their first taste of international culture," he said. "They get an appreciation for the world."

MBA student Jeff Null said the project was a lot of work but worth it.

"It's a unique learning experience that a lot of students don't get," Null, 26, said. "It's a great way to introduce the real business world in a classroom setting."

Tim Muth may be reached at tmuth@fit.edu.

Michelle Spitzer

"You can do projects in class but until you get into that international realm, you really don't experience it (the real world)."

—Tim Muth | Nathan M. Bisk College of Business

From left, Mohit Ganguly; Dr. Daniel Woodard, NASA physician; and Kunal Mitra.

Scientists Analyze Bone Mass Loss in Microgravity

The students of Kunal Mitra share a common interest leading to a promising partnership.

"NASA is always an attraction for our students," said Mitra, of Florida Tech's biomedical engineering department. "So I was interested in finding an interface between biomedical engineering and space applications."

"We received very good reviews from the funding agency (NASA's Florida Space Research Program) and the proposal received funding."

—Kunal Mitra | Program Chair | Biomedical Engineering Department

Mitra made that connection through collaboration with a longtime associate at NASA, Dr. Daniel Woodard. They are studying bone loss in microgravity through nanoscale finite element analysis of load-bearing structures in bone.

"I have known Woodard for a while, and we thought this project would be an excellent fit," explained Mitra, who is also a professor in Florida Tech's mechanical & aerospace engineering department and directs the Laser, Optics and Instrumentation Laboratory.

"We received very good reviews from the funding agency (NASA's Florida Space Research Program) and the proposal received funding."

The loss of bone mass is a major medical concern of NASA's for long-duration, manned space flights but disuse-induced bone loss is a longstanding issue for the layperson as well. Astronauts, of course, are a very specific focus group, but Mitra explained how the practical application of the study hopes to reach a far wider audience.

"The number of ordinary Americans, including many citizens of Florida, who suffer from disuse-induced bone loss exceeds the number of astronauts by about three orders of magnitude," said Mitra.

This type of bone loss is seen in victims of spinal cord injuries, post-polio syndrome and other medical conditions, and it limits the ability of the muscles to apply loads to the bones. Mitra's study aims to develop a geometric dataset to describe the osteon, a common structural component of bone, based on atomic force microscopy images.

"A predictive theory of the load-bearing behavior of bone based on finite element analysis will benefit health and medicine by making it possible to predict how bone will respond to time-varying loads in ambulation, exercise, injury and disuse," he said.

"This will make it possible to optimize therapeutic regimens for bone disease, such as osteoporosis and fracture healing and to optimize the design of biomedical bone implants and prostheses."

While it may not sound as such to the average person, conducting this research in these varying gravitational profiles is far more practical than attempting to do so on the ground.

"It is not feasible to perform ground-based simulation of all of these profiles that would be needed to optimize these countermeasures by a trial and error approach."

By testing the response of bone during prolonged exposure to microgravity, Mitra and his team hope to develop optimal countermeasures more readily than through traditional experiments. The partnership with NASA seems a perfect match.

"It is well known that bones respond to stress," Mitra said, "But the mechanisms by which it occurs is very difficult to understand. [NASA's] wide range of missions is contemplated with different gravitational loading profiles (the moon, Mars, etc.), which will help in developing predictive tools."

Kunal Mitra may be reached at kmitra@fit.edu.

Jon Jordan

Cause for Concern at the Poles

Slowly but inexorably the giant bright red king crabs are heading to Antarctica.

In fact, thousands of these unwelcome visitors are already there, and the landscape of the ocean may be irrevocably altered, as a research team from Florida Tech has discovered.

A group of graduate and post-doctoral student researchers led by Richard Aronson, professor and head of the biological science department, College of Science, has for years focused on the crab invasion.

In collaboration with James McClintock, professor of biology at the University of Alabama at Birmingham, Aronson's team first trekked to Antarctica in 2010 under a grant from the National Science Foundation. What they discovered surprised them.

"We had made some predictions about the presence of the crabs, but we saw more than we had expected," said Aronson.

In previous expeditions, scientists spotted a couple of crabs here and there. Now there are large populations.

Using a towed underwater camera vehicle designed and operated by Woods Hole Oceanographic Institution, Aronson's team gathered tens of thousands of images of the underwater invaders 1,500 meters below the surface.

It's been the first time these predators have wandered into Antarctica en masse in 40 million years. Climate change, says Aronson, is to blame.

Change does happen in Antarctica, but not as rapidly as it has in recent years.

"Sea surface temperatures have gone up one degree Centigrade in the last 50 years, double the global average," said Aronson.

One degree may seem minimal, but the upward temperature trend is enough to encourage the crabs, who kept away when the water was too cold because the lower temperatures would not allow the crustaceans to flush magnesium buildup out of their blood, a process necessary for their survival. Without the ability to get rid of magnesium, the crabs become paralyzed and cannot breathe.

For the crabs, Antarctica now offers an all-you-can-eat buffet without penalties, for no predators exist to control them. Even the poorly named crab-eater seal does not eat crabs, but rather prefers krill.

On the sea bottom, the crabs discover a bounty of delicacies, including tube worms, sea spiders and clams, all having thrived without predation for 40 million years … until the crabs arrived.

"It's putting these unusual, predator-free communities at risk," said Aronson.

"There are no barriers to eating the undefended prey. The crabs have the potential to tear the place apart. The whole Antarctic ecosystem is at risk of radical change."

At the other end of the spectrum, but equally dire, are the problems Aronson's researchers have encountered with coral in the tropics through a study funded by the Smithsonian Institution.

"Temperatures are also rising in the tropics. Corals are getting sick and spitting out the single-cell algae that is a source of carbohydrates for them," said Aronson.

"It can kill them. The plants and animals living at the latitudinal extremes of the tropics and the poles are quite different, of course, but they share a key characteristic: they have very narrow ranges of environmental tolerance. The ecological impacts of climate change are being seen earliest and most clearly in the tropics and at the poles."

As temperatures edge upward from global warming, whole ecosystems could be forever changed or wiped out. Scientists like Aronson are sounding the alarm.

"Climate change is full of surprises, and they're almost always nasty surprises," said Aronson.

Maria Sonnenberg

Aronson diving in Moorea, French Polynesia. Photo credit Joshua Idjadi

Doing the Math in Cancer Research

The unfortunate truth is that there are few degrees of separation when it comes to the average American and cancer.

Everyone knows of someone, it seems—either fighting the disease presently, a cancer survivor or those we've lost to the epidemic.

For Munevver Mine Subasi, an assistant professor in Florida Tech's department of mathematical sciences, involvement in a current research project on breast cancer has both a personal and a professional connection.

"I was motivated to get involved in breast cancer research during my post-graduate studies," she said, noting an abundance of opportunity through several projects.

"However, through observing the devastation of cancer in my own family and with close friends, I gained a better understanding about the impact of cancer research."

Subasi counts a grandmother and a cousin as cancer survivors in her own family and saw two close friends lose their mothers to aggressive pancreatic and bone cancers, respectively, in recent years.

With a background as a mathematician, Subasi didn't set out with cancer research in mind as a destination along her career path but a curiosity for the causes of disease in humans. The treatment, therefore, led her to explore cancer biology. She credits Gyan Bhanot at Rutgers' BioMaPS Institute as having helped her bridge the gap between mathematics and physical science.

Subasi's current project focuses on Tamoxifen, a drug taken orally in tablet form, which has had intermittent success in the treatment of Estrogen-positive (ER+) breast cancers. While in some cases, Tamoxifen has had tremendous results, making primary tumors disappear while preventing long-term metastasis; in others, the drug has proven less effective or does not work at all.

Through a rigorous analysis of microarray breast cancer data, Subasi aims to develop mathematical tools to identify Tamoxifen resistance in individual patients.

"My research team focuses on gene-gene interactions to stratify breast cancer patients into subclasses of ER+ disease," she explained. "And to identify the expression patterns on groups of genes, which are predictive of drug resistance within each subtype."

While clinical, molecular and genetic differences among the many subtypes of breast cancer have been identified, to this point, researchers have had difficulty predicting drug resistance and the patients at greatest risk in each subtype.

It is Subasi's mathematical expertise that she hopes will lead to mitigating the erratic performance of Tamoxifen, to identify new gene targets and suggest alternative therapies, for the most beneficial outcome.

"The successful results of this research are expected to lead to the discovery of novel biological information, improving breast cancer risk management," she said.

"Risk stratification would directly help clinicians to identify the patients most likely to have early disease recurrence who might benefit from more aggressive therapy. The proposed research activities [could then] be extended to the analysis of other human cancers."

Munevver Subasi may be reached at msubasi@fit.edu.

Jon Jordan

Munevver Subasi and Roby Poteau, master's student in operations research, look at the risk stratification of cancer patients. They're comparing the life expectancy of different diseases, including different types of cancer.

Tagging bonefish in the Bahamas

Aaron Adams in Belize is joined by fishing guide Carlton "Captain" Westby at left and Alex Anderson, University of Belize student.

Florida Tech Reels in Bonefish and Tarpon Trust

What keeps Aaron Adams up at night is the degradation of coastal habitat. And that's not good because Adams really needs his sleep.

He wears two hats as scientist and director of the Bonefish & Tarpon Trust. He's also a much-published author, journal editor, commercial photographer, educator, conservationist and fisherman. A lifetime angler, Adams began with a hook and a line at age four on the rivers of Maryland and Chesapeake Bay.

In April 2013, after spending 11 years at the Mote Marine Laboratory, he joined Florida Tech as a research associate. Adams now conducts his diverse trust duties from the university's Vero Beach Marine Laboratory, which, says Biological Sciences Department Head Professor Richard Aronson, "will open exciting new areas for research and teaching at the university."

The trust he leads conducts wide-ranging applied research and education in Florida, the Bahamas, Belize, Mexico, Hawaii and other parts of the world. Adams collaborates with high-profile marine science institutes and several universities to protect and restore fish populations and marine ecosystems.

The primary focus is to preserve the primarily "catch and release," or recreation, bonefish, tarpon and permit. Adams also works with Florida Tech's Jon Shenker, professor

"The Florida fisheries have an $8 billion a year economic impact. This rivals citrus and sugar. If the fish went away, it would be an extremely hard hit."

—Aaron Adams | Research Associate | Vero Beach Marine Lab

of biological sciences, on snook and tarpon studies, funded by the trust.

In his new seaside office, Adams is poised to speak for Indian River Lagoon sea grass restoration. He's gearing up for educational outreach and making the local connections to bring the environmental threats into focus.

To sum up his mission, Adams tells his big snook story. This is the fish that people see in the lagoon.

"It's not apparent what makes the fish grow to that size. It takes good water quality, good beach environment and healthy mangroves for the juveniles. A whole suite of qualities go into making a healthy habitat to grow that fish."

Degrading coastal habitat is a major concern worldwide. Florida has lost 50 percent of its mangroves from natural, pre-development levels, causing the loss of tarpon, snook and other fish. The good news: Mangrove areas today, once filled in to expand land use, are slowly being restored to improve habitats.

"The Florida fisheries have an $8 billion a year economic impact. This rivals citrus and sugar," says Adams. "If the fish went away, it would be an extremely hard hit."

Water quality is also a huge issue. The release of water from Lake Okeechobee when the level rises too high radically alters the fresh water composition as it flows to Florida waterways. This kills sea grass and oysters.

"I know the Vero Beach community considers conservation important. This means they should also be interested in Everglades restoration because it affects them here," says Adams.

The 48-year-old scientist brings the kind of experience that can earn the Vero Beach Marine Lab national recognition. "We are thrilled that we have Aaron and his Florida game fish conservation expertise here," said Aronson.

It has always been all about fish for Adams. He says, "If someone asked me what else would you do for a career, I'd have no idea."

Aaron Adams may be reached at aaron@bonefishtarpontrust.org.

Karen Rhine

Jon Shenker, director of the Florida Tech Sportfish Institute and professor of biological sciences

Holding a juvenile tarpon before tagging

Finding How the Little Fish Fare

"Fish—any kind, any question. If it's got fins, we're interested," writes Jon Shenker on his website. Director of the Florida Tech Sportfish Institute and professor of biological sciences, Shenker is another "go-to" for game fish questions. As a colleague of Aaron Adams for 10 years, Shenker and students currently work on several projects funded by the Bonefish & Tarpon Trust.

The Silver King (tarpon) is the target of much of their efforts. The team is implanting sonic tags in 20- to 40-inch juveniles to investigate their migration throughout the Indian River Lagoon. They want to know how the fish respond to salinity, rain and temperature to identify good habitats for the fish. They're also implanting radio frequency ID (RFID) tags on smaller, four- to six-inch, fish to track them in their initial nursery habitats in mangrove marshes around John's Island in Vero Beach and Pelican Island National Wildlife Refuge near the Sebastian Inlet.

Getting tarpon and bonefish to spawn in captivity would open the potential for stock enhancement through aquaculture. It's not going to be easy; Shenker is starting the process with similar, hopefully more easy-to-spawn ladyfish in a colony maintained at the Vero Beach Marine Lab.

"A good chunk of our time this summer is spent on Bonefish & Tarpon Trust work," says Shenker. "We're absolutely thrilled with Aaron joining Florida Tech's biological sciences faculty, and know that he's bringing tremendous opportunities with him."

Jon Shenker may be reached at Shenker@fit.edu.

Karen Rhine

Professors Illuminate Dark Lightning

Estimate high-dose events, but say they are likely rare

"Dark lightning," coined by Professor Joe Dwyer, could blast airline passengers with gamma rays who fly near the top of a thunderstorm, with doses equal to about 10 chest X-rays. At the middle of a storm, an altitude of about 16,000 feet, "the radiation could be comparable to 400 chest X-rays or roughly equal to a full-body CT scan," he says.

But, planes that fly into thunderstorms at dangerous levels are pretty rare and the bursts of radiation occur only over extremely brief periods.

"We know that commercial airplanes are typically struck by lightning once or twice a year. What we don't know is how often planes happen to be in just the right place to receive a high radiation dose. We believe it is very rare, but we'll continue to look for answers to this question," says Dwyer.

Dwyer and co-investigating Florida Tech professors Ningyu Liu and Hamid Rassoul have made advances over the past five years into their studies of the phenomenon. Last spring, they presented their latest models at a press conference of the European Geosciences Union in Vienna, Austria. Their findings prompted dozens of follow-up stories in the international media for months after.

To understand exactly how thunderstorms manage to produce high-energy radiation, the scientists showed how, instead of creating normal lightning, thunderstorms can sometimes produce an exotic kind of electrical breakdown that involves high-energy electrons and their anti-matter equivalent called positrons. The interplay between the electrons and positrons causes an explosive growth in the number of these high-energy particles. They emit the observed terrestrial gamma-ray flashes while rapidly discharging the thundercloud, sometimes faster than normal lightning. Even though copious gamma-rays are emitted by this process, very little visible light is produced, creating a kind of electrical breakdown within the storms Dwyer calls "dark lightning."

The team's recent modeling work of dark lightning calculates the radiation doses received by individuals inside aircraft that happen to be in exactly the wrong place at the wrong time. The model also explains many of the observed properties of terrestrial gamma-ray flashes.

Scientists have known for almost a decade that thunderstorms are capable of generating brief but powerful bursts of gamma-rays called terrestrial gamma-ray flashes, or TGFs. These flashes of gamma-rays are so bright they can blind instruments many hundreds of kilometers away in outer space. Because they can originate near the same altitudes at which commercial aircraft routinely fly, scientists have been trying to determine whether or not terrestrial gamma-ray flashes present a radiation hazard to individuals in aircraft.

The team conducts much of its research from numerous observations and experiments, including experiments involving artificial "triggered" lightning at the University of Florida/Florida Tech International Center for Lightning Research and Testing in Starke, Fla. Their next step is to make direct measurements using aircraft and balloons inside the thunderstorms, a perhaps risky endeavor.

"The radiation from dark lightning is not something that people need to be frightened about, and it's no reason to avoid flying. I have no problem getting on a plane with my family," said Dwyer.

This fundamental research on terrestrial gamma-ray flashes is funded in part by the Defense Advanced Research Projects Agency's NIMBUS program.

Joe Dwyer may be reached at jdwyer@fit.edu.

Karen Rhine

Professor Articulates Hands-off Voice Recognition

It's happened dozens of times. You're lounging comfortably in your favorite recliner. Feet up, drink on your left, snacks on your right, but then you realize something's missing.

There it is. Across the room you spot the television remote control.

Imagine being able to stay in your spot and simply say, "Television turn on channel two."

Veton Kepuska, an associate professor in Florida Tech's College of Engineering, electrical and computer engineering department, says he hopes the concept will be available to the public in the near future.

Kepuska, a speech scientist, has spent more than two decades researching and developing Wake-up-Word. The speech recognition technology allows virtually any device to respond to voice recognition through a trigger word.

The difference between his product and ones currently on the market is that his does not require a button to be pushed in order to activate the voice recognition. The trigger word essentially replaces the button.

"When you want to speak to someone, you refer to that person by name," Kepuska explained. "The usage of his or her name is a trigger word. You would assign a trigger word for anything from a TV, to a car, a phone, a computer, any kind of robot."

Aside from the average consumer using the product, Kepuska said it also is beneficial to the military and law enforcement.

"If someone is wearing a protective hazmat suit, then manipulating hazardous materials wouldn't be the best idea," he said. "It would be better to allow someone else to do this through their voice."

Vehicles, including helicopters or military drones, also could be operated by the voice recognition software rather than handheld controllers.

"It's really a simple concept, but how it works is very complicated," Kepuska said. "The technology was not available before."

Kepuska came to Florida Tech 10 years ago to continue his research and complete the project, taking speech recognition devices to the next level.

"Conventional speech recognition systems typically operate at their best within the range of 99 percent accuracy," Kepuska says. "This implies that for the natural rate of human speech, or conversation, the person who utters 100 words per minute would be expected to have at least one error per minute. My research has shown that Wake-up-Word speech recognition will make one error per three hours."

He recently received a $50,000 grant from the National Science Foundation to help make the product commercial.

Richard Fox, an Orlando-based entrepreneur and venture capitalist, is working with Kepuska to bring the product to the masses.

"The key step is demonstrating the product and right now that is being done," Fox said. "We have inquiries from big consumer corporations that have to remain confidential, but you would see them at Best Buy."

Next, these corporations would test the product and see how they can incorporate it into their devices, which would eventually make it to the consumer.

Here's hoping in the near future when the big game is about to start and the remote goes missing, a simple, "Television, turn on," will do.

Veton Kepuska may be reached at vkepuska@fit.edu

Michelle Spitzer

Veton Kepuska and his student Sean Powers demonstrate the hands-off system.

"When you want to speak to someone, you refer to that person by name. The usage of his or her name is a trigger word."

—Veton Kepuska | Associate Professor | Electrical and Computer Engineering Department

Florida Tech Research Briefs

Florida Tech has a long-standing history of conducting cutting-edge research in a wide variety of disciplines. The level of funded research has steadily risen over the years, and as such has served to establish Florida Tech's reputation as a world-class university.

FLORIDA TECH RESEARCH PARK
at Melbourne International Airport

New Site for Research Park

Headquarters for the Florida Tech Research Park, a partnership of the university and Melbourne International Airport, held its grand opening in April 2013 at its new location in the Center for Aeronautics and Innovation Building on NASA Boulevard. The research park, a self-sustaining innovation center, focuses on facilitating the creation, integration and application of technology for the region.

The park continues to welcome tenants, most recently Archo Solutions Engineering USA, of Sao Paolo, Brazil, and not long ago, Revolution Technologies. Tenants benefit by business incentives, convenient support services and amenities, a strong university partnership and a substantial research base.

"It's known that research parks create jobs and economic growth. I am very pleased that Florida Tech is in a position to make such an impact here in our community," said Florida Tech President and CEO Anthony J. Catanese.
For more information, visit www.fit.edu/researchpark or call (321) 914-0742.

Photo below: from left, Florida Tech President and CEO Anthony J. Catanese; Melbourne Mayor Kathleen Meehan; Phillip W. Farmer, chairman of the Florida Tech Board of Trustees; Pamela Gillespie, Director of Community Relations, U.S. Congressman Bill Posey; Rick Cloutier, deputy director of aviation operations, Melbourne International Airport; and Florida Tech Senior Vice President for External Relations Winston Scott.

Farmer Scholar's Implantable Biogenerator Earns First Place

Finding a method of electrical energy production within the human body to passively support internal implant can be a problem. Andrew Hernandez came up with an award-winning solution.

His research won first place in the Engineering Section of the Student Research Competition of the Sustainable Energy Alternatives and Advanced Materials REU (Research Experience for Undergraduates) Program. It was sponsored by the National Science Foundation.

Hernandez modified the design of an implantable biogenerator and tested it after having worked with biogenerators that rely on biological systems—such as the circulatory system— with Professor Shaohua Xu. The work won him the award.

In 2009 Hernandez was the first to be named a Phillip W. Farmer Scholar, which gave him full tuition support throughout his Florida Tech undergraduate career. He graduated with a bachelor's degree in chemical engineering in May 2013.

Graphic Makes Journal Cover

Professors Ke-Gang Wang and Martin Glicksman of the mechanical and aerospace engineering department published the paper, "Ostwald Ripening in Al-Li Alloys: A Test of Theory," in the *International Journal of Materials Research*. An illustration they created for their paper was featured on the cover of this prestigious journal in the November 2012 issue.

Students Help Commercialize Product

Mainstream Engineering sought out Florida Tech for help launching the company's new HVAC Remote Monitoring System (RMS) product. Associate Professor Abram Walton and students in the Nathan M. Bisk College of Business graduate course in technology commercialization developed a full, go-to-market strategy for the company.

The class conducted market research, business-model scenario planning and technology commercialization. "Mainstream previously used student teams from Harvard and Wharton graduate schools for this type of support. When the project ended, Mainstream noted that our consulting team 'had blown them away, with the quality of work," said Walton. "The company is eager to engage the school in further work."

Outstanding National Paper

Physics doctoral student Burcu Kosar's paper was deemed "outstanding" at the American Geophysical Union (AGU) meeting in San Francisco, Calif. Kosar's paper was on sprites, the gamma-ray flashes produced in Earth's atmosphere by severe lightning storms and upper atmospheric events. The AGU's Kara Smedley said her paper "sets an example for your fellow students and the entire AGU membership."

Correction

A photo, which appeared in the 2012 Discovery, page 22, was not Melbourne International Airport. The editor regrets the confusion.

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55th Anniversary

DISCOVERY

Under a $250,000-plus, 24-month research study funded by the Florida Department of Transportation (FDOT), researchers and their students in engineering systems and civil engineering are working with UAVs to provide real-time remote access inspection data. Evaluating the system's capabilities will help FDOT develop more efficient methods to inspect bridges and high mast luminaires (HMLs). Every two years, FDOT inspects approximately 7,000 bridges and 4,300 HMLs, which are typically time-consuming and often involve costly traffic delays. FDOT relies upon the inspectors to make important decisions that have significant economic and public safety implications.

(left to right) Bolurin Ola, an undergraduate in aviation management and Dennis Dalli, an engineering management graduate student, send a UAV aloft in a Melbourne park.

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