

Explore

FALL 2023

Research at the University of Florida



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Python Code
Can tech give scientists an edge?



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About the cover:

In the Everglades, Pete Donahue, Melissa Miller and Brandon Welty brave heat and alligators to gather data that can help control pythons. This page: Miller and Welty use radio telemetry to track a tagged snake.

Photos, this page and cover, by Cat Wofford, UF/IFAS Communications.

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John Jernigan

Sometimes the distractions of the moment make it hard to focus on longer-range challenges and opportunities. But, scientific and scholarly research is about thinking ahead, making discoveries today that will lead to a better tomorrow.

In late 1944, as it became apparent that Allied forces would prevail in World War II, President Franklin Roosevelt began thinking ahead, to how science had helped win the war and how it could impact the post-war future of the United States, and the world.

In a letter to Vannevar Bush, director of the Office of Scientific Research and Development that oversaw the development of many defense-related scientific advances, including radar, penicillin and the atomic bomb, Roosevelt wrote: “The information, the techniques and the research experience developed... by the thousands of scientists in the universities and in private industry, should be used in the days of peace ahead for the improvement of the national health, the creation of new enterprises bringing new jobs, and the betterment of the national standard of living.”

At Roosevelt’s direction, Bush brought together leaders from government, universities and industry to produce *Science: The Endless Frontier*, a landmark report delivered to President Harry Truman in July 1945 that spelled out a vision for supporting scientific research in the United States that is as fresh today as it was nearly 80 years ago.

At the heart of that report was the conviction that the country “must strengthen the centers of basic research, which are principally the colleges, universities and research institutes. These institutions provide the environment which is most conducive to the creation of new scientific knowledge... It is only the colleges, universities, and a few research institutes that devote most of their research efforts to expanding the frontiers of knowledge.”

In a 2014 report to Congress, a National Academy of Sciences committee noted that federal investments in research “have yielded benefits that today include computers, the Internet, wireless communication, the laser, the global positioning system,

and modern medicine, among many other—advances that have enabled the United States to achieve unprecedented prosperity, security, and quality of life.”

The purpose of publicly funded research at universities is to create a better tomorrow, to produce new knowledge that ensures our national security, improves human health, promotes economic leadership and builds an intellectual workforce. Through research, we produce the knowledge and insights necessary for new medical therapies, emerging technologies and improved crops for farmers. At the University of Florida, research in genetics is leading to groundbreaking drugs to treat blindness; research in chemistry is leading to completely recyclable plastics; and research in agriculture is leading to new varieties of fruits and vegetables.

The university research enterprise also produces the next generation of scientists and scholars. Every year, UF is among the national leaders in doctoral degrees awarded, turning out graduates who go on to pursue research here, at other institutions, in government and in industry.

Last year, UF researchers conducted a record \$1.25 billion in research. That was a 15% increase over the previous year, placing UF among the top universities in the country. A robust research enterprise allows UF to attract the best and brightest faculty to our campus, where we equip them to pursue discoveries and share their knowledge with our students. Some of that research leads to new products and new companies that make significant contributions to Florida’s economy. Continued investment in the research enterprise of our universities is key to ensuring a secure, healthy and prosperous future for our state and nation.

David P. Norton
Vice President for Research

UF research spending up 15% to record \$1.25 billion

Record **\$530 million** in spending on projects funded by the **federal** government and nearly **\$200 million** in **state and local** government spending.

RECORD SPENDING

Since 2012, **UF research expenditures** have **increased** by nearly **80%**, nearly doubling the rate of growth for university research spending nationally.

SPENDING UP 80%

Nearly half of the research spending was in the **six colleges** of UF Health, led by the College of Medicine in Gainesville and Jacksonville with **\$378 million**; the College of Public Health & Health Professions with **\$34.9 million**; the College of Pharmacy with **\$34.8 million**; the College of Veterinary Medicine with **\$31.3 million**; the College of Dentistry with **\$18.7 million**; and the College of Nursing with **\$5 million**.

UF HEALTH

The Herbert Wertheim UF Scripps Institute for Biomedical Innovation & Technology in Jupiter accounted for **\$97.6 million** in research spending.

UF SCRIPPS

UF Health Cancer Center received the National Cancer Institute (NCI) designation in 2023. The center has **doubled** its **research funding** since 2016, with **\$48.8 million in total cancer research grants** and 359 cancer research projects.

NCI Designation

AWARDS

UF also surpassed **\$1 billion** in new external **awards** for the first time in 2023, including **\$792 million** from the federal government, nearly **\$77 million** from state and local governments, **\$98 million** from private foundations and **\$61 million** from industry.

Herbert Wertheim College of Engineering

Herbert Wertheim College of Engineering conducted **\$148.4 million** in research.

IFAS

UF's Institute of Food and Agricultural Sciences (UF/IFAS) conducted over **\$300 million** in research.

CLAS

College of Liberal Arts and Sciences conducted **\$63.2 million** in research.

FLORIDA MUSEUM

Florida Museum of Natural History conducted **\$8 million** in research.

STATE ECONOMIC IMPACT

UF accounts for about **40%** of the State University System of Florida's research spending. Research at Florida's state universities has an estimated statewide **economic impact** of about **\$4 billion annually**, according to recent studies.



Professor Juan Gilbert and President Joe Biden during a White House ceremony in October

Voting tech earns professor presidential technology medal

President Joe Biden has awarded UF computer science Professor Juan Gilbert the National Medal of Technology and Innovation for developing a system to make voting more reliable and accessible, and for increasing diversity in the computer science workforce.

The National Medal of Technology and Innovation, or NMTI, is the nation's highest honor for technological achievement, bestowed by the president of the United States on leading innovators for their outstanding contributions to America's economic, environmental and social well-being.

As a computer scientist, educator and researcher, Gilbert, the Andrew Banks Family Preeminence Endowed Professor and chair of UF's Department of Computer & Information Science & Engineering, has dedicated much of his career to finding ways to improve election technology, with the ultimate goal of protecting democracy.

To that end, he invented Prime III, an open-source voting system that accommodates individuals with physical disabilities as well as ensures the reliability and security of every vote. Prime III was the first open-source voting system to be used

in federal, state and local elections in the United States.

"The mission of the research enterprise at the University of Florida is to make a positive difference in the lives of people in the state, the nation, and the world, both in the present and in the future," said UF President Ben Sasse. "Dr. Juan Gilbert is doing just that. We could not be more pleased."

The National Medal of Technology and Innovation recognizes those who have made lasting contributions to America's competitiveness, standard of living, and quality of life through technological innovation and to recognize those who have helped strengthen the nation's technological workforce.

"Dr. Gilbert's recognition from the White House is a great source of pride for UF and our college, and a fitting honor," said Forrest Masters, interim dean for UF's Herbert Wertheim College of Engineering. "His inclusion into this cadre of eminent innovators speaks to the importance of his work in addressing some of our society's most pressing challenges, and his commitment to the real-world technological solutions that distinguish us

as one of the most inventive universities in the nation."

Gilbert's interest in voting security grew after the 2000 U.S. presidential election exposed flaws in the country's voting technology. As a freshly minted Ph.D. and professor, he went to work to come up with a solution and designed technology that can adapt to voters of varied abilities.

"We were just trying to fix a problem," Gilbert said. "If you can't vote, how is that different from not having the right to vote? What is gratifying is changing the history of voting."

Through his expertise in advancing computer software and technology, Gilbert focuses on the point where technology intersects with people and improves the outcome of that interaction. At UF, he leads the Computing for Social Good Lab, which designs and evaluates computational technologies as they relate to human conditions. In addition to his work with Prime III, he has developed software that uses artificial intelligence to address the issues of diversity in admissions and hiring and created an app that allows police officers to initiate a video call with the driver they have just pulled over.

Gilbert attended college at Miami University in Oxford, Ohio, 20 minutes from where he grew up in Hamilton, Ohio. While he hadn't planned on becoming an academic, in 2000 he was the first Black person at the University of Cincinnati to receive a Ph.D. in computer science. Ever since, Gilbert has worked to diversify the field and encourage students from underrepresented groups to pursue graduate degrees. Many of the graduate students in his lab are from underrepresented groups, and Gilbert spends time doing outreach at organizations like UF's chapter of the National Society of Black Engineers.

"I've always wanted to help other people, and I saw science as empowering," Gilbert said.

Gilbert's work as a researcher, teacher, and mentor has not gone unnoticed. He received the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring from President Barack Obama in 2011.

Gilbert is a Fellow of the Association for Computing Machinery (ACM), American Association of the Advancement of Science (AAAS), the IEEE and the National Academy of Inventors (NAI). He also was recognized with the 2021 ACM Social Impact Award, the 2018 Computer Research Association's A. Nico Habermann Award, and the AAAS 2014 Mentor Award. He was named a 2015-2106 AAAS-Lemelson Invention Ambassador, Speech Technology Luminary by Speech Technology Magazine and a national role model by Minority Access Inc.

With the motto "Change the World" hanging in his lab, Gilbert and his students and colleagues are doing just that, especially in the field of voting technology.

"In the future, everyone is going to use technology to vote, and it will definitely be inspired by our work," he said. "People have died in this country for the right to vote, and we're committed to making voting more accessible for everyone."

Karen Dooley



Felipe Ferrao in a Gainesville campus greenhouse with young coffee plants

Change is brewing: Growing tea and coffee in Florida

As coffee and tea cultivation faces threats from climate change, Florida could become a new source for your morning beverage.

Researchers with UF's Institute of Food and Agricultural Sciences have tested eight types of tea for Florida, evaluating three- to five-year old plants as they matured for harvest. One variety died out completely, but the others endured intense sun and tropical-storm force winds.

"We feel that North Central Florida is pretty good in terms of climate for growing tea," said Bala Rathinasabapathi, a UF/IFAS professor of horticultural sciences.

Rathinasabapathi is also testing varieties for South Florida.

"Tea likes acidic soil, just as citrus does," he said.

This summer, researchers planted coffee varieties that thrive in Puerto Rico in experimental plots in Homestead, Fort Pierce and Citra, which is southeast of Gainesville and also the site of the tea experiment. After determining which plants succeed, the researchers will test the flavor of the coffee and investigate the crop's potential profitability.

"Coffee production needs to adapt to a changing climate. Its future is at a critical point," says geneticist Felipe Ferrao, who leads UF's coffee research. "This work is a new frontier."



President Sasse announces strategic funding awardees



Ben Sasse, UF President

A neurotechnology lab, astrobiology experiments, and a cohort of Gulf Scholars are among the projects receiving strategic funding through a program to advance the student experience and interdisciplinary scholarship at the University of Florida.

After UF received \$130 million in new funding from the Florida Legislature this year, President Ben Sasse established that more than half

of the new funding must be used for strategic purposes.

“When we asked campus leadership to come up with their best ideas for how to use this money, they jumped in with both feet,” Sasse said, adding that the proposals “can do some incredible things.”

Additional awards continue to be announced. Funded proposals include:

- **Health Affairs:** Florida’s Digital Twin, \$1.75 million— Design and construction of a statewide digital twin technology program to reduce barriers to cross-campus collaboration and to increase engagement between UF faculty and researchers and public- and private-sector stakeholders.
- **College of Education:** UF Promoting Interdisciplinary Use of Neurotechnologies to Enhance Education, Research, and Service (PIONEERS), \$113,754—Partnering with UF’s Herbert Wertheim College of Engineering and Design, Construction and Planning, the College of Education aims to purchase and deploy a neurotechnology lab that transforms educational research and practice.

- **College of Liberal Arts and Sciences:** UF and the Gulf, \$413,834 over four years— Creation of a Gulf Scholars program in the Bob Graham Center for Public Service with partners in the College of the Arts; Design, Construction and Planning; the College of Agricultural and Life Sciences; Engineering; and the College of Journalism and Communications to promote interdisciplinary research and experiential learning focused on the challenges facing communities along the Gulf of Mexico.
- **College of Pharmacy:** In-Space Biomanufacturing for Human Health Innovation Hub, \$1.5 million over three years— Conduct astrobiology experiments in space and on the ground to reveal the significant effects of low-gravity on biological systems.
- **College of the Arts, supported by UF/IFAS:** Arts Impact Engine, \$1 million over four years— An initiative to help faculty and students write competitive proposals for external funding opportunities, advancing UF’s fast-growing and highly grant-funded arts program.
- **Institute of Food and Agricultural Sciences:** Plant Transformation Center, \$2 million over two years— UF/ IFAS researchers are focused on the rapid development and commercialization of genetically improved crops.
- **Warrington College of Business:** FinTech Research Center, \$600,000 over three years— Support operations for fintech research centers in Jacksonville, Tampa and South Florida.
- **Herbert Wertheim College of Engineering:** Charting the Course to Preeminence in National Security Leadership, \$316,000— Partnering with the Office of Government and Community Relations and the Hamilton Center, the college aims to accelerate the long-term positioning of UF as a trusted partner for research, policymaking and workforce development with federal agencies responsible for national security and defense.

For the full list of funded projects, visit news.ufl.edu

Report: NASA needs significant increase in space biology research

Rob Ferl has spent his career working with NASA to understand what happens to Earth's living organisms on the journey to space, so it has been particularly gratifying for him to co-chair a National Academies of Science, Engineering, and Medicine committee that is charting the course for the next 10 years of biological and physical sciences research in space.

That committee—the Decadal Survey on Biological and Physical Sciences Research in Space 2023-2032—released a report in September calling on NASA to increase its investment in biological and physical sciences research tenfold over the next decade to prepare for more and longer space missions.

Their final publication, *Thriving in Space*, is a 350-page analysis of where biological and physical sciences research needs to go in the next decade.

Ferl and co-chair Krystyn Van Vliet, a professor of engineering and vice president for research and innovation at Cornell University, spent the past three years coordinating multiple scientific panels and taking input from hundreds of researchers around the country to produce the report.

Biological and physical sciences research provides the critical scientific and technological foundations that make space exploration possible, according to the report: “As humanity looks toward the Moon and Mars for future missions, this work is needed to help astronauts adapt and live in the harsh environments of space.”

The survey was commissioned by NASA to “review the state of knowledge in the current and emerging areas of space-related biological and physical sciences research and generate consensus recommendations for a comprehensive vision and strategy for a decade of transformative science at the frontiers of biological and physical sciences research in space.”

“Imagine what might be accomplished if science could effectively grow plants for life support away from Earth, manufacture better materials from lunar or Martian resources, and reduce risks of extended space exploration by humans or by automated machines,” the report begins.

It then proposes three cross-cutting themes for biological and physical sciences research over the next decade to help make that dream a reality:

- **Adapting to Space** concerns how the fundamental physics of space environments impact the ability of living systems to survive transition to and extended stays in space.
- **Living and Traveling in Space** explores living systems and supportive environments over long durations in space, while deriving resources in space under the logistical and physical constraints of space.
- **Gravity or Terrestrial Limitations** seeks scientific insights that can be found only in space.

“Sustained human exploration beyond low Earth orbit presents science objectives and challenges we haven’t yet completed or in some cases even approached through the era of the International Space Station,” Ferl says. “Crews will spend more time in low Earth orbit, in deep space transit and while living and working in lunar or Martian stations. NASA should work to take advantage of the profusion of research capabilities from academia and through commercial space platforms to tackle these new challenges and ensure biological and physical sciences

research can continue meeting the science needs of the nation.”

Ferl, a distinguished professor in UF’s Institute of Food and Agricultural Sciences and assistant vice president for research, considers this opportunity “my chance to have a lasting effect on an area of science that I have come to appreciate and love enormously.”

“The timing is actually pretty perfect, because as a seasoned space scientist, the chance to help lead the development of a document of this stature is kind of a capstone event to inform the next generation,” he says.

Joseph Kays





7 Questions with Oşubi Craig

He didn't plan to return to his hometown, but when engineer, musician and administrator Oşubi Craig saw the opportunity to lead UF's Center for Art, Migration and Entrepreneurship, he knew it was too good to pass up. CAME launched in 2020 to study and foster the cultural and economic contributions of diaspora communities, with faculty research, a Maker in Residence, new creative works and community outreach. Here, Craig shares his hopes for the center's global network of scholars and artists, how culture fuels the economy, and how a sandwich can be art.

How do you explain the links between art, migration, and entrepreneurship?

The reason that people love Disney's Food and Wine Festival is that you eat food from all over the world. It's not just American food, it's the fact that you get to taste food from everywhere. That speaks to the way in which we experience arts and culture. Food, music, dance, art—those are the sticky substances that keep people in communities. And when people are having arts experiences, the dollars that are churning inside of our community really begin to multiply. Americans for the Arts says that every dollar spent in an art space is circulated inside of our community at least six times. We want to figure out the ways that we cultivate environments for creativity and culture to flourish.



Why is that especially relevant in Florida?

When we look back at the recession of 2008, the economy and Wall Street going haywire, we were seeing those signs here in Florida before everybody else. Florida is a leader and a litmus test of what is going to be happening next. This intersection of arts, migration and entrepreneurship really defines what the new economy looks like, because there's so many people, specifically from the Global South, coming to the States looking to build and chase the American dream. It is reshaping our state in really powerful and impactful ways. This uniquely situates culture makers to be on the forefront of growth and innovation. People don't typically think of Florida as an art hub, yet the biggest art event in the world, Art Basel, meets in Miami every year. Florida is the true melting pot experience where art, migration, and entrepreneurship come together, and everyone wins in the process.

What intrigued you about the opportunity to lead CAME?

The ambitious idea of creating a center like this was just incredible to hear about. And the opportunity to have a Maker in Residence for three years changes what's possible because you get to go deeper. You have time for things to really marinate. As a drummer, engineer and Gainesville native, I jumped at the opportunity to lead this work in my community.

CAME's first maker-in-residence, Qudus Onikeku, created Atunda, an artificial-intelligence-powered platform to copyright dance moves. What's next?

We are negotiating funding with a major foundation to get 1,500 new dance moves into our AI protocol. We are really, really excited about what it represents—a tool to help dance artists document and get paid for their creations. We're not just talking about protecting dance moves, we're talking about protecting intellectual property. The management of the IP around digital spaces is going to represent significant economic opportunity for large companies. It's also going to have to be mediated from a legal and technological standpoint. We're going to provide people with a tool to say "I created this on this date, and I have proof."

For the next Maker in Residence, we are looking for someone who has a focus in AI in the arts or arts in emerging technology. The moment is too ripe for us at UF to miss the opportunity of having somebody that can interface with the amazing capacity and tools that we have, along with the incredible faculty in the College of the Arts and relationships with innovators across campus. We can't pass it up. It's going to be the most significant hire for the center in our history, because of all of the opportunity that sits right now at our feet.

The Center has affiliate faculty around the country and the world. What's an example of a collaboration you're excited about?

We have a faculty member at Wake Forest, Dr. Ariel Smith, who studies food truck culture as a growth space for entrepreneurs in Black and brown communities. People who work in those spaces might say, "I'm not an artist," but then will give you a handcrafted, amazing sandwich that has all of these different cultural influences that come together. And it's not just good food, but folks who shape, lead, and provide for their communities. For us, that is definitely representative of what CAME is all about.

You're also a musician. How does your creative practice inform your approach to research?

As a drummer, I try to do a lot of listening. Any musician worth their salt needs to get on the bandstand and listen to what everybody else is playing, even if you're out front soloing. As a director, I know that in the end I am responsible for the decisions that are made, but I do my best to bring in everyone's voice. And I think one of the things that has been an asset for me being both a higher ed administrator and arts administrator is that I can relate to artists, having lived as a performing artist for years.

When you think big about CAME's future, what do you envision?

CAME is about culture in motion—we want to connect communities, creativity, and innovation on both a local and global scale. Just like IFAS is a land grant arm for UF's agriculture activities, we imagine CAME also leveraging our relationships with makers and innovators to extend the work that we do, and its benefits, beyond the college campus and local community. I would love to have representation outside of Gainesville—to have programming and potentially staff in Jacksonville, in Orlando, in Tampa and South Florida. To be in the places where the action is happening at a different scale, I think that is where you get to a different level of impact—bringing arts, culture, and entrepreneurship experiences to all Floridians.

For more of this interview, visit explore.research.ufl.edu.



by Natalie van Hoose

Return 'Em Right

A new effort helps anglers
boost survival of reef fish

A new program is training thousands of recreational anglers with equipment to release reef fish safely, helping protect fisheries along the Gulf Coast.

When reef fish such as snapper and grouper are reeled in from deep waters, the swift pressure change can cause their internal gases to expand, a condition known as barotrauma. This often results in severe bloating and grotesquely displaced organs, rendering a fish too buoyant to swim away when released. Each year, millions of reef fish die of barotrauma.

A UF-based team aims to change that.

In May 2022, Florida Sea Grant (FSG) launched “Return ‘Em Right,” a research-based educational program that teaches Gulf Coast anglers how to use descending devices—simple tools that quickly return fish to depth, allowing them to recompress and enhancing their chance of survival. Anglers who complete FSG’s online educational course at ReturnEmRight.org are eligible for a free gear kit, which includes two types of descending devices.

In the program’s first year, FSG trained nearly 14,000 anglers, including more than 570 charter captains, and distributed over 13,000 gear kits. FSG is helping to implement the seven-year program in collaboration with the NOAA Restoration Center and the Gulf State Marine Fisheries Commission, with assistance from UF’s Institute of Food and Agricultural Sciences.

“Return ‘Em Right is changing the culture around releasing reef fish, said Charles Sidman, associate director of research for FSG and the program’s principal investigator. In surveys, 65% of anglers who enrolled in the training said they had never used a descending device. After taking the course, that number fell to 17%.

“Every fish successfully released has the chance to grow, spawn and contribute to the future of fisheries,” Sidman said. “FSG has



Return 'Em Right

been studying the most effective ways to reduce barotrauma for 15 years. Now, we’re equipping the angling community with the best tools available to steward reef fish for generations to come.”

FSG has a 50-year history of researching and promoting sustainable fishing practices in Florida, where recreational fishing adds an estimated \$13 billion to the economy each year. This made FSG a natural partner for a program that spans Gulf states, Sidman said.

Return ‘Em Right is also dynamic—the team tweaks training modules, gear kits and messaging in response to angler feedback. Follow-up surveys provide fresh data on how often anglers use descending devices and where, which species of fish they’re releasing and the kinds of resources they need in the future.

“Return ‘Em Right is being managed more like a start-up business than an academic program,” Sidman said. “Many of the tactics we’re using to implement the program come from the business world—how we market the use of descending devices, how we attract anglers and keep them engaged in the long-term sustainability of fishing. I’ve never been involved in anything at UF like this before.”

Can Tech Tackle Pythons?



As the invasive species spreads,
'scout snakes' could give
biologists an edge

by Alisson Clark



Photos by Cat Wofford, UF/IFAS Communications





hiss emerges from a plastic bin, rising over the noise from a nearby highway.

On a levee at the edge of the Everglades, University of Florida wildlife ecologist Melissa Miller approaches the Rubbermaid container. Inside, double-bagged, lies 12 feet of coiled muscle with six rows of needle-sharp teeth and a powerful urge to escape.

It's about to get its wish.

Miller feels for the snake's head and grips just behind it, then lifts the 40-pound bundle, peeling back the thin cloth bags.

"It's like unwrapping a horrible present," she says.

Burmese pythons have proliferated here, bringing parasites and pathogens and stressing an ecosystem we've invested billions to restore—not only for wildlife, but the storm protection and fresh water it provides South Florida residents. The snakes have spread north to Lake Okeechobee, south to Key Largo, east to Miami and west to Naples. One model suggests a third of the southern United States could sustain them.

Miller hopes this python and others in a new "scout snake" program can turn the tide. When it disappears into the marsh where it was captured two weeks ago, it will carry implants to track its movements. When groups of potential mates gather for breeding, the tagged snake will reveal their location, helping capture more of the invaders. But with these tech-equipped snakes, removal is only part of the goal.

Wading with pythons

"We've got a signal!" Miller says.

Miles out in the Everglades, UF wildlife biologist Brandon Welty holds an antenna aloft. A beep sounds from his handheld receiver, indicating the distance from another snake's tracker. As they get nearer, the beeps get louder.

They're searching for PyMo-1445, an earlier recruit to the scout program that's been missing for almost a month. Two weeks ago, an aerial survey tracked the 9-foot male here, near a tree island rising up from the sawgrass. Tree islands seem to be a favorite hangout, but that's one of the many, many things we don't know about pythons. If scientists hope to slow their spread, they need to understand their habitat preferences, along with their mating habits, how many of their young survive, how long they live in the wild, and much more.

"It's the most studied invasive in South Florida, but there's still so much we still don't know," says Miller, the principal investigator on the scout project. "If we can say, they're breeding at this time of year, on this tree island, in this type of habitat, we have more ability to detect and remove pythons in the wild. This is an urgent need."

Much of what we do know comes from the 18,000 pythons euthanized since 2017. No one knows how many remain, but it's likely many, many times that number.

Welty spent three years as a contractor, bagging hundreds of pythons on and around the levees built to control water flow. The levees turn into snake superhighways at night, making pythons easy to spot. We know less about those who reside in the inaccessible interior, which makes up 97% of the Everglades.

The airboat navigates ever-narrower trails through the swamp, until the GPS indicates they're 300 yards from PyMo-1445's last known location. The trails end, but the airboat keeps pushing through the razor-sharp sawgrass.

Beep.

"This one is elusive. He likes to move a lot," says airboat operator Pete Donahue, cutting the engine.

Beep.

Alligator bellows reverberate like thunder. Welty watches the signal strength indicator on his receiver jump from three bars to five.

Beep.

Beep.

Beep.

"He's here," Welty says.



Welty and Miller release a tagged python. Radio tracking will help remove additional snakes and shed light on their habits.



Airboats help the team reach the scout snakes when water levels allow, but the dry season requires wading through thigh-high water and mud.

Funded by a \$1.4 million grant from the South Florida Water Management District and \$346,000 from the Florida Fish and Wildlife Conservation Commission, the scout snake program aims to slow the spread of the non-native species by providing the data needed to locate and remove more pythons.

Kodiak C. Hengstebeck



While python bites do happen, the bigger threats to researchers in the field are water moccasins, alligators and heat stroke.



Miller and co-authors of a 2023 *NeoBiota* paper led by the United States Geological Survey described pythons as “one of the most intractable invasive-species management issues across the globe.”

Even with radio tags, finding the scout snakes in the sawgrass is exhausting work. “You have to love it or you’re not going to last long,” Miller says.

Below: The pink, threadlike tag is visible just below the scout snake’s head.



They slide off the boat and into the water. With the roar of the airboat engine extinguished, they hear only the trills of red-winged blackbirds flitting between the cattails. No breeze stirs the sawgrass. Silence.

“Keep your eyes peeled for movement,” Miller says.

Struggling through mats of submerged vegetation that drag at their pant legs, Miller and Welty inch closer, the mud beneath sucking at their boots. Donahue wades away from them in a flanking maneuver, sweeping out in a semicircle to keep the python between them. With no dry land nearby, snakes will bask where the thatch of cattails is thick enough to support their weight, or slip beneath the surface to swim when they want to travel quickly.

Being so close to a wild python doesn’t concern the team: their bites “bleed a lot, but don’t hurt that much,” Welty explains. They worry more about alligators, swarms of fire ants and water moccasins— not to mention heat stroke. Outside of the wet season that runs from May to October, they track exclusively on foot, since there’s not enough water for airboats. Wading through sawgrass “is more like climbing,” Miller says. “It’s exhausting.”

Beep.

Beep.

Beep.

Beep.

“He’s very close,” Welty says.

They squint into the shadows for the gleam of sunlight on scales, a glimpse of the intricate giraffe-like pattern that made Burmese pythons so prized as pets. Nothing.

“Is he moving?” Miller asks.

“He’s moving away from us,” Welty replies, “which means he’s in the water.”

They stop pursuing. If they chase PyMo-1445 too much, they'll alter the behavior they're trying to document. It's disappointing: Welty estimates they were less than three feet away. But they'll still be able to record habitat data as the snake slides unseen through the swamp.

"So many nice spots for snakes," Miller sighs.

Not just a South Florida problem

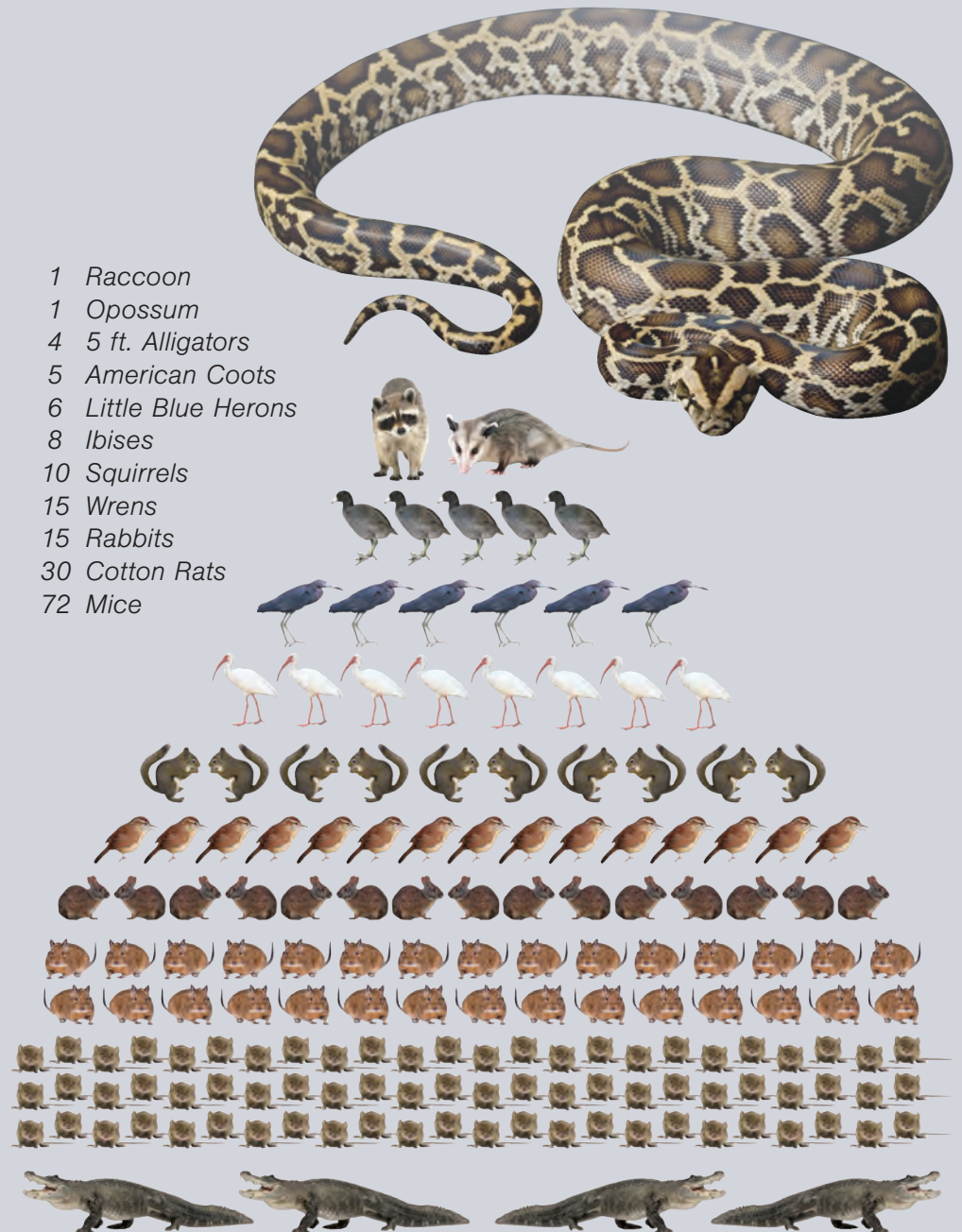
Why are Burmese pythons here, 10,000 miles from their native range?

Floridians have reported occasional sightings since 1912, when the *Tampa Daily Times* wondered if "some ship brought these reptiles from the far east and the seamen, being tired of having them about, turned them loose on the coast."

It's hard to imagine intentionally sharing a seagoing vessel with a constrictor, but in the 1970s, it was trendy to share your home with one. In the later decades of a captive python's 30-year lifespan, though—when rats no longer satisfy and feeding it requires rabbits and even pigs—a pet owner might look at a nearby swamp and think, why not? Hurricane damage to outdoor enclosures might also have contributed to accidental releases. Scientists presumed the 11 pythons spotted between 1995 and 2000 were isolated releases, but when smaller, younger pythons began popping up around the Everglades, even skeptics had to admit they were reproducing.

Three wild boars. Seventy-one alligators. Five bobcats and five domestic cats. A goat, an otter and five chickens—plus 94 round-tailed muskrats, 43 deer and 52 marsh rabbits. All of these were found in the digestive tracts of pythons in a 2023 study by UF wildlife ecologist Christina Romagosa. The 1,716 snakes sampled ate their way through 76 species, besting the fearsome beaks of great blue herons, munching the 8-foot wingspans of magnificent frigatebirds, and gobbling up threatened species like little blue herons and roseate spoonbills.

Sample diet for a Burmese python in the Florida Everglades to grow to 13 feet in approximately 5-7 years



Source: South Florida Water Management District; Skip Snow, Everglades National Park and Dr. Stephan Secor, University of Alabama.

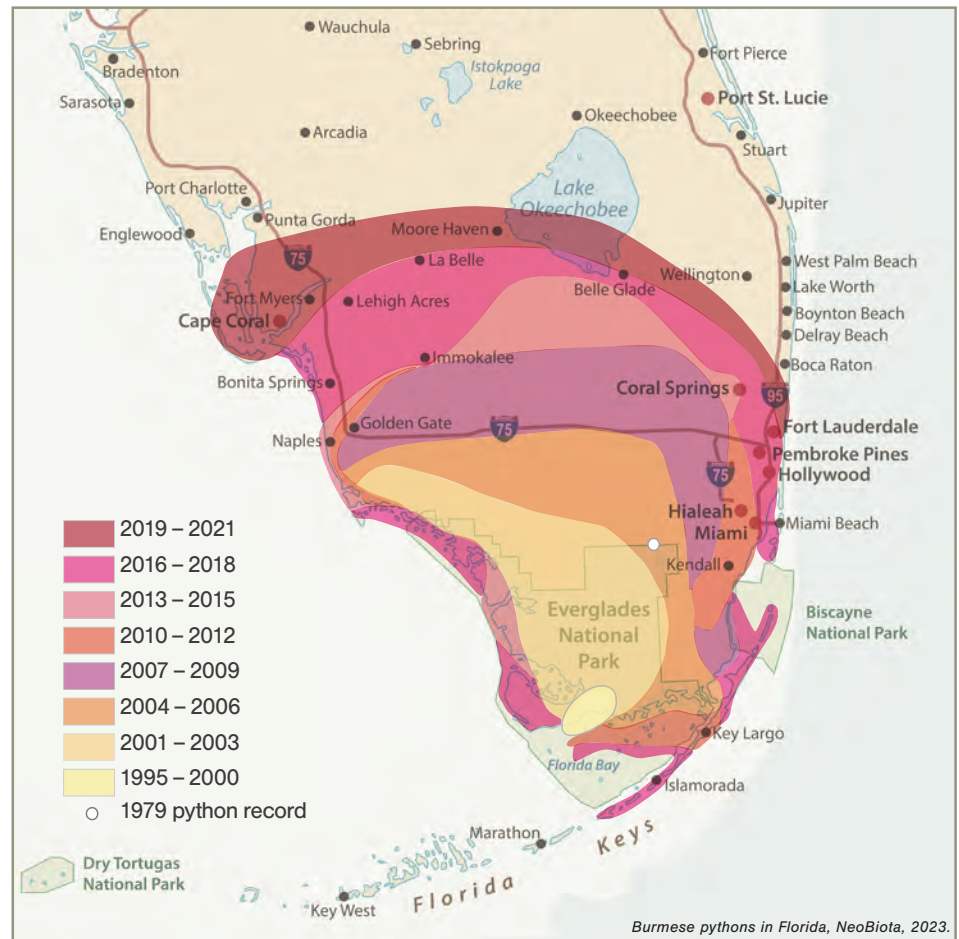
People aren't in direct danger: The sole recorded human fatality from a wild python worldwide dates to 1900 (although they have caused traffic accidents when crossing the road). There's never been an unprovoked attack on any of Everglades National Park's million annual visitors. And unless you've lost a python in your bathroom, you're incredibly unlikely to find one in your toilet, Miller assures, addressing a pervasive fear occasionally stoked by news coverage.

But for native wildlife and the ecosystems that sustain human life, pythons are bad news. They not only eat native creatures but compete for resources and disturb population dynamics in ways that could allow disease to spread—possibly to us. With much of the mammal population decimated by pythons, for example, mosquitoes have to feed on smaller creatures. In a 2017 study, IFAS scientists found mosquitoes were getting more blood meals from rodents that serve as reservoirs for Everglades virus, a subtype of equine encephalitis. That could translate to increased human exposure to the disease when those mosquitoes bite us. It doesn't usually make people sick—but it's mutating.

We once thought winters would limit pythons' territory. A 2010 cold snap in South Florida slowed their spread, but Miller points out that if the snakes that survived were naturally more cold-hardy, the die-off effectively selected for offspring with that trait. A warming climate may also be in their corner, but there's also a possibility they can learn to ride out lower temperatures by hiding in burrows or culverts. And pythons are very, very good at hiding.

"You can walk right past one and nine times out of 10 never even know it was there," Welty says.

That's where the scouts come in.



Pythons have spread steadily, with one model suggesting that a third of the southern United States could sustain them.

A snake in the grass

At the levee where the team is releasing the new scout snake, PyMo-1461, Welty points out a nearby burrow no bigger around than a basketball. The snake was captured there while guarding eggs—they've been known to lay more than 100 at a time.

She was thin from staying close to her nest—pythons don't eat when guarding eggs—so Welty is glad to hear her hissing. It means she's strong enough to be a good informant.

"She bit me through the bag already," he warns.

Because PyMo-1461 was found within the study area and was big enough to handle the implants, the contractor who caught her submitted her to the scout program instead of euthanizing it. (One such candidate, a 16-footer, regurgitated a 6-foot alligator while in holding. Neither survived.) From there, PyMo-1461 went to a local veterinarian who implanted the radio tags—two, in case one malfunctions—that emit a frequency unique to that snake. Her new accessories also include an accelerometer, which can reveal more about her movements and behaviors, and a durable threadlike tag that tells contractors they've found a scout snake that shouldn't be killed.

The five-year project, in collaboration with the United States Geological Survey, Fort Collins Science Center, South Florida Water Management District and the Florida Fish



"I love puzzles and challenges, and invasive species are a nonstop challenge," says Miller, shown releasing a scout snake.

and Wildlife Conservation Commission, is just beginning, with seven males and seven females roaming the Everglades.

"When people see the releases on social media, they ask, 'Are they fixed?'" Miller says.

They're not. Scout males help the team lure in and euthanize large females of reproductive age, and females help them understand reproductive behavior. Neither works if the snakes are sterilized. Miller understands why people might be confused about re-releasing a species we're trying so hard to eliminate, but she knows it's a necessary step. And it's working: Welty has already intercepted two more pythons while tracking the scouts. The planned addition of drones to their arsenal will allow easier access to remote areas and let them track more snakes. (The team is also working on high-tech solutions for invasive species like tegus, training artificial intelligence-enabled traps to recognize and capture the voracious black-and-white lizards that can grow to four feet long.)

Miller places the python on the levee. Then she releases the head and quickly backs away. PyMo-1461 coils up as if to strike, reconsiders. After a few minutes, the snake lurches off of the gravel road toward its burrow. The second her tail disappears into the grass, she's invisible, despite being inches away.

In four days, though—and throughout the five-year study— they'll meet again. ☒

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Vintage Vials

As UF's College of Pharmacy turns 100, a glimpse into a museum preserving its history

Hundred-year-old plant samples from the campus medicinal garden. Tinctures and tablets. Handwritten notes from a century ago, detailing the vision for UF's first health college. As UF's College of Pharmacy celebrates its centennial, much of its history lives on in a small, appointment-only museum in the Health Professions, Nursing and Pharmacy Building. As UF's



first co-ed college, Pharmacy blazed trails from its inception, graduating UF's first female master's student in 1932 and first Black Ph.D. student in 1966. Its research achievements include developing better drug-trial models, improving drug delivery past the blood brain barrier, finding promising new pharmaceuticals from the sea, discovering genetic links in drug responses

and advancing drug safety in vulnerable populations. In 2022, the college rose to third in the nation for total and NIH research funding with a record \$32.3 million.

For more photos from the pharmacy museum, follow us on Instagram at @uf.research.



GOING ROGUE

UF-led group develops new tools for tracking
illicit nuclear materials

By Joseph Kays

A visibly nervous man is stopped at a border crossing in eastern Europe. Authorities find a glass tube filled with black powder inside a heavy lead container in his trunk. Geiger counters go crazy. The powder is radioactive.

North Korea conducts a nuclear test and within hours U.S. “sniffer” planes scramble to gather air samples off the secretive country’s coast.

Three men are arrested in Germany as they disembark a flight from Moscow. They are carrying more than a pound of radioactive material they hoped to sell, including plutonium.

The International Atomic Energy Agency, the United Nations’ nuclear watchdog, recently reported 344 cases of trafficking or “malicious use” of nuclear and other radioactive material since 1993, and while that number might seem small, the consequences of even one of those cases proceeding to its logical conclusion are so grave that the U.S. government and its counterparts around the globe invest billions to keep nuclear material out of the hands of bad actors.

Since the dawn of the atomic age, but especially since the collapse of the Soviet Union in the early 1990s, the field of nuclear forensics has emerged as essential to tracking the movement of rogue nuclear material around the globe and to providing law enforcement with the proof it needs to prosecute the perpetrators.

Now, the Consortium for Nuclear Forensics, a University of Florida-led team of 32 scientists and engineers at 16 universities, has been awarded a five-year, \$26.4 million grant from the U.S. Department of Energy’s National Nuclear Security Agency, or NNSA, to develop new nuclear forensic technologies and to train the next generation of nuclear sleuths to use them.



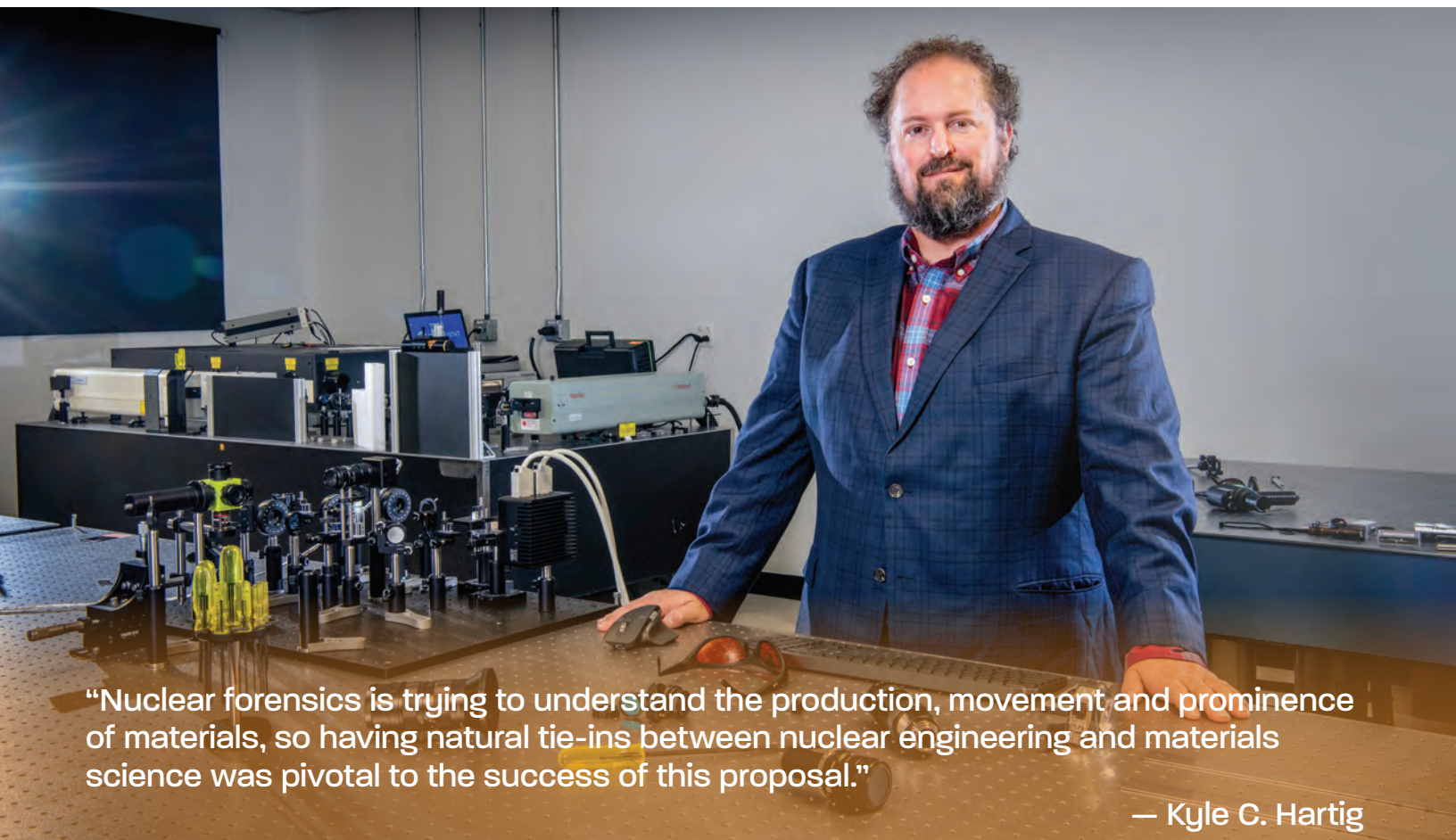
CONSORTIUM FOR NUCLEAR FORENSICS

Jim Baciak, the project leader and a professor in UF’s Nuclear Engineering Program, says new or improved scientific techniques developed in university labs will be employed in the DOE’s seven national laboratories around the country to test suspected nuclear materials for the FBI, the CIA, the Department of Homeland Security, the Air Force, and other law enforcement agencies.

Baciak says the team’s technical diversity—with expertise in analytical chemistry, radiochemistry, environmental sciences, geochemistry, nuclear engineering, physics, statistical analyses, machine learning and optical sciences—allows it to attack problems from many angles.

“Our team represents a diverse range of backgrounds, while also working in a highly collaborative environment that will lead to a number of new discoveries, insights and technologies that will support technical nuclear forensics for generations to come,” he says.

Nuclear Engineering Professor James Baciak and his students use activation analysis to analyze the radiation signatures that may exist in materials (such as LEDs) after a detonation.



“Nuclear forensics is trying to understand the production, movement and prominence of materials, so having natural tie-ins between nuclear engineering and materials science was pivotal to the success of this proposal.”

— Kyle C. Hartig

Kyle C. Hartig, an assistant professor in the Nuclear Engineering Program, adds that UF is uniquely equipped to lead this nuclear forensics effort, partly because its nuclear program is located within the Department of Materials Science and Engineering, unlike most nuclear engineering programs, which are either free-standing or part of mechanical engineering departments.

“There are about 24 nuclear engineering programs around the country and we’re the only one of them in a materials science department,” Hartig says. “Nuclear forensics is trying to understand the production, movement and prominence of materials, so having natural tie-ins between nuclear engineering and materials science was pivotal to the success of this proposal.”

Camille Palmer, the consortium co-director and an associate professor at Oregon State University’s School of Nuclear Science & Engineering, adds: “The consortium’s expertise, proven track record and a strong commitment to collaboration have played pivotal roles in earning the trust of the NNSA. The proposal effectively outlined how the team would contribute to the NNSA’s mission, providing a clear roadmap for addressing the need to bolster capacity in nuclear forensics and to drive innovative, program-relevant research. Furthermore, UF’s response showcased a robust ability to manage and support large, collaborative projects.”

Next Generation

A primary goal of the project is to train more than 50 Ph.D.s in diverse disciplines over the next five years, helping to create the next generation of nuclear forensics scientists, engineers and analysts.

“The national laboratories have a lot of expertise that’s quickly moving toward retirement, so there are significant efforts underway to develop the next generation of scientific expertise that can be with those labs for years to come,” Baciak says. “We need to make sure we have the right people trained in the right new techniques and new science who can then go into these fields.”

Hartig adds that the national laboratories “are not just interested in a chemist or a material scientist, but a material scientist who knows how to work with radioactive materials or a chemist who knows how to use other equipment outside their specialty.

“There’s not one analysis that points the finger at where a sample came from, so these folks have to be able to talk to mass spectrometer operators, to nuclear engineers, to radiochemists, to microscopists to kind of get that Venn Diagram to overlap to get to whodunit.”

Another unique capability UF brings to the project is the ability to prepare and image radiologically-active nuclear fuels and materials in the lab, led by Associate Professor Assel Aitkaliyeva.

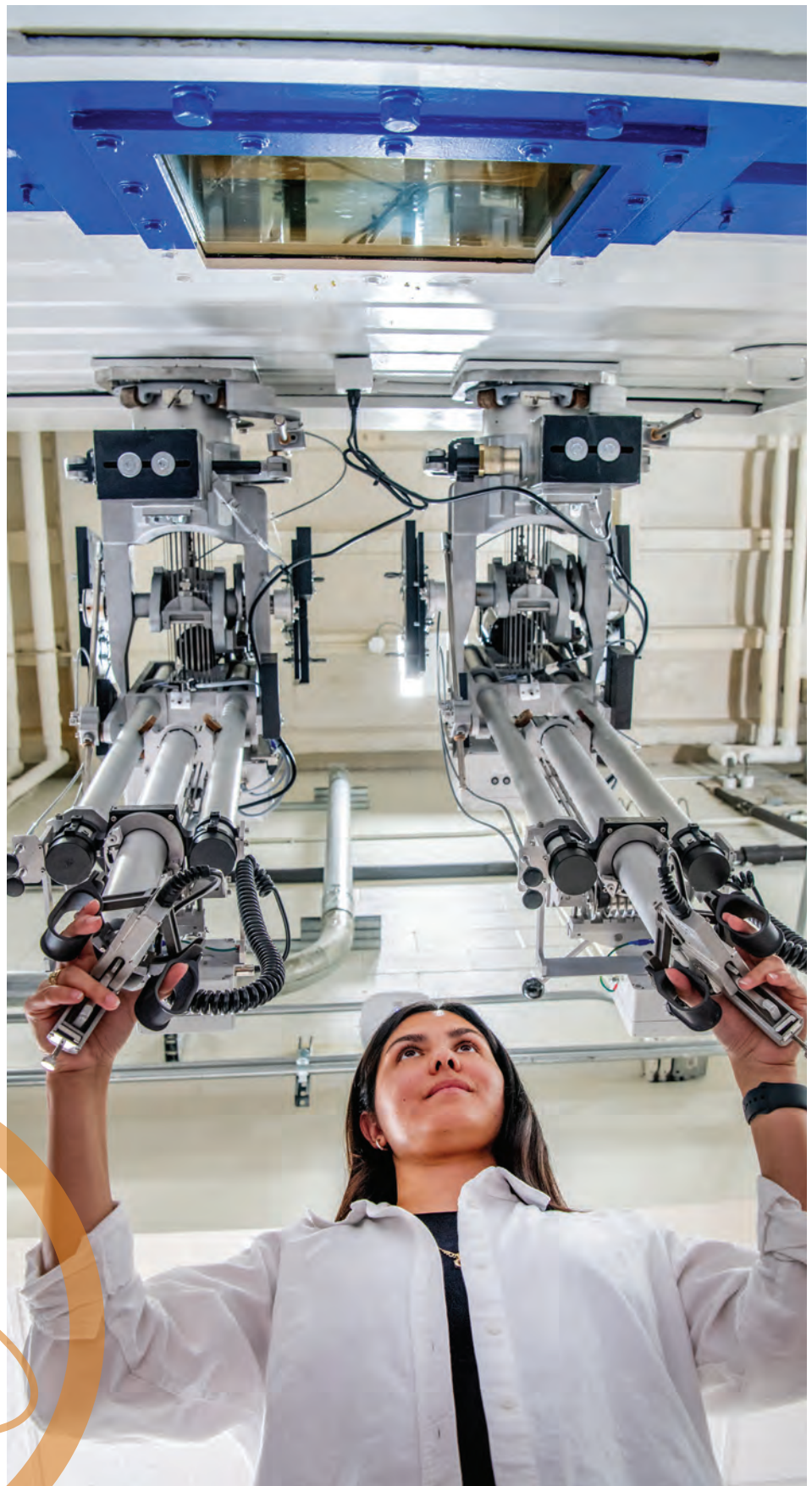
UF invested in state-of-the-art characterization capabilities for radioactive materials—a focused ion beam instrument and a transmission electron microscope—and built a secure lab for them where Aitkaliyeva and her colleagues and students can slice nanometer-thick samples of material and image them at the atomic level.

“We are the only university in the country that can currently characterize irradiated fuels in a focused ion beam instrument,” says Aitkaliyeva, who was recruited from Idaho National Lab in 2017 to establish this facility. “Universities typically do not handle irradiated fuels on campus.”

Aitkaliyeva says these tools are key to understanding how materials degrade and how they behave in a reactor environment.

In nuclear forensics, Aitkaliyeva says, microstructure plays an important role. So the thrust she leads will develop new capabilities and methodologies to discover diagnostic features on scales ranging from a nanometer to a micrometer to a centimeter.

Each material carries a unique signature, based on how it was made and processed, she says. The team will use a combination of physical analysis and machine learning to extrapolate where a sample comes from based on that signature. This research could help reveal the production history of unknown nuclear material, and therefore narrow down the possible origins of the material, Aitkaliyeva says.



Doctoral student Aileen Sarceno uses manipulator arms to safely handle and examine radioactive materials that are contained within a shielded room.





The researchers, their students, and national laboratory collaborators are focusing on five technical areas:

- **Rapid Turnaround Forensics** is studying methods to shorten chemical analysis techniques to 24 hours or less.
- **Advanced Analytical Methods** is developing improved material characterization and microscopy techniques.
- **Ultrasensitive Measurements** is investigating methods in environmental sampling and instrumentation to look at low-level signals.
- **Signature Discovery** is determining if new signals and measurements can lead to improved accuracy in determining material quantities.
- **Prompt Effects and Measurements** is seeking to understand signals given off immediately following a nuclear detonation.



“Both UF and Oregon State have robust artificial intelligence/machine learning capabilities funded by NVIDIA,” she says. “We are developing a machine learning workflow that should accelerate analysis without human error.”

Baciak and Hartig add that UF’s computing and artificial intelligence capabilities are essential to the success of the consortium.

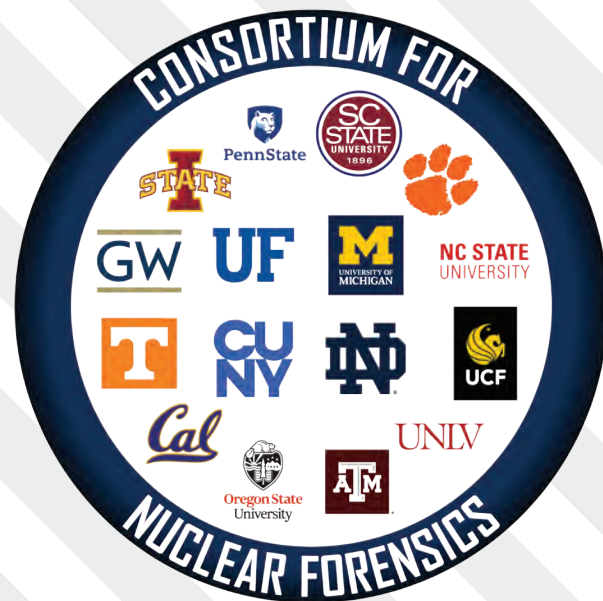
“Nuclear forensics involves the most complex elements and molecules,” Hartig says. “Anything else on the periodic table is simple compared to them, so modeling and understanding those elements and the molecules made up of those elements is challenging to begin with, and then to actually build the models, run the models, get good results, requires the most advanced technology,”

Access to UF’s powerful supercomputer, HiPerGator, will be especially important to some of the smaller institutions in the consortium, like the five minority-serving universities “who will be able to really see what their codes can do using those resources,” Hartig says.

“Also, having HiPerGator is going to enable us to host a lot of data generated from this consortium that will be available to other scientists and engineers outside of the consortium,” Baciak adds.



Left: Assel Aitkaliyeva with a transmission electron microscope. Above: Operating a focused ion beam instrument with doctoral student Jack Mayer. The specialized tools enable her group to prepare and study samples of nuclear material to better understand their structure and origins.



The consortium will collaborate on research with staff scientists and engineers from seven Department of Energy national laboratories—Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, Pacific Northwest, Sandia, and Savannah River.

Other universities in the consortium include UC-Berkeley, University of Central Florida, City University of New York, Clemson, George Washington University, Iowa State, Michigan, UNLV, North Carolina State, Notre Dame, Oregon State, Penn State, South Carolina State, Tennessee and Texas A&M.

Boom!

Yet another focus of the research is on quickly determining what happened should a nuclear explosion occur.

Hartig says nuclear forensics isn't about just interdicting materials, it's also about being prepared to respond to nuclear events.

"Understanding the boom is obviously an essential part of nuclear forensics," Baciak adds.

Should a large explosion occur, Hartig says policy makers need to know quickly if it was an asteroid, a suitcase bomb or a foreign adversary's missile.

"Answers to those questions are invaluable to a president who has to decide within the first hour what we're going to do," Hartig says, adding that if someone detonates a nuclear device they need to know there will be consequences.

"One of the goals of nuclear forensics is to build confidence, so we can say to the bad guys, 'Don't do it. We'll know you did it and it won't be good for you at the end of the day.'"


Hartig says a lot of the early nuclear forensics data was gleaned from tests, but the United States ceased nuclear testing and significantly curtailed the production of new weapons in the early 1990s, so now researchers have to rely on laboratory processes and simulations to study post-detonation effects.

"We're not detonating nuclear weapons. We're not making new ones, and a lot of the expertise about forensics came out of all of that, so NNSA is funding large, laboratory-scale processes to simulate reprocessing. We don't reprocess right now, but we

need to make sure we have a workforce that, if a national need arises, can do this."

Consortium member Vasileios Anagnostopoulos, an assistant professor of chemistry at the University of Central Florida, says the project is already creating new synergies between the State University System of Florida institutions.

"The consortium provides a platform for discussions among scientists of different backgrounds, such as chemists, engineers and laser scientists," Anagnostopoulos says. "This interdisciplinary approach paves the way for future collaborations on a wide array of topics, which is very important given the geographic proximity of our institutions."

Other UF faculty in the consortium are Juan Nino and Nathalie Wall from materials science and engineering, and Ryan Houim from mechanical and aerospace engineering. 

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Related website:
<https://www.nuclearforensicsconsortium.org>



by Michelle Koidin Jaffee

A cycling accident. The loss of a beloved grandmother. A career-ending sports injury. These University of Florida researchers are united by deeply personal experiences that motivate them to understand the brain — and make it work better amid disease or injury.



Dr. Aliyah Snyder



Dr. Ashley Rawls



Dr. Aysegul Gunduz

BRAIN TRUST



Support and encouragement from her family and colleagues helped Dr. Gunduz get back on her bike—and back to her research—after a traumatic brain injury.

Mapping the brain—and a path back from her own injury

Even after years of studying deep brain stimulation, what fascinates Aysegul Gunduz the most is the brain's ability to adapt—to allow artificial electrical current to alter cell activity and quell tremors or tics, seizures or involuntary muscle contractions.

"People say you can't teach an old dog new tricks, but you really can," says Gunduz, a biomedical engineer and director of UF's Brain Mapping Laboratory.

Three and a half years ago, her longstanding appreciation of the brain's plasticity was put to the test: She herself was wheeled in under the bright lights, her brain the one to be operated on.

She had been training for a triathlon on a new bicycle when she suddenly hit a rough patch of pavement, lost control and fell. Although she was wearing a helmet, the impact caused a traumatic brain injury and a need for emergency surgery to relieve pressure in her head and stop seizures.

Dr. Brian Hoh, chair of UF neurosurgery, performed the operation. The days before and after were a blur to her, but one thing she knew in her heart, she says: "I owe him my life."

Every day in intensive care, she was visited by her longtime collaborators Dr. Michael Okun, a neurologist, and Dr. Kelly Foote, a neurosurgeon. A decade earlier, Okun and Foote, now co-directors of the Fixel Institute, had been searching for an expert who could analyze brain signals in their pursuit of continuing to improve deep brain stimulation for Parkinson's disease and other conditions. They'd been working as a team ever since.

"She is creative, she is innovative, and she is brilliant," Okun says. "She's an expert at taking the language of the brain and converting it into units that we can use to decode certain symptoms and develop therapies."

Gunduz sensed quickly it was the right fit. "Sometimes clinicians think engineers are like technicians who magically put together the things they want," she says with a chuckle. "But

"She is creative, she is innovative, and she is brilliant. She's an expert at taking the language of the brain and converting it into units that we can use to decode certain symptoms and develop therapies."

— Dr. Michael Okun

Mike and Kelly gave me an equal seat at the table. They lift up people around them."

Years later, as she healed from the accident, support and encouragement from many—her fiancé (now husband), colleagues and family back in Turkey—helped her get back on track. Care by UF neuropsychologist Russell Bauer, an expert in traumatic brain injury, and the UF Health rehab team helped her get back to work and fueled her determination.

Over time, her perspective on the accident has evolved. "As ironic as it is for this to happen to a brain researcher, I knew my brain could regain the functions that were impaired," says Gunduz, whose many awards over the years include the Gator Nation Leadership Award and the Presidential Early Career Award for Scientists and Engineers, the highest honor given by the U.S. government to outstanding scientists and engineers beginning independent careers.

"Having worked with a lot of neurosurgical patients, I knew that if you keep at it, your brain can heal itself," she says. "So that kept me going, as well as the promise I had to my Ph.D. students. And my father is a physical medicine rehabilitation doctor back in Turkey, so that kept me going, too."



Jacqueline Hart

In the operating room, Dr. Gunduz collects neurophysiological data to decode brain signals and refine aspects of deep brain stimulation.

All along, she held onto a deep belief in her capacity to grow, a belief that stretched back to her school days, when a teacher once told her, “I don’t see you becoming an engineer.” After initial tears, she didn’t give up, and in summer 2023 she shared the teacher’s words on social media on the day she was promoted to full professor of biomedical engineering.

Her determination to recover from the accident and get back to her research was no surprise to longtime colleagues such as Peter Brunner, who worked with Gunduz during her postdoctoral fellowship at Albany Medical College in 2011.

“She not only made a remarkable recovery, but she also has gained extremely valuable insight for herself on how the human brain is plastic and how it can recover,” says Brunner, an associate professor of neurosurgery and biomedical engineering at Washington University in St. Louis. “This is really a compliment to all the physicians involved in her recovery but also to her perseverance and strong push to move forward.”

Not only did she make it through, he says, but “she came back out on the other side even stronger.”

Brunner saw the same spark in her at the start of her career, when she chose to pursue a line of technological research considered risky at the time: detecting debilitating tics, which then was seen as the cutting edge of what scientists thought could be done.

“She picked something that’s really difficult and literally bet the farm on it,” Brunner says. “She picked something nobody really saw taking off and was extremely successful and developed herself into one of the world experts in deep brain stimulation.”

Today, Gunduz, the inaugural Fixel Brain Mapping Professor, is back in the operating room at the UF Health Neuromedicine Hospital. With MRI images on a monitor beside her, she watches as innovative software she developed is used in patients undergoing deep brain stimulation (DBS) surgery to ease symptoms in conditions including Tourette syndrome and essential tremor.

Her current focus is to make DBS more like a cardiac pacemaker, in a way—to make the mild pulses of electricity responsive to changing signals in the brain rather than continuous, to limit side effects and the draining of the implant’s battery.

Some days in the operating room, the team uses software she developed to map the brain of a patient to guide implantation of an electrode. Other days, she is collecting neurophysiological data, for later decoding of brain signals to refine aspects of DBS and develop the next generation of software.

“She is guiding the future,” says Okun, “of how the brain is going to be targeted and how we’re going to intervene.”

Moving toward a broader view of Parkinson's

Dr. Ashley Rawls looks out at her audience and asks: When you hear “Parkinson’s disease,” who is the first person you see in your mind?

“Michael J. Fox,” responds one participant. “Janet Reno,” says another.

Rawls then projects a photo of Muhammad Ali. In unison, several utter his name. Nodding along, Rawls says, “It affects a multitude of people from different backgrounds.”

A UF Health neurologist and researcher who specializes in movement disorders, Rawls is helping spread the message that Parkinson’s reaches across races in hopes of getting more patients diagnosed earlier and providing better access to care. One strategy to do this has been free community events like this one, sponsored by the Parkinson’s Foundation, to chip away at common misconceptions of who is a typical Parkinson’s patient.

“If you search online for Parkinson’s, one of the first images you see is this older white gentleman who’s hunched over with tremors,” says Heather Simpson, a UF Health occupational therapist and a co-leader of the community outreach efforts. “In particular within the African-American and Black community, many of the Parkinson’s symptoms can be misconstrued for typical aging, such as heart disease and diabetes.”

Every year, approximately 90,000 Americans receive a new Parkinson’s diagnosis, according to the Parkinson’s Foundation, and 1.2 million are projected to be living with the condition by 2030. But according to a review of medical literature, research has shown that African American patients diagnosed with Parkinson’s are less likely to receive standard of care than white patients and more likely to come to specialty clinics with severe or advanced disease, and one study looking at the largest group of Black Parkinson’s patients from a single center, in Chicago, showed they were four years older at first diagnosis.

In Gainesville, the initiative of one patient who sought to help others deeply moved Rawls.

At first, Orien Greene, a UF Health neurology patient, thought his stiffness and slowness were arthritis and his insomnia was due to the stress of a rough day. But after getting a Parkinson’s diagnosis two years ago, he came up with the idea of doing community outreach, and together, he, Rawls and Simpson hatched a plan. Last year, with a \$9,430 grant from the Parkinson’s Foundation, they brought the “Power in Knowing” program, a partnership with the Norman Fixel Institute for Neurological Diseases at UF Health, to assemblies at two churches and one school in the Gainesville area.

“The sooner you catch it, the better it is with most medical things, and likewise with Parkinson’s,” says Greene, 67, who early on kept his diagnosis private. “I wrestled with that for a minute, but then I made the decision that, OK, it’s better to let people know, not just harbor the information, and maybe it’ll help somebody else as well.”



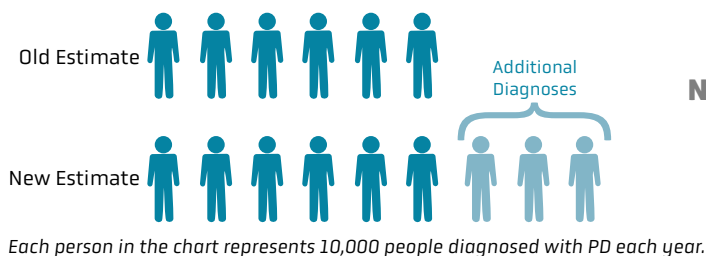
Dr. Rawls and her grandmother, Dorothy Lee George

The team was encouraged by response to their program: Surveys showed an 83% improvement in knowledge of Parkinson’s symptoms, a 118% improvement in knowledge of treatment options and a 148% improvement in knowledge of where to go for patient and family resources, on a 4-point Likert rating scale, Simpson says.

“Dr. Rawls knew what the community needed,” Simpson says. “She can communicate from personal experience, which is very helpful, and she’s a very trustworthy and caring person.”

As a medical school student, Rawls witnessed firsthand the health problems facing her maternal grandmother and lapses in communication between doctors and family members at a time when trust was needed and worries ran high. Her mother was a science teacher and her father a nuclear engineer, but medical jargon leaves a lot of room for miscommunication for almost everybody, she says.

“I found that there’s this divide between all the things that medical personnel are trained with and know



New PD incidence is 50% higher than previous estimates.

Source: Parkinson's Foundation

and being able to converse and talk with people who may not have the same level of expertise,” she says. “There was a breakdown there. So one thing that brought me toward medicine is trying to bridge that gap in communication.”

The death of her beloved grandma, known as “Ms. George,” in her fourth year at the UF College of Medicine further inspired Rawls’ drive to teach medical students. Following residency at the Medical University of South Carolina and a fellowship in movement disorders at Stanford, Rawls returned to UF as a clinical assistant professor. In addition to teaching and caring for patients, she is also the site principal investigator of a national clinical study, Black and African American Connections to Parkinson’s Disease, known as BLAAC PD.



Patient Orien Greene (right) came up with the idea of organizing community outreach about Parkinson's disease and teamed up with UF Health occupational therapist Heather Simpson (left) and Dr. Rawls to bring the "Power in Knowing" program out into the Gainesville community.



Surveys following the "Power in Knowing" outreach program showed great improvement in knowledge of Parkinson's symptoms, treatment options and where to go for patient and family resources.

The six-site study, a partnership of the Aligning Science Across Parkinson’s initiative and The Michael J. Fox Foundation for Parkinson’s Research, is examining the genetics of Parkinson’s, identifying similarities and differences among different ethnic heritages. At UF, BLAAC PD study participants, both with and without Parkinson’s disease, contribute an anonymous one-time blood or saliva sample for DNA testing as well as demographic and family medical history.

“About 90% of genetic studies performed in the Parkinson’s field are persons of European ancestry, so the genetic impact of PD susceptibility on Black and African American populations is largely unknown,” Rawls says. “BLAAC PD will help us learn about the potential linkage between genes and our patients of Black and African American descent.”

Her greatest hope is that by understanding the factors that contribute to Parkinson’s, this will yield new focused treatments in the future.

Sidelined by concussions, she now studies new treatments

Sledding belly-down and head-first on an ice track at 70 miles per hour day after day, Aliyah Snyder could feel her chin and the side of her head vibrating against the ice. She was on the rise in the sport of skeleton, ranked 44th in the world and competing on the North America's Cup circuit, when persistent headaches, dizziness and loss of balance forced her to step away.

This was before there was increased awareness nationally about concussions, she says, before "getting your bell rung" meant something potentially more serious. During her yearlong recovery back home in the Florida Panhandle in 2010, she kept thinking about research-assistant work she did as an undergrad at the Florida Institute of Technology, looking at soccer heading and potential risks of concussion and neurocognitive impairment. As she bounced from medical appointment to appointment, she had a revelation.

"There was a lack of effective health care and education around concussion," Snyder says. "I thought: This is meaningful to me. There is clearly a huge gap in health care that I can contribute to."

The daughter of an Air Force pilot and a satellite meteorologist, Snyder grew up moving across the U.S. and first showed her athletic ability in high school, when she was a Florida state fencing champion three years in a row. Fast forward to post-college, she was assistant coach of the men's rowing team at Connecticut College when a boyfriend who was training on the bobsledding team at the Olympic Center suggested she try skeleton. She thought it looked crazy and, as an adventure seeker, like a lot of fun.

"I remember the first time I went off the top of the track in Lake Placid, and you know you're going to hit 70 miles an hour—nothing's going to stop you from hitting that speed, and like, buckle up," she says, laughing. "It's like flying. It's the biggest adrenaline rush I think there is."

She trained for two years, earning a spot on the Israeli national team, before the constant subconcussive impact of her head knocking against the ice became too much. Once back at home in Florida, she reached out to her Florida Tech mentor Frank Webbe, a triple-Gator with a doctorate in psychology from UF and an expert in sports-related brain injury. Could she come back to his lab, as a volunteer? He didn't hesitate.

"She was on a mission," Webbe says. "And that mission was to put people in touch with knowledge and with contacts that would help them, and it was also to create new knowledge to help them."

Early on, he could see she remained concerned about some lingering symptoms of her own, but as the symptoms improved, she

embraced new academic and research projects. In addition to analyzing data, she began creating websites and programs for people who'd had brain injuries and then decided to apply to graduate school in neuropsychology at UF.

She wanted to focus on persisting symptoms after concussion, an area of study that has been under-researched, says Russell Bauer, professor emeritus of clinical and health psychology who became her UF mentor. This allowed Snyder to stake out her own territory.

"Her situation fits to a T with what she's interested in studying, because she did not have an 'incident concussion' where she banged her head and lost consciousness," Bauer says. "Her concussions resulted from chronic subconcussive jostling of the head from going down the track."

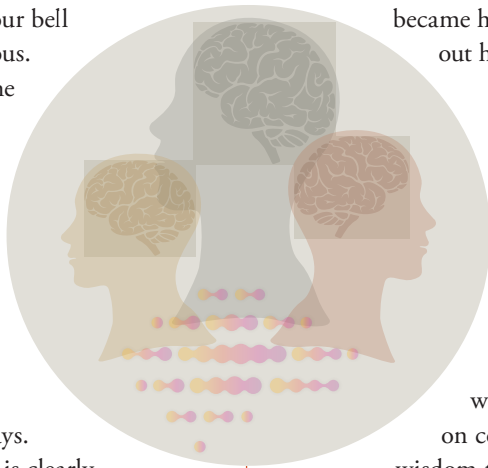
For her dissertation, she took the rare approach of running a clinical trial. Her goal was to examine the effects of aerobic exercise on concussion recovery, in light of conventional wisdom to only rest after concussion. In her pilot study of 26 young-adult participants who were 14 to 25 days post-concussion, Snyder found a one-week aerobic exercise program didn't appear to negatively impact cognition, mood, sleep or neurocognitive performance.

After internship training at Emory in pediatric and adult rehabilitation neuropsychology and a fellowship at UCLA in brain injury and sports neuropsychology, Snyder returned to UF in 2020 as an assistant professor and clinician-researcher in the College of Public Health and Health Professions. Today she's part of an interdisciplinary team that specializes in concussion assessment and treatment, and she directs the Holistic Interventions for Brain Health and Recovery Clinic, with techniques including psychotherapy, mindfulness meditation and biofeedback.

"She's developed a multi-pronged approach to identifying and then treating these symptoms, which include hypervigilance, autonomic hyperarousal, sleep disturbances, depression—each has a biological component and also a psychological component," Bauer says. "She's implementing very specific targeted interventions for each of those areas."

"There was a lack of effective health care and education around concussion. I thought: This is meaningful to me. There is clearly a huge gap in health care that I can contribute to."

—Aliyah Snyder





John Jernigan

Dr. Aliyah Snyder is part of an interdisciplinary team that specializes in concussion assessment and treatment. She hopes to advance widespread availability of specific interventions to help people recover.

Snyder also maintains a position as a project scientist for the UCLA Steve Tisch BrainSPORT Program, and in that role, she's currently running an arm of a large multisite NIH-funded study into pediatric concussion recovery, the CARE4Kids study. The study includes patients ages 11 to 17 who have been diagnosed with a concussion, and Snyder's part is to oversee autonomic assessment. She is tracking measures such as heart rate variability, or the variation in time between each heartbeat, while collaborators are collecting blood and advanced neuroimaging, among other techniques, to predict which children will develop persistent symptoms.

In another project, Snyder plans to expand a UF interdisciplinary concussion database to track outcomes of various

interventions, to better understand the efficacy of current treatments and design future trials to test new approaches, such as vagal nerve stimulation.

Overall, what she hopes to achieve is widespread availability of specific interventions to help people recover, starting with a standardized, self-paced online program she plans to develop.

Snyder says her personal experiences with concussion and with long COVID—a new area of study for her—drive her on a daily basis.

“Everybody’s journey is very different, but I empathize with every patient coming in and going through recovery,” she says. “What I relate to most is the search for answers, and we are finally coming to a place where we have more answers.”

It’s still ambiguous in many areas, she says. “But to give some type of empowerment or control back to patients in their recovery—that’s where I get the most satisfaction.” ❌

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Snap Decisions

Posting about your kids on social media? Here's how to protect their privacy

by Alisson Clark

When the United Nations, the American Academy of Pediatrics or *The Wall Street Journal* need insight on sharenting—the term coined for posting about your kids online—they turn to the University of Florida's Stacey Steinberg.

As the author of the book “Growing Up Shared: How Parents Can Share Smarter on Social Media and What You Can Do to Keep Your Family Safe in a No-Privacy World,” Steinberg recognizes the benefits and risks of posting content about kids and wants families to understand them, too.

“I went into this work not to stop people from sharing, but because I love to share, and I found so much good coming out of it,” says Steinberg, who leads the Levin College of Law's Center on Children and Families.

But as much as she enjoys posting the typical proud-parent moments of her three kids, she knows seemingly harmless photos and information can have unintended consequences—especially when sharing settings allow them to be seen outside of a small circle of friends and family. She cites a study from the bank Barclays predicting that by 2030, almost two-thirds of identity theft cases will stem from what parents post about their kids. (Think about typical account-security questions like mother's maiden name or first pet: It wouldn't take long for scammers to dig up those answers on our social profiles.) Then there's the new threat of pornography created by editing innocent pictures posted online.

Alongside criminal dangers, Steinberg contemplates sharing's impact on children's privacy. Before they create their own social media presence, today's kids have a digital identity crafted by everything that's been posted about them—an identity they often have no control over.

Steinberg, who got her undergraduate and law degrees at UF, began to wonder about children's rights to privacy online after joining her alma mater as a legal studies professor. When she started posting content about her kids on her (now-deleted) blog and, later, on social media, she didn't worry much about the long-term impacts. But when she weighed the issue from a legal perspective, she could see potential harms beyond their safety and security.

It's easy to view our kids' stories as our own. You'd be unlikely to spill all the details of a silly or embarrassing story about a friend on Facebook, but as parents, we do that to our kids all the time. What seems cute now might be mortifying or even harmful later: Imagine a prospective employer searching your name online and finding a potty training video as the first result. That led Steinberg to ponder if kids—especially older ones—have a say in what's shared about them, and if so, how it coexists with parents' free speech rights.

“Children may have an interest in controlling their digital footprints now or years in the future,” Steinberg says.

In 2015, Steinberg wrote an essay for *The Washington Post* calling for deeper contemplation of kids' digital footprints, calling it “the parenting issue of our generation.” She thought it was a one-off, but fellow UF Law professor Lyrissa Lidsky and then-dean Laura Rosenbury, also a children's rights scholar, encouraged Steinberg to study the issue.



Steinberg giving her 2021 TED talk, which journalist Katie Couric called “fascinating.”

“Honestly, I thought that was my magnum opus. That was the last thing I was going to write,” Steinberg recalls. “But when I mentioned the article to Dean Rosenbury, she thought it was fascinating and so important.”

What followed was the book, a TED talk in Vienna, and countless articles in news outlets and law journals, and her work being cited by UNICEF. Still, she resists being labeled an expert.

“I hate the word expert because I am totally living my own social media experiment in my house,” she says. “I have three very, very different kids that have different levels of comfort with how they’re portrayed online and I want to respect their differences. There’s not one right way to do it.” (See sidebar for her tips on finding the right balance for your family.)

She’s also quick to point out she didn’t coin the word “sharenting”—she doesn’t even like it.

“It sounds judgmental, and it’s kind of a silly word,” she says.

In some countries, though, legal limitations on sharenting are serious business. A Dutch woman was ordered to take down photos of her grandkids from

How to safeguard kids (and their privacy) when posting on social media

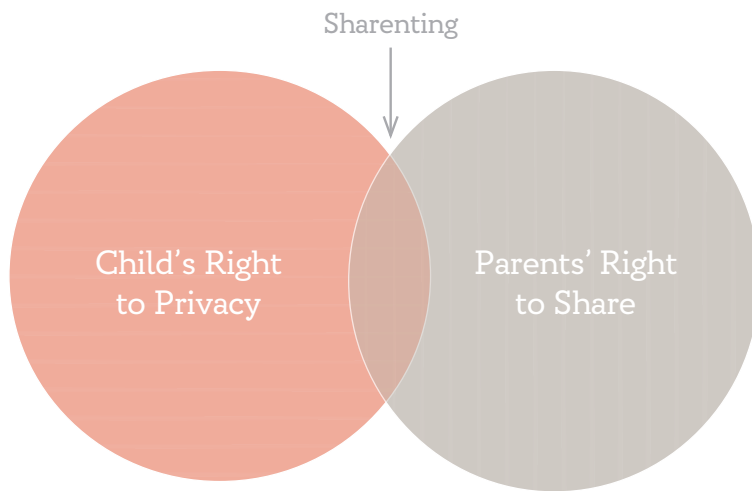
Tips from UF legal scholar Stacey Steinberg

Limit details. When writing posts, using a nickname or initials in place of the child’s name can help keep kids and their identity safe. Be cautious about locations, too. You might not want to name their school or check in at their sports practice field.

Get consent. Ask the child if it’s OK to take and share a photo, and follow their wishes—it not only gives them a voice in their digital presence, but teaches them good habits for their future social accounts. “For a preschooler, you might say, ‘I’m really proud of you and excited about your science project, or your art piece. Are you good with me telling my friends? Are you good with me telling your grandma and grandpa?’ As they get older, that becomes more specific. In their tweens, you might be discussing why someone might not want something to be shared.”

Look back. Periodically review any social media accounts where you share about your kids to check your privacy settings. Steinberg also likes to review older posts and delete or change the visibility of photos that might not need to be as widely available as they once were. “It gives you a chance to say, ‘Have we shared in a manner that that was okay with our kids at 4 but isn’t okay with our kids at 14? Do we need to take things down?’”

Post later. Instead of posting about that piano recital or spelling bee win in the moment, consider waiting. That way, you’re not only keeping your focus in the room with your child, you’re modeling good practices. “When our kids see us step out of the moment to share a picture instead of waiting, they take note,” Steinberg says.



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Facebook and Pinterest in 2020 after posting them without permission from their mother. In 2023, France drafted legislation to hold parents accountable for protecting children's privacy. Don't expect anything like that in the United States, which has no constitutionally enshrined right to privacy and favors a parents' rights approach, Steinberg says. In fact, the U.S. is the only member state

not to ratify the United Nations Convention on the Rights of the Child.

Steinberg's research has persuaded her that the best way to protect children's privacy might not be a legal remedy. Instead, she envisions a public-health solution, not unlike the campaign that encouraged safer sleep practices for babies to prevent Sudden Infant Death Syndrome. A widespread effort to teach families online

safety could make a difference, she says. "As much as we need people researching the risks and legal solutions, we need people to find successful methods to communicate this in ways that don't judge," she says.

While her public outreach made strides toward that goal, Steinberg is shifting her focus. She's still balancing almost-daily requests for media interviews three years after the book's publication, but the former special victims unit prosecutor is devoting more time to directing the Gator TeamChild Juvenile Law Clinic, which provides free legal services to kids in foster care. She's also guiding students through their own research on kids' online privacy, which has taught her that parents-to-be who grew up with social media will approach sharenting differently.

"I absolutely think that the next generation of parents will share less," she says.

Steinberg doesn't want to stop people from sharing joyful updates about the kids they love. She just wants families to understand how to enjoy the best parts of social media while avoiding harm.

"My goal," she says, "is to protect kids in the long run." ❌

Stacey Steinberg
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Share together. Parents can consider a family account that older kids help curate, which can help them think through the decisions they'll make when they get their own accounts. Without supervised practice, "it's a bit like giving a child a driver's license without ever giving them a chance to sit alongside us and learn to drive," she says.

Vent carefully. Social media can be a crucial source of support when struggling with tough parenting issues, but consider who has access to posts that discuss details about your child's behavioral or academic issues. While it may seem far-fetched, the data-sifting power of artificial intelligence could mean that public posts impact kids' future job or college prospects.

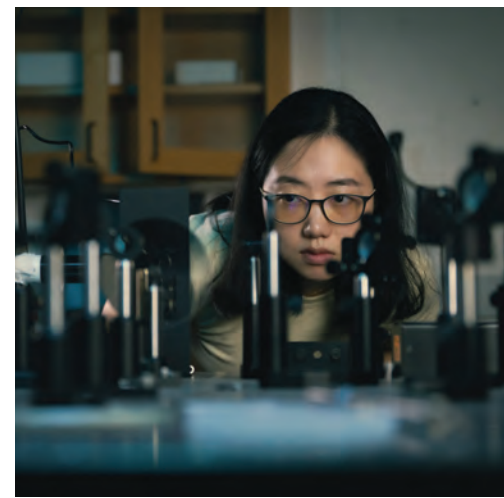
No nudity. No matter how innocent a bathtub photo or other nudity seems, it's too accessible to child pornographers once it's shared online.

Reach out. It's not just your own posts, but details shared by your extended family, friends, schools, religious groups, and extra-curriculars. "Don't shame others, but let loved ones know you're steering when it comes to your child's digital footprint," Steinberg says. You might want to set up a Google alert for your child's name, and ensure that your settings require approval for photos to be tagged. If an organization your child is involved with doesn't have a social media policy, you could offer to create one.

Bright and Early

The National Science Foundation selected a record nine University of Florida researchers for its

Faculty Early Career Development Program in 2022, with more honored this year. Known as NSF CAREER, the prestigious award provides a minimum of \$100,000 per year for a five-year project that includes a community outreach component. Meet some of the winners here—and look for more in future issues and on our Instagram, @uf.research.



Kathe Todd-Brown

Computational biogeochemist Kathe Todd-Brown builds mathematical models of how soil breathes, which is critical for predicting greenhouse gas levels and setting emissions targets. Todd-Brown's grant also supports building a data-centered community to create standards for soil measurements to facilitate global collaboration.





Xiao-Xiao Zhang

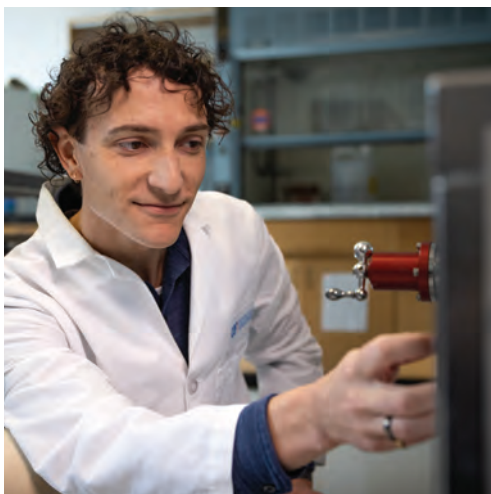
In her nano-optics lab, physicist Xiao-Xiao Zhang uses optical spectroscopy to probe the properties of two-dimensional materials, which are just one atom thick, with potential applications in solar cells and quantum computing. The outreach component of her award will focus on career development of women and girls in STEM.



Dana Bartošová

Mathematician Dana Bartošová studies abstract topological dynamics and its connection to set theory and model theory, which has applications from string theory to differential equations. As part of the grant, Bartošová will expand a community she created to support parents in academia.

**NSF
Career
Awards**



Ryan Need

Engineer Ryan Need focuses on nanoscale ion diffusion to facilitate energy efficiency and enhance information storage for the future of computing. Need's outreach work will provide activity kits and videos to introduce K-12 students to materials science.

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PhD grads: Where has your UF degree taken you?



Jennifer Adler — *Interdisciplinary Ecology, 2018*

A National Geographic Explorer and underwater photojournalist, Adler uses her science background to tell visual stories about conservation.  @jmadler

Tell us about your adventures in the field or the lab, where you're working, or any collaborations with UF. Email us at communications@research.ufl.edu or mention [@uf.research](https://www.instagram.com/uf.research) in your Instagram story!