

## UA PARTNERS WITH USGS TO BUILD HYDROLOGIC INSTRUMENTATION FACILITY

By Bryant Welbourne

The University of Alabama is partnering with the [U.S. Geological Survey](#) to construct a new Hydrologic Instrumentation Facility, a state-of-the-art science and engineering facility, that will support the agency's Water Enterprise observing networks and research.

"I am pleased that the U.S. Geological Survey has chosen to relocate its Hydrologic Instrumentation Facility to The University of Alabama, a leading innovator in the field of water research and science. This new facility will expand on the Alabama Water Institute's critical mission of furthering the study of water as a weather-related threat, as a resource, and for distribution. I look forward to the transformative discoveries that will come from this new partnership, as well as the economic benefit it will bring to Alabama," said U.S. Sen. Richard Shelby of Alabama.

U.S. Congress appropriated \$38.5 million to replace the current aging USGS facilities located at the National Aeronautics and Space Administration Stennis Space Center in Bay St. Louis, Mississippi, with the requirement to collocate with complementary academic and federal partners.

"We extend our sincere appreciation to Sen. Shelby, who played an integral role throughout this process and helped ensure the University could expand its water research program as global demand increases," said UA System Chancellor Finis St. John. "With the Alabama Water Institute, the Global Water Security Center, and now the



USGS-HIF, The University of Alabama has cemented its position as the nation's leader in this critical area."

UA was selected as the site of the new HIF for the opportunities it provides to dovetail with other water-related research and development already conducted on campus, including the NOAA National Water Center. The HIF, which will be built on the north side of campus near the Black Warrior River, will serve a fundamental role at USGS in providing instrumentation and equipment services to USGS Science Centers and external partners.

"With the addition of the USGS-HIF to Tuscaloosa, our campus will serve as the epicenter for water research and operations in the United States," said UA President Stuart R. Bell. "This mission-driven partnership will provide countless teaching, research and service opportunities for our students and faculty."

The new USGS-HIF is expected to increase economic development in the region. USGS anticipates the facility will also support and encourage strong collaboration with other federal agencies located on campus.

The 95,000-square-foot, two-story facility will include a hydraulics lab,

water quality labs, field testing facilities, environmental chambers, sensor innovation space, warehouse, training labs, network operations center and administrative offices. Construction is expected to begin in late 2022, and the USGS plans to take occupancy in 2023.

"This partnership will ensure a world-class USGS facility for the testing and development of cutting-edge USGS hydrologic instrumentation, which provides the backbone for our near-real-time water monitoring and other research," said Don Cline, associate director for the USGS Water Mission Area. "This information enriches the lives of everyday Americans and is used nationwide by all types of end-users, from water managers to recreational boaters, to make critical decisions."

Water is a signature research and academic focus at UA.

The University of Alabama System Board of Trustees recently approved the creation of the Global Water Security Center, which will be part of the Alabama Water Institute and provide national decision-makers with strategic information, groundbreaking research, applied scientific techniques

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## NEW USGS FACILITY

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and transformative best practices to inform appropriate action regarding water distribution. Mike Gremillion, an experienced weather professional in the military and intelligence communities, will lead the Global Water Security Center while continuing as deputy director of the AWI.

The AWI, led by executive director Scott Rayder, serves as a world-class interdisciplinary water research institute that develops pathbreaking, holistic and environmentally friendly solutions to ensure people and ecological systems in our community, state, nation and world are water secure, with access to clean water and are resilient to extreme events. Rayder has played a key role in continuing collaboration with the NOAA National Water Center on UA's campus.

"As global demand for water increases alongside a predicted decrease in water quality and availability, The University of Alabama is taking a leadership role to ensure the nation can better understand water security and predict how changes will impact the geopolitical sphere," said Dr. Russell J. Mumper, vice president for research and economic development. "We are pleased to welcome USGS to Tuscaloosa and stand ready to support USGS and NWC in their missions."

UA's comprehensive water research program emboldens UA's strategic goal of increasing productivity and innovation in research, learning and creative activities that impact economic and societal development.

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## NEW MOBILE APP TO AID GULF OF MEXICO FISHERMEN, BOATERS

**A new mobile app from the Alabama Water Institute and the [Mississippi-Alabama Sea Grant Consortium](#) provides a fast, interactive way to find important weather, boating, safety and fishing information for the Gulf of Mexico.**

By Brock Parker

A student-led project from The University of Alabama's [Management Information Systems](#) program, the app allows users to instantly access information about weather, tides, buoy stations, water safety and fishing regulations based on their location.

"You'd normally have to search for all this information separately, so it's really a one-stop shop," said Presley Gobbell, marketing lead for the MIS team.

The home page of the app offers a quick look at the user's location and features easy-to-read navigation buttons.

The weather area provides current temperature, precipitation, humidity and wind speed, as well as hourly and 7-day forecasts. The regulations section has information provided by Fish Rules, LLC, a third-party source that offers quick access to location-specific, up-to-date fishing regulations, such as season openings and bag limits on a variety of species. It also has information on obtaining both saltwater and freshwater fishing licenses.

The safety section covers several topics crucial to boaters out on the water.

"Users can see important safety features about their boat, as well as access emergency procedures, such as how to contact the U.S. Coast Guard if they run into trouble," said Abbie Merker, one of the project's student developers.

The map allows the user to select from several tide and buoy stations



that provide current information about high and low tide times, tide height, wave height and more. Coast Guard stations are also listed on the map with radio frequencies for maritime safety information broadcasts and distress calls. This information will be also be available even with no cellular service.

"It stores your last-accessed location locally on your device, so anything like diving flags, equipment or what to do in case of emergency is saved in the app," said Sam Barnes, the project's team lead.

Under the regulations section, users can also scout specific locations on the map to help plan a fishing getaway.

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## NEW MASG/AWI MOBILE APP

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"If you're planning to go to Tampa or Gulf Shores, for example, you can drop a pin on those locations and all the fish relevant to that area will show up," said Griffin Turner, tech lead for the project. "You'll be shown a screen that's populated with information ranging from the size of the fish, how many you can catch and even gear that you can use."

While the app is currently only available for the Gulf of Mexico, there is the possibility for growth into other areas of the country.

"If Fish Rules decides to expand to the east and west coasts, as long as the way they provide information doesn't change too much, the app could potentially grow to cover those areas," said Garrett McGiffert, a student developer.

The app started as a partnership project between AWI and Mississippi-Alabama Sea Grant in 2019.

"I have become a big fan of undergraduate capstone projects," LaDon Swann, the director of Mississippi-Alabama Sea Grant, said. "I am amazed at what a group of dedicated students can do during a semester. As a fisherman, I have always looked for ways to reduce the number of phone apps I have to check when planning a fishing trip. This app has the potential to be the go-to app for me."

The first team of UA MIS students developed the framework before handing it off after they graduated.

"The team prior to this was able to get an initial version deployed to Android, and this team was able to build it up and get it onto Apple as well," said Dr. Gary Spurrier, faculty sponsor and assistant professor in UA's Department of Information



Systems, Statistics and Management Science.

The current team of students finished the first version of the app prior to the end of fall semester 2021. Most have graduated, but have left behind a wish list as updates and developments continue.

"We would like to see a citizen science function where you could upload information and photos about fish you've caught in a certain

area to help with data collection for fisheries around the Gulf," said Turner.

Turner said working with AWI and Mississippi-Alabama Sea Grant has been a rewarding experience, and UA has prepared him for the next steps in his career.

"One of the companies I was interviewing with was greatly impressed with how UA's MIS program specifically implements a curriculum that sets us up for success in life after collegiate environment," he said.

By bringing this project to the public and partnering with the MIS program and its students, AWI is helping to strengthen one of UA's strategic goals to increase innovation in research, scholarship and creative activities that impact economic and societal development.

**The app is now available by searching "MAPP-AWI" on [iOS](#) and [Android](#).**

Visit AWI's  
**Podcast**

We created this podcast series as a way to introduce our affiliated faculty members and students, to help showcase their work and to show how their research is helping to improve every aspect of water across all walks of life. There will be one-on-one interviews with our researchers, but also some of their public talks at workshops and conferences.

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## UA-LED COLLABORATIVE GROUNDWATER EFFORT AWARDED NSF FUNDING

By Dr. Prabhakar Clement & Brock Parker

A collaborative groundwater research effort led by researchers at The University of Alabama has been awarded \$600,000 in supplemental funding from the [National Science Foundation](#). The new funds will augment the [Integrated Groundwater Management project](#), a \$6 million, 4-year, Track-2 EPSCoR effort with investigators at [Alabama A&M University](#) and [Alabama State University](#). They will also support a postdoctoral research fellow with a Ph.D. degree from a minority-serving institution. The IGM project is led by UA researchers [Dr. Prabhakar Clement](#), [Dr. Mukesh Kumar](#) and [Dr. Leigh Terry](#) in the Department of Civil, Construction, and Environmental Engineering.

With this additional funding, the IGM project team will build strategic partnerships with Dr. Pooja Preetha at Alabama A&M University and Dr. Uma Kannan at Alabama State University, which will help to further broaden the participation and workforce development in the groundwater area. This new funding will add two new partners to the interdisciplinary IGM project team that already has researchers from five other southeastern institutions including the University of Mississippi, Tuskegee University, Southern University, Auburn University and Louisiana State University. The team is developing computer models and simulation tools for harnessing big datasets to predict fine-scale recharge rates and groundwater storage levels in the southeastern region. The research outcomes of this project will include recharge maps for the region, an advanced understanding of groundwater recharge and storage processes and water table dynamics.

## AWI AWARDS \$198,500 IN RESEARCH SUPPORT TO UA FACULTY

By Brock Parker

Equipment, proposals and publications are critical tools for ensuring successful research at The University of Alabama. The Alabama Water Institute recently awarded \$198,501.44 in multiple grants to AWI-affiliated faculty members to support their water-related research efforts.

The AWI has provided the following funds to eight researchers through the institute's Equipment Support Program:

[Dr. Hamid Moradkhani](#), Alton N. Scott Chair Professor of Civil and Environmental Engineering and director of the Center for Complex Hydrosystems Research, has received \$44,000 for computing servers. Moradkhani's center is heavily dependent on computational resources for creating and running complex water-related models. This equipment received \$9,700 in cost-share contributions.

[Dr. Ruigang Wang](#), associate professor in UA's Department of Metallurgical and Materials Engineering, was awarded \$32,000 for a quadrupole mass spectrometer. It is widely used in water electrolysis, electrocatalyst studies, real time gas analysis and plasma diagnostics. The cost-share received for this equipment is \$20,000.

"Water pollution is hazardous to the health of humans and other organisms, and development of materials for detection, removal and/or decomposition of aqueous pollutants is of critical importance," said Wang. "This QMS offers a facile way to characterize materials used in electrocatalysis and separations for water-related applications."

[Dr. Feng Yan](#), assistant professor in the Department of Metallurgical and Materials Engineering, was awarded

\$27,000 from AWI to help purchase time-resolved photoluminescence spectroscopy equipment. It will provide a fundamental understanding of newly developed photosensitive materials for quantum dots, nanomaterials, and catalyst, photocatalyst, and photovoltaics applications. The equipment also received approximately \$40,000 in cost-share funding.

"This TRPL will be the first instrument of its kind here as UA has no similar instruments for the time-resolved carrier lifetime characterization," said Yan. "It will strengthen UA and AWI's competitiveness for external funding opportunities."

[Dr. David Cruz-Uribe](#), professor and chair of UA's Department of Mathematics, received \$16,000 for a high-performance computing node. The node will be added to the department's HPC cluster specifically to assist junior faculty who are actively engaged with water-related research. This equipment also received \$4,000 in cost-share funding.

[Dr. Ariel Shogren](#), assistant professor in UA's Department of Biological Sciences, was awarded \$12,705 to purchase four submersible field fluorometers and loggers to measure hydrologic tracers at high temporal frequency. They will be used to support multiple proposals for, as well as for experiential learning across multiple freshwater studies and ecohydrology courses at UA. This equipment also received \$3,485 in cost-share funding.

"Ultimately, obtaining information about where water is going at multiple spatial and temporal scales is necessary to quantify human impacts on aquatic ecosystems and detect environmental change,"

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## AWI AWARDS UA FACULTY

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Shogren said.

[Dr. Carla Atkinson](#), associate professor in UAs Department of Biological Sciences, was awarded \$9,215.40 to purchase six HOBO dissolved oxygen loggers to estimate stream ecosystem metabolism in three intermittent streams in Alabama. This equipment received \$3,056.40 in cost-share funding.

“Intermittent streams are not commonly monitored, and the implementation of infrastructure to monitor these unique systems is often challenging,” said Atkinson. “With the additional information from these sensors, we will be able to better inform the management and protection of intermittent streams, particularly as the number of intermittent streams is projected to increase across the United States in the future.”

[Dr. Keivan Davami](#), assistant professor in UAs Department of Mechanical Engineering, was awarded \$4,000 for a camera to measure infrared temperatures with \$995 in cost-share funding. The compact infrared camera is ideally suited for almost all NIR and CO<sub>2</sub> laser processing tasks, such as additive manufacturing and 3D printing. Davami will use the camera for non-contact temperature measurements during laser shock peening and temperature monitoring during metal melting processes.

[Dr. Evan Wujcik](#), assistant professor in the Department of Chemical and Biological Engineering, received \$3,000 to purchase a voltage source and controller system to be incorporated into his lab’s existing electrospinning equipment. This equipment also received \$3,000 in cost-share funding. The component will be used in the development of new water-centric applications for scalable fibers.

The AWI has also awarded the following funds through its Interdisciplinary Innovations Program:

[Dr. Leigh Terry](#), AWI Early Career Faculty Fellow and assistant professor in UAs Department of Civil, Construction and Environmental Engineering, and [Dr. Nate Jones](#), assistant professor in UAs Department of Biological Sciences, have been awarded \$24,884 to support their proposal, “Predicting private well-users locations across Alabama’s Black Belt Region.” [Dr. Sagy Cohen](#), associate professor

in UAs Department of Geography, and [Dr. Hamed Moftakhari](#), assistant professor in UAs Department of Civil, Construction and Environmental Engineering, have been awarded \$24,197 to support their proposal, “Continental-Scale Modeling of Sediment Trapping Behind Dams using Remote Sensing and Machine Learning.”

**The AWI also provides faculty members with publication support. For more information about how to apply for AWI support programs and for deadlines, contact Stefanie O’Neill at [soneill2@ua.edu](mailto:soneill2@ua.edu).**

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## KRAUSS NAMED AWI DIRECTOR OF RESEARCH TO OPERATIONS COMMUNICATIONS

By Brock Parker



Zach Krauss

The Alabama Water Institute has named Zachary Krauss as its new Director of Research to Operations

mate change education at Goucher College in Maryland.

Krauss has taught physical science topics to K-12 audiences, summer camps and the general public. As AWI’s communications director, he will continue dovetailing his knowledge of the hard sciences with his experience teaching science to the non-scientist.

Communications at The University of Alabama. As director, Krauss is responsible for being the lead scientific communicator and continuing to build the institute’s brand.

“When I think about world-class research institutions, I think about how they have been successful building their brand both in industry and academia, as well as in their local community,” said Krauss.

A native of New York, Krauss earned his bachelor’s degree in atmospheric science from Cornell University and his master’s degree in environmental earth systems management from Millersville University in Pennsylvania. He is also the chief meteorologist and owner of SWCT/ NY Weather LLC, a private hyperlocal meteorological consulting firm, and an adjunct professor of cli-

“The climatic and environmental problems facing our world today are interdisciplinary, and it takes adept scientific communicators to make progress on the resolution of these issues,” Krauss said.

By hiring Krauss, AWI Executive Director Scott Rayder brings new ideas and perspectives to the institute to continue to increase its impact locally, regionally and nationally.

“Zach will bring expertise in promoting and translating AWI science for many audiences and demonstrating to citizens of Alabama how research from Tuscaloosa has national implications, but also returns to our water-rich state,” said Rayder.

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# UA RESEARCH ENHANCED BY NEW RESEARCH SOFTWARE ENGINEER

By Brock Parker



Dr. Karnesh Jain

Jain as UA's first research software engineer.

A research software engineer, or RSE, can develop software related to domain-specific research, such as science, engineering, digital humani-

To address the growing necessity for high-quality software in research, The University of Alabama recently hired Dr. Karnesh

ties, computational simulations, artificial intelligence and machine learning. They can work with a number of faculty members, graduate students and postdocs where software is crucial for the development, execution or analysis of research.

"Having a research software engineer here at UA is critical to the future success of research projects across campus," said Dr. Jeffrey Carver, chair of UA's Cyber Initiative and professor in the Department of Computer Science. "With the need for software and computation increasing in domains across the University, Dr. Jain's work will be instrumental to advancing UA's research enterprise."

The Alabama Water Institute is currently working with Jain to address needs for water modeling, machine learning and data analytics. AWI-affiliated faculty member Dr. Kasra Momeni, associate professor of mechanical engineering, is also working with the Cyber Initiative to develop a deep learning model for image classification of 2D materials. UA's School of Social Work is also developing mobile apps that will help users locate mental health and substance abuse treatments anywhere in Alabama, provide tailored information to health providers about Opioid Use Disorder and help people in rural communities find transportation to medical appointments.

These types of collaborations help demonstrate UA's needs as a research institution. Adding RSEs, as well as lab technicians, will allow for dedicated personnel to be available for software and other equipment support.

"Having a research software engineer improves UA's ability to be adaptable and enhances its R1 status," said AWI Executive Director Scott Rayder. "It frees up researchers to do their work while allowing UA to address collaborative needs as we grow."

**Jain is employed by the Alabama Cyber Institute, and his position is funded in part by the Alabama Water Institute. To [learn more about RSE capabilities](#) and how to schedule research software projects, contact [Dr. Jeffrey Carver](#) or [Dr. Karnesh Jain](#) at ACI.**

## KRAUSS HIRED BY AWI

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Krauss and his team will work to expand AWI's presence online through its podcast and various social media channels by coordinating and increasing livestreams and Q&A events with AWI-affiliated faculty members, research centers and industry and government partners. Locally, Krauss will build upon in-person water research efforts that will benefit both Tuscaloosa and the UA campus.

"I will work on initiatives such as resuming the AWI H.U.B. Talk Series, giving both the local community and online world an opportunity to hear directly from our renowned researchers and professionals," he said. "I know I am excited to learn from the team Scott has already built here."

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### HOW TO GET AFFILIATED WITH THE ALABAMA WATER INSTITUTE

If you have expertise that could contribute to addressing complex water issues, please register yourself on our website. All registered members are considered affiliated with AWI and have access to all AWI resources.

To register, visit the AWI website: [awi.ua.edu](http://awi.ua.edu)

#### Eligibility Criteria:

- A faculty/staff/student appointment at UA.
- Research expertise in a water-related field.
- Completion of registration form.

For questions contact  
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or 205-348-9128