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Auburn Research is published biannually as a collaboration between the Office of the Vice President for Research & Economic Development and the Office of Communications and Marketing.

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On the cover:

A versatile cotton crop at Alabama Agricultural Experiment Station’s E.V. Smith Research Center. In addition to cotton fibers for textiles, cottonseed oil is an important part of the human food supply, and other parts of the cotton plant are used in animal feed.

Photo by Jeff Etheridge

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Editor’s note: Requirements for face masks have changed during the months we were putting this issue together. Photos taken without masks took place earlier in the process, before they were required.
**TELEHEALTH NETWORK ADDRESSES HEALTH ISSUES**

by Mitch Emmens

As the COVID-19 pandemic continues to be a threat, health care professionals and industry experts are developing ways to share information to aid in combating the virus, and to educate about prevention and treatment.

Auburn has joined the University of Alabama at Birmingham and the Alabama Cooperative Extension System to form the Telehealth Network—a group of faculty and administrative professionals with diverse expertise who are holding regular meetings by virtual assembly to share information.

The group formed over the summer, according to Dr. Jennifer Kergerman, associate dean and a professor in the College of Human Sciences. Discussions include not only the current COVID-19 pandemic, but also information about such chronic conditions as diabetes and hypertension, as well as research funding opportunities.

“The group consists of a broad range of very knowledgeable people, and it continues to expand,” Kergerman said. “The COVID-19 pandemic certainly drove the need for this group, but the network also serves as a significant information source for many important topics that relate to health, research and education.”

The Telehealth Network goals and issues it strives to address include:

- Disproportionate chronic health conditions among underserved and rural populations;
- More effective use of technology for extending education, assessment and treatment options;
- Establishing a network of diverse collaborators engaged in advancing the capacity and reach of telehealth;
- Building on the strengths of multiple institutions and systems to provide innovative and effective prevention and intervention programs;
- Extending the reach of health education, assessment and treatment that help reduce health disparities and promote health equity;
- Facilitating novel, applied research activities by engaging rural and underserved populations;
- Seeking and sustaining multiple streams of funding to support telehealth research and practice.

**HUNTSVILLE RESEARCH CENTER CELEBRATES A DECADE OF SUCCESS**

By Morgan S. Martin

The Auburn University Huntsville Research Center (AUHRC) is celebrating its 10-year anniversary of advancing Auburn’s research portfolio and presence in north Alabama and beyond.

Headed by Dr. Rodney Robertson as executive director, the AUHRC was created to match Auburn’s research capacities with the needs of Huntsville’s government agencies and industries. By facilitating collaborations between Auburn researchers and Huntsville industry leaders on a number of federal contracts, the AUHRC aims to increase research funding to both Auburn and the state of Alabama.

“We have had many successes in establishing meaningful and long-lasting partnerships between the university and the numerous industries and government agencies located here,” Robertson said. “Through these collaborations, Auburn’s premier research capabilities have been used to address significant government and industry needs that benefit not only our region, but our nation as a whole.”

The AUHRC has linked Huntsville-based industries to several of Auburn’s colleges and programs, and created partnerships with the U.S. Army, NASA, Muscle and Space Intelligence Center, Missile Defense Agency; FBI and HudsonAlpha Institute for Biotechnology, among many others.

The Auburn presence in Huntsville has grown to include five core AUHRC employees and an additional seven College of Engineering employees who are funded by government contracts and located on-site at Army facilities at Redstone Arsenal and at NASA’s Marshall Space Flight Center. The center’s focus areas include projects in defense, cyber security, aerospace, advanced manufacturing, life sciences, biotechnology, information technology and other federal and state government priorities.

“We are poised for even greater success in the future and look forward to the next decade,” Robertson said.

For news and updates from the AUHRC, follow @AuburnHRC on Twitter.

**RESEARCHERS AIM TO FUEL NEW MARKETS FROM HURRICANE-RAVAGED TIMBER**

By Zvi Greene

A team of researchers from Auburn University’s School of Forestry and Wildlife Sciences is in exploratory ways to grow new life to downed timber that has been decimated by hurricanes.

The Downed Timber Initiative aims to develop new methods of retrieving fallen trees and branches that would otherwise go to waste or become fuel for wildfires, and then developing innovative products from the salvaged wood.

The research is funded by a $1.0 million federal appropriation to the U.S. Forest Service, an agency of the USDA. Those funds will be allocated to four Auburn research teams led by faculty members: Dr. Sodi Peresin, assistant professor of Forest Biomaterials; Dr. Tom Gallagher, the Regions Professor of Forest Engineering; Dr. Brian Via, the Regions Professor of Forest Products; and Dr. Yucheng Peng, assistant professor of Sustainable Packaging Systems. Each researcher will work with a Forest Service representative.

Dr. Graeme Lockaby, director of the Center for Environmental Studies at the Urban-Rural Interface (CESURI) and Clinton McClure, professor of forestry in the School of Forestry and Wildlife Sciences, said the idea began as they spoke to landowners who were facing the ravages of Hurricane Michael, a Category 5 tropical storm that in 2018 demolished hundreds of millions of dollars’ worth of timber to the Southeast.

“Landowners had just 10 days to extract downed timber because the region’s hot, wet climate leads to rapid decomposition. Lack of access to the wood for extraction exacerbated the dilemma,” Lockaby said.

In addition, the immense volume of flattened timber in hurricane-impacted areas quickly saturated the market, resulting in dropping and often disappearing wood prices as null quotas resulted.

When landowners asked for solutions, Locatelli educationally said the wealth: “At this point, there’s not very much you can do.”

That led to discussions with Peresin, who saw potential for making commercially valuable products from partially decayed wood, and Gallagher, who envisioned developing a harvesting machine component capable of extracting fallen timber.

Lockaby said research often doesn’t translate well to the people it will benefit the most. This case was an exception.

“Our work is technical, we’re passionate about it, but it’s difficult to understand if you’ve not trained in a specific discipline. Often times people wonder, how relevant is that? Is it going to touch my life?” he said. “This will clearly touch people who live in those areas, especially forest landowners who depend on timber sales.”

Hurricanes break off, tangle and lay down timber horizontally. Gallagher said, making harvesting difficult when using the equipment currently available. He is developing a new attachment that could be used to collect the scattered timber easier.

Via is developing methods and uses to measure timber strength and degradation of downed timber as a resource for making corn-laminated timbers, or CET — lumber glued together at 90 degrees into three or more layers.

“Stronger timber can be used for use in structural applications like lumber and CET, while partially degraded timber might be salvaged into other product areas,” Via said.

Timber rank as “weak” or “degraded” by acoustics will be sent to be used to develop other product streams such as wood composites, nanocellulose and wood plastic composites.

Peng will use good-quality wood fibers from downed timber to develop bio-based composites for value-added applications in automobiles, construction and packaging.

“The goal is to maximize the utilization of our renewable natural resources for sustainability and to get the maximum return for the landowners, lowering their long during natural disasters,” Peng said.

Peresin will work with the USDA Forest Products Lab to process partially decayed timber into micro/nanomaterials, or CNMs, which will form the basis of an array of products that will allow harvested downed timber to penetrate large markets. The team will also upscale CNM production and design bio-based barriers for particulate and controlled release nutrients for soil stimulation.

“This is an opportunity for the Forest Products Development Center and the School of Forestry and Wildlife Sciences to offer innovative business opportunities to the forest industry in our region,” said Peresin.
Auburn researchers turning plant waste into water quality detection devices

by Mitch Emmons

Inside every plant and tree nature has hidden amazing fibrinous building blocks called cellulose nanocrystals, and a team of Auburn researchers is turning them into microelectromechanical system (MEMS) sensors to help ensure that Alabamians have safe water.

The Alabama Department of Economic and Community Affairs (ADECA) has awarded a grant to support this research aimed at producing MEMS sensors that can be used in detection devices to ensure the safety of water resources such as lakes and individual wells. Specifically, the research targets developing MEMS sensors to detect the presence of antibiotics and pesticides in Alabama water sources.

MEMS manufacturing to date has required large, multi-million-dollar production facilities — that is until the Auburn team recently proved these micro miracles can be fabricated using readily available waste materials from the forest and agriculture industries. Moreover, they can be produced significantly more economically and in a more environmentally friendly way than is possible using current large-scale manufacturing processes.

This “Cellulose MEMS” biosensor development program is conducted by Dr. Virginia Davis, Alumni Professor, and Dr. Robert Ashurst, the Upsilon Family Associate Professor from the Department of Chemical Engineering in the Samuel Ginn College of Engineering, and Dr. Solalak Prasain, assistant professor of forest biomaterials in the School of Forestry and Wildlife Sciences.

There are two major types of sensors the team believes can be improved using the cellulose nanocrystals. First, that cellulose nanocrystals can be used to improve the sensitivity of a technique called ELISA for detecting malaria biomarkers. However, since ELISA requires expensive equipment and sending samples to a lab, the team is also looking at a second area: MEMS sensors because of the associated manufacturing complexities, according to Davis. However, the team has proven that these cellulose nanocrystals can be used to economically produce MEMS, thus making MEMS more readily available and practical for sensor applications.

MEMS production technology, or microfabrication, uses the same technology to produce integrated circuits from silicon, and the technology revolutionized circuit miniaturization, allowing powerful computers to shrink from the size of a room half a century ago, to the smart phones that we carry in our pockets today, ” Davis said. “But silicon MEMS fabrication processes are expensive, energy intensive — reaching temperatures of approximately 1000º C, and utilize hazardous chemicals — such as hydrofluoric acid.

“One of the really awesome things about using the nanocrystals for sensors is that they can simply be painted onto a surface and then fabricated into devices using a relatively easy process,” Davis said. “It does not have to be done in a large-scale, major manufacturing environment like it is needed for silicon. We have proven that our devices can be made very quickly and in a very small lab setting. This makes it an excellent opportunity for small business to become a player in the growing MEMS manufacturing industry.”

Davis and her research collaborators are rising to meet the challenge of developing better sensor technologies — ones that are more affordable, more energy efficient and more environmentally friendly and — more tailored to meet specific detection needs. Their work has progressed through numerous stages of proof and development and has prior funding to explore a variety of potential applications, including cancer detection.

Their initial funding from the National Science Foundation resulted in two patents which are available for licensing through the university’s Office of Innovation Advancement and Commercialization (IAC). The IAC assisted in pursuing the ADECA funding to study water sensors as well as Auburn LAUNCH Research and Innovation funding to progress the MEMS technology. The team has also received funding from Auburn’s intramural grants program and Auburn University Research Initiative in Cancer.

Although their work in the cancer detection arena continues, the team’s newest research is focused on the MEMS biosensors.

“We are really excited to receive this new funding from the state so we can use resources that are abundant in Alabama to develop better devices for the detection of antibiotics and pesticides in water,” Davis said. “These are two significant concerns in the state of Alabama. These potential contaminants in water sources are simply a result of our modern life. A reliable, rapid, easy-to-use and economical detection system is a real need that we are excited to try to meet.”

“Of course we are excited to receive this new funding from the state so we can use resources that are abundant in Alabama to develop better devices for the detection of antibiotics and pesticides in water,” Davis said. “These are two significant concerns in the state of Alabama. These potential contaminants in water sources are simply a result of our modern life. A reliable, rapid, easy-to-use and economical detection system is a real need that we are excited to try to meet.”

In previous work, Prasain and her collaborators, Associate Professor Dr. Sarah Zohdy, showed that cellulose materials can enhance the sensitivity of ELISA for detecting malaria biomarkers. However, since ELISA requires expensive equipment and sending samples to a lab, the team is also looking at a second area: MEMS sensors because of the associated manufacturing complexities, according to Davis. However, the team has proven that these cellulose nanocrystals can be used to economically produce MEMS, thus making MEMS more readily available and practical for sensor applications.

MEMS production technology, or microfabrication, uses the same technology to produce integrated circuits from silicon, Davis explains.
HINTON PART OF GRANT TEAM USING TELEPRACTICE TO SUPPORT EARLY INTERVENTIONS
by George Littleton

An Auburn University College of Education faculty member is leading a team to use telepractice and routine-based home visits to help families served through Alabama’s Early Intervention System care for their children with developmental delays.

The award, sponsored by the Alabama Department of Early Childhood Education, investigates the implementation of routine-based home visits using telepractice to implement early intervention services when barriers, including COVID-19, prevent families from participating in home visits. The grant also supports fidelity checks and coaching through telepractice, and supplementary service delivery through a learning environment.

Dr. Vanessa Hinton, associate clinical professor and coordinator for the college’s special education distance master’s degree program, has extensive experience in delivering remote instruction or distance education. Her role in the grant is to train practitioners in how best to use distance education to help their clients. Hinton has been working with the Alabama Department of Rehabilitation Services (ADRS), which is the lead agency for early intervention, on various projects promoting evidence-based practices over the past few years.

“We had been working on this for about a year and, of course, had no idea the pandemic was coming,” Hinton said. “But I work in distance learning for our Department of Special Education, Rehabilitation, and Counseling, and through my partnership with the Alabama Early Intervention System, we were already discussing telepractice as a way of helping providers. I am basically instituting an established model or practice, but using my experience in distance learning to make it work. It is a collaborative effort.”

Hinton explained that few investigators at the university focus on the importance of early intervention for children with developmental disabilities such as autism spectrum disorder or cerebral palsy. Early intervention is for families of children with disabilities from birth through age 2, and can involve child care but is not preschool.

Instead, it focuses on services provided to caregivers in a child’s natural environment that empower caregivers to be the first and best teachers of their child. ADRS is the lead agency for the Alabama Early Intervention System, and it collaborates with the Office of School Readiness.

Hinton PART OF GRANT TEAM USING TELEPRACTICE TO SUPPORT EARLY INTERVENTIONS

INNOVATION & RESEARCH COMMONS OPENS AT RBD LIBRARY
By Jayson Hill

Auburn University researchers have been asking for a dedicated research commons. Now they have one. The Auburn University Libraries used the COVID-19 campus closure to finish work on the newest addition to its services: the Innovation & Research Commons (I&RC). Located on the first floor of RBD Library, the I&RC offers a makerspace as well as physical spaces for interdisciplinary research activities and discussions.

The I&RC is a place for turning ideas into reality. Its purpose is to help faculty and students find new ways to incorporate digital and analog technologies into their classroom and research projects. It is a shared space among faculty in a campus-wide initiative for interdisciplinary research ideas and projects.

The I&RC makerspace offers 3D printers and 3D scanners for additive manufacturing, electronics, a laser cutter, sewing machines, a tabletop letterpress book press, virtual and augmented reality equipment for course development and virtual instruction, an audio editing studio, and large-format printers and scanners.

The I&RC also includes an Adobe Creative Cloud open learning space; a data services and visualization hub — the DataSpace — to help researchers organize their datasets, troubleshoot their computational workflows and comply with data-management requirements from federal and private funders; and a large, interactive digital display — the Liquid Galaxy — that provides a platform for 3D geospatial visualizations, panoramic images, exhibits, videos and tours in a shared immersive environment.

The I&RC is currently open. Library users may contact the I&RC staff or their liaison librarians to arrange an orientation tour.

Dr. Dianna Tallier, an Auburn early childhood special education graduate and the director of First Teacher Home Visiting to the Department of Early Childhood Education, helped write an $11 million Preschool Development Birth to 5 grant for the state, funded through the federal Department of Health and Human Services. The telepractice portion is one of many grant-funded projects.

“What I do is locate early intervention agencies that have been trained in the Routines-Based Home Visiting Model developed by Dr. Robin McWilliam from the University of Alabama,” Hinton explained. “This is the model that has been adopted by the Alabama Early Intervention System, and the model uses the in-home routines of the family. Using existing routines of the family, you support the caregiver in embedding strategies and interventions for the child. The intervention is performed by the caregiver. Too often professionals come in and tell the caregiver what to do and leave, but with this model we support them and help them build capacity. This derives from the adult learning theory because the caregiver and interventionist partner together. It must be done in a way the interventionist is not coming off as an outside ‘expert.’ We may be experts in special education or therapy, but the caregiver is the expert about the child, how the child lives his or her life and what the child needs to accomplish daily living. Routines-based home visits require role release. The family member is in charge. You are there to support the caregiver, and in this phase of the grant that support is being offered through telepractice.”

Telepractice is simply the application of telecommunication technologies to deliver information, guidance and support — in this case, providing early intervention services to support the caregiver and child.

Meanwhile, as opposed to in-home visits, Hinton’s role is to coordinate the telepractice aspect of the routines, instead of teach the routines. She helps professionals understand how best to use distance technology to help the caregivers at home.

“Telepractice and early intervention pair well together,” Hinton said. “Because early intervention is a family consultation model, we do not feel the early intervention provider has to be directly in the home to help caregivers with their day-to-day routines. In the first part of the routines-based visit, the family sets the agenda. The family knows its routines and what they want to work on. So you are pairing a service with a family’s routine. The professional can play any role you need to help the family lead the visit. Utilizing telepractice technology will allow us the opportunity to do this while maintaining a critical level of fidelity.”

“These children are often frail and at-risk,” she concluded. “So the original intent of the grant was given an even greater emphasis because of the virus outbreak. It’s new, it’s wide open and it is timelier than imagined because of COVID-19.”
CADC FACULTY AND STUDENTS CREATE AU-MED PAK
by Kelley Young

Over the course of several trips to Haiti, Dr. Scott Kramer, Atlanta Auburn SIGI Alumni Endowed Professor in Auburn’s McWhorter School of Building Science, repeatedly encountered a challenging problem. Local medical missionaries shared their frustrations in trying to reach underserved communities in mountainous, rural and other inaccessible areas while carrying the supplies they needed to diagnose and treat the people there. Together, Kramer and his colleague Randy Bartlett, Business Endowed Professor of industrial design in the School of Industrial and Graphic Design (SIGD), developed an idea: The AU Diagnostic Medical Lab-in-a-Backpack, or AU Med-Pak for short.

The objective of this spatialized backpack is to hold supplies a medical professional might need to diagnose or treat the inhabitants of remote areas for anything from minor ailments to serious life-threatening illnesses. The backpack they envision would also need to be flexible enough to equip for specific needs and circumstances and light enough to carry long distances. Kramer and Bartlett initiated the project by dividing the students in Bartlett’s third-year industrial design studio into four groups with whom they worked closely to design, develop and fabricate working prototypes for the AU Med-Pak. After completion of this studio-based process, Kramer and Bartlett, accompanied by SIGD’s prototype fabrication facility manager David Gowan, took four prototypes to Haiti to test and receive feedback from medical professionals in the field. The best features of each design were then incorporated into a more refined version of the backpack.

“The internal components can be customized for work with different locations and diseases.”
- Randy Bartlett

At the pandemic’s changes the landscape of health care across the globe, Kramer and Bartlett are considering the development of a version of the AU Med-Pak specifically for use in underserved rural areas of the United States. They are also investigatorying ways to enrich the backpack with COVID-19 testing capabilities.

“The backpack is designed with modular components,” Bartlett said. “The internal components can be customized for work with different locations and diseases.”

Based on the success of his partnership with Bartlett and the strength of the students’ design work, Kramer says this is just the beginning for the AU Med-Pak. “We will analyze data from users, clean up the ergonomics and go on to the next iteration.”

PROTECTING OUR LANDSCAPE FOR THE FUTURE
by Mitch Emmons

The widespread destruction left by Hurricane Michael in 2018 significantly changed the middle region of the Florida Panhandle, and it spurred an Auburn research team to examine the effects of the altered landscape and develop management tools to help preserve and protect the area’s unique natural resources.

Dr. Chris Anderson, an associate professor of wetland ecology in the School of Forestry and Wildlife Sciences, leads a team of other Auburn scientists and colleagues from the University of South Alabama and the University of Georgia in a multi-year study of the watershed along the Gulf Coast from Alabama across Florida’s Panhandle and into Georgia.

The multi-disciplinary team represents a combination of ecological, climate and hydrological scientists working with social scientists to understand how future stakeholders land decisions may contribute to changes in land use and eventually to coastal water quality. Focusing on watershed drainage from Pensacola Bay in Alabama, to St. Andrews Bay in Florida, the project is extensive in its scope.

“We targeted this region because it affects parts of Alabama, Florida and Georgia,” Anderson said. “We are looking at drainages that include much of the coastal counties of Alabama and west Florida whose large-scale land use changes are occurring and where events have happened to reduce forest cover in the region. All of this can eventually affect the coastal water quality in an area that is known for its clarity, beautiful beaches and healthy bays. The primary goal of our project is to determine future land use trends and utilize existing models to predict and identify threats to coastal water quality. This project will ultimately generate information that can be used to plan, protect and preserve these coastal gems.”

The designated study area, though there are some urban centers along the coast, has historically been largely rural and forested, Anderson said. This project seeks to understand how climate and various socio-economic factors may change forest land use decisions and ultimately reduce forest cover along the Gulf of Mexico.

“Using 10 regional watersheds along the northern Gulf of Mexico, we seek to understand the extent of future forest loss and how it may alter drainage patterns and water quality to estuaries and their associated communities along the coast,” Anderson said.

The project is funded by a National Academy of Sciences, Engineering and Medicine grant through their Gulf Research-Healthy Ecosystems Program. Anderson is joined in this project by fellow Auburn researchers Dr. Kelly Dunning, Dr. Latif Kahn, Dr. Wayne Morse, Dr. Richard Hall and Dr. Sanjiv Kumar; University of South Alabama researchers Dr. John Lurteer and Dr. Purser DeVerse of the University of Georgia.

The study is intended to produce an extensive planning and analysis tool that will be developed in partnership with various state and local government planners, the forest and agriculture industry and others involved and interested in preserving the water quality of the region.
When the COVID-19 pandemic struck in the spring, Auburn researchers adapted to the rapidly changing research environment, utilizing best practices in safety procedures to carry on with essential research programs.

Auburn design adapts CPAP machines into emergency ventilators

By Jeremy Henderson

In April a team of Auburn engineers developed a way to quickly and inexpensively convert CPAP machines into ventilators, one of the most important tools hospitals have for helping COVID-19 patients.

Continuous positive airway pressure (CPAP) machines are commonly used to help people with obstructive sleep apnea breathe more easily during sleep. The Auburn design, called RE-InVENT, is an accessory that safely repurposes a CPAP into a functional ventilator.

In the early stages of the COVID-19 pandemic, ventilators were in short supply at hospitals across the nation as the number of patients requiring respiratory assistance increased.

Dr. Tom Burch and Dr. Michael Zabala, faculty in the Samuel Ginn College of Engineering’s Department of Mechanical Engineering, and Hayden Burch, a sophomore in mechanical engineering, initiated the project. Additional engineering faculty and alumni helped refine the mechanical design, control system, user interface and alarms. Critical respiratory care medical professionals contributed to the design of RE-InVENT.

Successful tests with live animals were followed by production of the machines through a partnership with Huntsville-based IS4S, an integrated systems solutions company. The partnership with Huntsville-based IS4S, an integrated systems solutions company. Successful tests with live animals were followed by production of the machines through a partnership with Huntsville-based IS4S, an integrated systems solutions company.

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Auburn Engineering faculty collaborate on COVID-19 sensing device

By Cassie Montgomery

Researchers in the Auburn Samuel Ginn College of Engineering received a $400,000 grant from the National Science Foundation to develop a biosensor that will rapidly detect COVID-19.

“COVID-19 belongs to a family of similar viruses known as beta coronaviruses. There have been two other such viruses that have emerged over the past two decades — Middle East respiratory syndrome (MERS), and severe acute respiratory syndrome, commonly referred to as SARS.”

“There are similarities between the viruses that cause MERS, SARS and COVID-19 to the point where the name of the current virus is SARS-CoV-2,” said Dr. Robert Pantazes, assistant professor in the Department of Chemical Engineering and the principal investigator on the project. “What we’re doing is using computational tools and experimental methods to try to take advantage of all the resources that were already in existence for these other coronaviruses and convert them into tools that will work with COVID-19 and potential future coronaviruses outbreaks.”

The research project, “Antibody-Based Nanoplasmonic Barcode Biosensors for COVID-19 Detection,” is led by Pantazes in collaboration with Dr. Pengyu Chen, assistant professor in the Auburn Department of Mechanical Engineering and Dr. Jennifer Maynard, the Henry Beckman Professor of Chemical Engineering at the University of Texas.

Specifically, the team of researchers is developing an inexpensive, near-real-time, point-of-care diagnostic device that would meet the need to test quickly, and most conveniently, diagnose COVID-19 and understand its spread.

With the biosensor resembling a test strip in the device, test samples would be mixed with antibody modified nanoparticles and placed onto the absorbent end of the strip. If there is COVID-19 present, the nanoparticles would stick to the strip and change the color of the test line.

“My lab has a long history in developing nanoplasmonic-based biosensors for immune detection,” said Chen, a co-investigator on the project. “This biosensor design originated from a barcode sensor for detecting immune proteins in mixtures of human fluids and can be applied to saliva and throat swabs.”

The team plans to screen and select optimized antibodies that can target the spike protein on the surface membrane of the virus. They will then attach the antibodies to a glass surface in a barcode pattern to capture the virus. With the biosensor resembling a test strip in the device, test samples would be mixed with antibody modified nanoparticles and placed onto the absorbent end of the strip. If there is COVID-19 present, the nanoparticles would stick to the strip and change the color of the test line.

“By capturing the spike protein, we can differentiate COVID-19 from other similar viruses,” said Chen. “With the biosensor resembling a test strip in the device, test samples would be mixed with antibody modified nanoparticles and placed onto the absorbent end of the strip. If there is COVID-19 present, the nanoparticles would stick to the strip and change the color of the test line.

“The academic research community is working rapidly to reduce the impact that the pandemic has on our daily way of life.”

- Dr. Robert Pantazes

“With the biosensor resembling a test strip in the device, test samples would be mixed with antibody modified nanoparticles and placed onto the absorbent end of the strip. If there is COVID-19 present, the nanoparticles would stick to the strip and change the color of the test line.”

“With the biosensor resembling a test strip in the device, test samples would be mixed with antibody modified nanoparticles and placed onto the absorbent end of the strip. If there is COVID-19 present, the nanoparticles would stick to the strip and change the color of the test line.”
Auburn faculty evaluate COVID-19 public health order compliance
by Cassie Montgomery

Two faculty members in the Auburn Samuel Ginn College of Engineering were awarded a $145,000 National Science Foundation grant to evaluate the public’s compliance with public health orders related to the COVID-19 pandemic by looking at social media behavior.

The effectiveness of these orders at slowing the spread of the virus is still being evaluated and largely depends on how the public responds to them. The faculty are using this data to create a simulation to help policymakers improve mitigation strategies in the future.

The research project, “Quantifying Social Media Data for Improved Modeling of Mitigation Strategies for the COVID-19 Pandemic,” is led by Assistant Professor Dr. Konstantinos Mykoniatis and Dr. Alice Smith, the J.W. Forehand/Accenture Professor, both in the Department of Industrial and Systems Engineering. The two are collaborating with Dr. Anastasia Angelopoulou, assistant professor of computer science at Columbus State University, to collect social media data, analyze the data to identify patterns and build a simulation model to evaluate the effectiveness of different mitigation strategies.

"The majority of mitigation strategies and policies are based on assumptions and how well a model can predict a specific situation depends on those assumptions," said Mykoniatis, the principal investigator on the project. "Most of these models have very oversimplified assumptions — namely that all people will follow a specific engagement strategy or public health order. We thought that, by studying the human behavior exhibited on social media, we could get a more accurate representation of how willing people are to follow these strategies and comply with these orders."

By collecting social media posts related to certain keywords such as “COVID-19,” “coronavirus,” or “pandemic,” the researchers aimed to group the data by like characteristics, including demographics and geographic location. Understanding correlations between an individual’s identifying characteristics and the degree to which like-minded people comply or resist shelter-in-place orders can help policymakers shape messaging to counteract potential resistance.

“We’re going to concentrate on Twitter to try to build relationships about different clusters of people and their reactions to public health recommendations that might lead them to a certain degree of compliance or active resistance,” said Smith, the project’s co-principal investigator. "We’re going to see what we can find out about the differences that can be used in models to ascertain the relative success or failure (compliance) of certain mitigations that could be proposed and understood for a given grouping of people or community of people that certain strategies are going to be preferred over others and why."

The team is also evaluating the role that rumors and false information about the coronavirus pandemic have played in determining the effects of compliance behavior.

Once the raw data is collected, Smith will analyze and cluster the data using unsupervised machine learning techniques. Mykoniatis will then use the findings to build a hybrid dynamic simulation model that can be used to evaluate the effectiveness of future messaging campaigns. The results will be made available to the public when the project ends in 2022.

"With this simulation approach, we’re considering how these groups of like-minded individuals behave and react to certain strategies and how likely they are to follow these types of orders going forward," Mykoniatis said.
Auburn researchers approach possible coronavirus vaccines from multiple angles

by Jayna Har, Mitch Emmens

and Mike Jarragan

Auburn College of Veterinary Medicine associate professor Dr. Constantinos Kyriakis began work in the spring to test new vaccine candidates that could offer protection against COVID-19 and help prevent the spread of the novel coronavirus. Working with Dr. Ted Ross, director of the Center for Vaccines and Immunology at the University of Georgia, Kyriakis conducted animal trials to investigate the immunogenicity of different vaccine doses and adjuvants combinations against SARS-CoV-2, the virus which causes COVID-19. Ross’ research team is designing and generating multiple vaccine candidates as part of global efforts to combat SARS-CoV-2.

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PRESSURE ON TO SOLVE HYPERTENSION MYSTERY

by Mike Jernigan

If there is one thing that gets Dr. Vinicia Biancardi’s blood pressure up, it is pondering the many mysteries surrounding hypertension and its causes.

A medical condition that affects a third of the adult U.S. population, hypertension, or high blood pressure, can lead to serious health problems if left untreated. These include significantly increasing the risk of stroke as well as occurrences of numerous heart and kidney diseases.

For such a common condition, however, the causes of hypertension remain something of a mystery in most cases. In some patients, the problem has a known origin, usually a secondary medical issue that is the root cause. Appropriately enough, these cases are known as “secondary hypertension.” But in the majority of cases (more than 90%), the source of the problem is unknown. Occurrences of this type are called “essential hypertension,” and it is these cases that cause Biancardi — an assistant professor in the Auburn University College of Veterinary Medicine’s Department of Anatomy, Physiology and Pharmacology — to feel her own pulse quicken.

“A large number of patients within the essential hypertension group do not respond appropriately to currently available medications,” Biancardi said. “Traditional treatment involves the use of monotherapy (one drug), or an association of different classes of medication, as needed, in an attempt to control blood pressure levels. These are things like diuretics, beta-blockers, ACE inhibitors, etc. In half of the patients in the essential hypertension group, the jump from monotherapy to multiple classes of drugs will allow the treatment to work for a short time, bringing blood pressure levels down. “However,” she adds, “this anti-hypertensive effect fades with long-term treatment. This is where our interest lies. The pathophysiology of this type of hypertension is still unknown. Despite the variety in classes of medications available, the fact that patients remain hypertensive tells us we are missing something critical. By better understanding the mechanisms at play, we can hopefully identify new targets for future medications.”

“These mechanisms” are not what one might expect. While the average person likely thinks of hypertension as largely a cardiovascular issue, its real origin is much more complex and involve far more than just the heart and circulatory system.

“In those patients in which their blood pressure does not fall off, after some period of time, begins to increase again with traditional treatment, it appears the hypertension is driven by some abnormality within the central nervous system such that there is an increase in ‘hypertensin’ signals sent from the brain to the cardiovascular system. Based on this idea of hypertension originating within the central nervous system, we call this ‘neurogenic hypertension,’ and this is the form of hypertension I study.”

Biancardi is particularly interested in the neurotransmitter Angiotensin II (AngII) and its role in interfering with the brain’s instructions regulating routine body functions. Neurotransmitters are chemical substances that play a role as signaling devices to deliver those instructions from the brain, including to the cardiovascular system.

Normally AngII — produced by the circulatory system — is unable to penetrate the blood-brain barrier, a highly selective border of endothelial cells that prevents harmful substances in the blood from crossing into the brain. But in cases of neurogenic hypertension, Biancardi has found that AngII, which is produced in excess due to the disease, damages the blood-brain barrier in a manner that allows it to cross into the brain and affect the regions that control the cardiovascular function directly. Within the brain, excess AngII has inflammatory properties that change the normal pattern of interaction from the brain to the body, sending altered instructions to the cardiovascular system and contributing to neurogenic hypertension.

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Penetration of AngII into the brain can also cause an increase in reactive oxygen species (ROS), a type of unstable molecule that contains oxygen and easily reacts with other molecules in a cell. An excess of ROS in cells can cause not only more inflammation, but in severe cases even damage to DNA, RNA and proteins, which can cause cell death.

According to Biancardi, the body’s normal response to oxidative stress would come in the form of antioxidant defenses, many of which are controlled by a protein in the body called Nrf2. Interestingly, Nrf2 is found in cardiomyocytes, or cardiac muscle cells, which make up the heart muscle. This is where the team has found that the Nrf2 can become impaired due to oxidative stress.

But in cases of neurogenic hypertension, Biancardi has found that one particular protein in the brain is damaged by oxidative stress. This protein is called Nrf2-binding protein-1, or Nrf2BP-1, and it is the part of the brain that helps control blood pressure levels.

When Nrf2 is impaired, the brain is unable to produce the antioxidants needed to keep the body healthy. This can lead to a variety of problems, including high blood pressure.

If Biancardi and the Auburn team can solve that mystery, it could go a long way toward improved therapies for hypertension. And better treatments could potentially impact millions of people who are prone to one of America’s most common and confounding health problems, as well as have possible applications to many other neuro-inflammatory diseases.

“Given the almost universal nature of brain inflammation across a wide spectrum of neurological diseases, we hope that a better understanding of these mechanisms will also have far-reaching impacts beyond hypertension,” Biancardi noted. “While a rare case for hypertension is unlikely given our current knowledge, we do know that the key in mitigating the risks associated with the disease is managing blood pressure and bringing it down to normal levels. We are very hopeful that teasing apart the contribution of Nrf2 to the maintenance of neurogenic hypertension and better understanding the interactions between AngII and Nrf2 will allow us to possibly identify new treatments.”
INITIATIVE BRINGS PHARMACOGENOMICS TO FOREFRONT

By Matt Crouch

Recognizing the importance of genomics in modern health care and a rise in precision medicine, the Auburn Harrison School of Pharmacy created the Center for Pharmacogenomics and Single-Cell Omics Initiative (AUPharmGx). One year later, the initiative — a first of its kind in the state of Alabama — is seeing early positive returns, placing Auburn at the forefront of the growing science.

“Pharmacogenomics is the study of the contribution of genomics and of other ‘omics’, such as epigenomics, transcriptomics, proteomics and many others to a patient’s response to drugs,” said Dr. Amit Kumar Mitra, director of AUPharmGx. “The ultimate goal is to individualize drug selection and drug use in order to maximize drug efficacy and to avoid adverse drug reactions.”

By facilitating collaborative research and providing state-of-the-art technologies to generate omics data, as well as cutting-edge data analysis, AUPharmGx puts Auburn at the forefront of an increasingly important area of health care.

“This is the first-of-its-kind initiative in the state of Alabama, offering such a broad range of facilities under one roof aimed at pharmacogenomics research,” Mitra said. “This core facility provides all the services required in a typical pharmacogenomics study from conception to data analysis.”

Mitra, an assistant professor in the Harrison School of Pharmacy’s Department of Drug Discovery and Development, is also director of the Center for Pharmacogenomics and Single-Cell Omics Initiative (AUPharmGx). This pharmacy school initiative formed the center in 2019, recognizing the importance of genomics in modern health care and a rise in precision medicines.

Dr. Amit Mitra, assistant professor in the Harrison School of Pharmacy's Department of Drug Discovery and Development, is also director of the Center for Pharmacogenomics and Single-Cell Omics Initiative or (AUPharmGx).

The pharmacy school initiated the center in 2019, recognizing the importance of genomics in modern health care and a rise in precision medicines.

The center offers a variety of services and resources, including:

- Targeted gene expression analysis
- Quantitative real-time PCR (qPCR) for mRNA/Gene expression
- Single-cell analysis
- Microfluidics analysis/micrometagenomics
- Cell line authentication
- Generate CRISPR-edited knockout cell pools
- Bioinformatics and data analysis
- Support for grant writing

To learn more about the Center for Pharmacogenomics and Single-Cell Omics Initiative, or schedule an appointment or consultation, email aupharmgx@auburn.edu and visit wp.auburn.edu/aupharmgx/

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The strategic investment by the Harrison School of Pharmacy, or HSOP, in AUPharmGx is providing early positive returns.

“As a health profession school with a strong commitment to advancing health and well-being in large part through pharmaceutical sciences-based research, AUPharmGx is designed to foster collaborative efforts between multidisciplinary health scientists and health care providers,” said Dr. Tim Moore, HSOP’s associate dean for research. “In less than one year of accepting projects, AUPharmGx has provided support for nearly a dozen separate research efforts, covering a wide spectrum of services, including RNA sequencing, gen expression analysis, single DNA sequencing, whole-genome sequencing and microbiome analysis/metagenomics. These projects have also addressed a wide range of health issues such as Alzheimer’s disease, neurodegenerative cancer (including breast cancer), hypoxia and lung injury.

“We are also grateful for the university efforts to sustain research activities during the COVID-19 pandemic, and AUPharmGx is able to continue its work uninterrupted.”

AUPharmGx is conveniently located within the Harrison School of Pharmacy’s Walker Building along War Eagle Way and the Thach Concourse.

offers education and training on how to conduct proper pharmacogenomic research, including consultation on where and how to start specific projects, help in sample preparations, data generation using next-generation methods and also help in data analysis and interpretation.

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RESEARCH INITIATIVE SEEKS TO END HEALTH DISPARITIES

by Charlotte Tuggle

The early months of 2020 were ravaged by disease and ignited racial injustices. But the link between the two runs deeper than face masks at protests. At the intersection of health and inequality, Auburn researchers work to inform, educate and end health disparities for disadvantaged communities.

By combining forces across campus, the interdisciplinary Health Disparities Research Initiative (HDRI), led by the Department of Human Development and Family Studies Associate Professor Dr. Thomas Fuller-Rowell in the College of Human Sciences, drives the development of health disparities research and instruction to implement positive, systemic change.

“Health disparities are insidious and harmful to society. Health disparities are also present to a disturbing degree in most societies around the world. Just as we need to be prepared to fight physical disease, we also — just as importantly — need to be ready to fight social and societal ‘diseases’ like health disparities,” Fuller-Rowell said.

“If stark health disparities and their underlying causes are left unaddressed, perceptions of fairness are undermined, and social unrest in various forms is likely to ensue alongside economic stagnation. In our view, addressing health disparities are an urgent item on the agenda of scientists, political leaders and society as a whole.”

The HDRI’s pillars of study are socioeconomic and racial health disparities. Socioeconomic health disparities spring from the level of income or education a person has, which will affect their health and longevity. Fuller-Rowell said the HDRI’s work is an essential first step to ultimately address health disparities. Moving forward, he has plans to grow the HDRI’s research training opportunities to both graduate and undergraduate students.

“One of the HDRI’s latest projects is an examination of whether the COVID-19 pandemic has had a differential impact on the health of black and white undergraduate students. The project builds on an ongoing study of undergraduate students at Auburn, which had already assessed the health of 265 students prior to the start of the pandemic. The new assessment, which was carried out two months into the national shutdown, measured student mental and physical health and documents exposure to various stressors associated with the pandemic. Their results will provide insight into how the novel coronavirus has affected black and white students, in addition to the broader mechanisms of racial health disparities.”

Across campus, faculty members have made a commitment to engage together and move forward the goals of the HDRI. Professors from human sciences, nursing, pharmacy, veterinary medicine, psychology and more use the interdisciplinary trajectory of the initiative. At the student level, graduate students and junior scholars are trained to become the next generation of health disparities researchers.

“The pressing nature and complexity of health disparities require fresh perspectives,” said Dr. Jennifer Kerpelman, associate dean for research, graduate studies and outreach in the College of Human Sciences.

“Involvement of diverse students and junior scholars will foster innovative contributions to emerging research and outreach programs that offer real solutions and promote greater health equity.”

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As millions of Americans prepare to vote this election season, the security and integrity of our elections is a topic at the forefront of many people’s minds.

Will there be vote fraud or vote suppression? Could hackers try to tamper with voter rolls or even vote? How will the COVID-19 pandemic affect my ability to vote?

As people ponder these questions, thousands of election managers across the United States are already grappling with these issues and many more. For these election officials, their roles have grown increasingly challenging over the years as election systems have become more complex and technology has become more widely used in elections and their management.

It’s for that reason that a new interdisciplinary collaboration in combining two of Auburn University’s greatest strengths in the interest of securing our elections.

The McCrary Institute for Cyber and Critical Infrastructure Security is teaming up with Auburn University’s Election Administration Initiative, housed in the Department of Political Science, to integrate its cyber expertise into established certification and academic programs offered by Auburn.

“Having both the McCrary Institute and the Election Administration Initiative under one roof at Auburn University is absolutely exceptional. No other university has this combined level of expertise,” said Dr. Kathleen Hale, professor of political science and the initiative’s director.

Auburn has been a national leader in election administration for decades — the university has the nation’s largest group of faculty in the field of political science and public administration that focus on election administration.

The university offers the only national certification program for election officials through its 25-year partnership with the Election Center — known more commonly as the National Association of Election Officials. In addition to the certification program, Auburn is also one of two universities that offer a graduate certificate in election administration, either as a stand-alone program like Auburn’s or in conjunction with a Master of Public Administration program.

The Election Administration Initiative’s work is largely focused on professionalizing the field of election administration and building capacity across state and local election offices. Its training covers everything from maintaining election systems to continuity of operations planning.

“We have seen a number of conversations with government entities that are involved with this, including federal, state and local officials, who expressed real interest and excitement about our teams collaborating on these activities.”

Given its focus and national prestige, partnering with the Election Administration Initiative was a natural fit for the McCrary Institute and its affiliated Center for Cyber and Homeland Security.

“There’s doing amazing work already, and we at the McCrary Institute saw lots of opportunities to plug our work into theirs,” McCrary Institute director Frank Cilluffo said. “We have had a number of conversations with government entities that are involved with this, including federal, state and local officials, who expressed real interest and excitement about our teams collaborating on these activities.”

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As the collaboration between the Election Administration Initiative and the McCrary Institute continues to unfold, aspirations include the development of a free-standing graduate certificate that focuses on cybersecurity in elections from a policy and governance perspective.

Some of that curriculum could potentially dovetail into the certification training offered through the Election Center.

“This exciting part of this partnership with the McCrary Institute and developing the synergy that comes from these two expert areas working together is that we will build new capacity for preparedness, build new capacity for continuity of operations as well as for administrative practices and for thinking about how people can vote safely and securely,” Hale said.

By adding additional curricula and training to address these evolving threats to our election systems, the Election Administration Initiative and the McCrary Institute are aiming to ensure the kind of election that Americans expect — ones that are secure, transparent and where every vote is counted.

“Do people wonder if anyone is watching what comes to these two expert areas working together is that we will build new capacity for preparedness, build new capacity for continuity of operations as well as for administrative practices and for thinking about how people can vote safely and securely,” Hale said.

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“We’re talking about arming and educating our administration with knowledge to better maintain the trust and efficacy of our election systems,” Cilluffo said. “At the end of the day, our election systems are all about trust.”

“Having both the McCrary Institute and the Election Administration Initiative under one roof at Auburn University is absolutely exceptional. No other university has this combined level of expertise.” — Dr. Kathleen Hale

As the collaboration between the Election Administration Initiative and the McCrary Institute continues to unfold, aspirations include the development of a free-standing graduate certificate that focuses on cybersecurity in elections from a policy and governance perspective.

Some of that curriculum could potentially dovetail into the certification training offered through the Election Center.

“This exciting part of this partnership with the McCrary Institute and developing the synergy
Dr. Ed Thomas, Jnr., earned his doctorate degree at Auburn and has spent more than two decades immersed in teaching, conducting research and engaging communities throughout the nation in outreach programs. In a process that lasted five years, Thomas oversees the development and 204 opening of Auburn’s Magnet Laboratory, which features a one- of-a-kind, 6,000-pound superconducting magnet. As of 2019, he had led research activities exceeding more than $11 million in external funding.

With decades of experience, he is truly passionate about plasma science. According to the National Academies of Sciences, Engineering and Medicine’s (NASMEM) decadal assessment, plasma research has helped make jet turbines, medical implants, lighting, solar cells, nanomaterials and even spacecraft possible. In the future, plasma will help unlock improvements for our entire society, including medical breakthroughs, agricultural advancements and carbon dioxide capture.

Thomas was selected to serve as a committee member for the decadal assessment of plasma science report Plasma Science: Enabling Technology, Sustainability, Security and Exploration (Plasma2020). The 18-member group worked on several corporate cutting-edge engineering technologies and research to develop innovative methods of protecting our nation’s critical infrastructures. Thomas’s research has focused on four main thrusts: secure software engineering, cloud security and forensics, electronic intelligence (EL) for security and advanced manufacturing security.

The work by the committee directly impacts federal agencies, policymakers and academic institutions, and encourages collaboration among them. A virtual report briefing about this team of scientists was held in May 2020, which was livestreamed by more than 500 attendees. To watch the entire recorded presentation, visit vimeo.com/42524776.

Key findings and recommendations were presented in four major areas:

• Stewardship — advancing interdisciplinary research
• Education, workforce and diversity
• Research enterprise and public partnerships
• Better serving the plasma science and engineering community

Thomas is the Charles W. Bailey Endowed Professor and associate dean for research and graduate studies in the College of Science and Mathematics (CSOM), a fellow of the American Physical Society and the director of the unique Magnetized Plasma Research Laboratory that studies the physics of plasma.

Thomas has dedicated his career at Auburn to helping shape the university’s plasma program — gaining international recognition and a respected reputation in plasma research. Now, he is helping to impact the field of plasma science for future generations.

To download a copy of this entire report or learn more about NASMEM, visit nas.edu/plasma.
NATIONAL SCIENCE FOUNDATION CAREER AWARD RECIPIENTS

The National Science Foundation’s Faculty Early Career Development (CAREER) Program issues research funding “in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.” During the 2019-2020 fiscal year, the following Auburn faculty members received this prestigious recognition:

**DR. MAJID BEIDAGHI**
Department of Mechanical Engineering
Project Title: Cathode Materials for Aluminum Batteries: Understanding Factors Influencing Aluminum Ion Intercalation into MXenes

**DR. DEBSWAPNA BHATTACHARYA**
Department of Computer Science and Software Engineering
Project Title: Bringing Models to Nature: Open Access Bioinformatics for Protein Structure Refinement

**DR. PENGYU CHEN**
Department of Mechanical Engineering
Project Title: Nano-Plasmon Ruler Imaging for Direct Visualization of How Cells “Talk”

**DR. BYRON FARNUM**
Department of Chemistry and Biochemistry
Project Title: Multi-Electron Nickel Redox Cycles for Solar Energy Conversion and Storage

**DR. EVANGELOS MILIORDOS**
Department of Chemistry and Biochemistry

**DR. NEHA POTNIS**
Department of Entomology and Plant Pathology
Project Title: Investigating the Mechanistic Basis of Host Adaptation in Close and Distant Relatives Within Xanthomonas Species Complex

**DR. DAVID ROUECHE**
Department of Civil Engineering
Project Title: Theory-Guided Statistical Framework for Advancing Learning from Post-Windstorm Engineering Assessments

**DR. DANIEL WARNER**
Department of Biological Sciences
Project Title: Testing Alternative Routes of Adaptive Phenotype-Environment Matching Across Heterogeneous Landscapes in Wild Populations

**DR. MATTHEW WATERS**
Department of Crop, Soil and Environmental Sciences
Project Title: Identifying Primary and Secondary Drivers of Cyanobacteria Production Using the Sediment Record and Paleolimnology

**ESTIMATED COMBINED VALUE FOR THIS YEAR'S NSF CAREER AWARDS AT AUBURN**

$6M
College of Agriculture fulfills role in food supply chain during COVID-19 pandemic

By Paul Hollis

As the specter of a worldwide pandemic continued to grow this past spring, so did the importance of the land-grant institution’s role in providing an abundant and safe food supply to a nation and world in crisis.

In Auburn’s College of Agriculture and Alabama Agricultural Experiment Station (AAES), faculty, staff and students recognized early on that their core mission must continue in the face of unprecedented challenges.

“We made the decision to keep all experimental operations going forward during the period of adjusted operations,” said Dr. Paul Patterson, dean of the College of Agriculture and director of the AAES. “Failing to proceed with our experimental work would result in the loss of one year’s worth of experimental data and failure to perform on contracted research work.”
“College of Agriculture administrators meet with the research center directors via Zoom video conference biweekly to check on health status and needs,” he said.

No disruptions in animal food chain

In the Department of Animal Science, faculty, staff and students made necessary transitions in the areas of animal care as well as animal harvest for those scheduled to enter the food chain, said Dr. Wayne Greene, professor and head of the department. “Our farm crews have worked tirelessly during this pandemic to ensure that they were cross-trained and had adequate student workers available, while maintaining social distancing to take care of our animals for teaching, research and Extension,” Greene said.

Experimental trials continue

For the 15 AAES research centers located strategically throughout the state, spring can be the busiest time of the year because that’s when hundreds of crops and grasses are planted and need input from research centers. The spring of 2020 was no different, except for the many extra precautions taken to ensure everyone’s safety, said Greg Pace, director of research operations for the AAES.

“We performed all normal operations to install all of our experiments,” Pace said. “We normally carry out research operations between 700 and 800 trials across all of our centers including field crops, plant breeding, horticulture, beef cattle and biometrics engineering.

“During the initial stages of the pandemic, we limited interaction so that employees stayed on their respective units and maintained personal distances within units. Tours and station events such as grower meetings were canceled until further notice.”

Pace and research centers have continued to work at normal capacity.

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University of Alabama research is helping to ensure that the state’s commercial fruit and vegetable industry will continue to provide healthy and safe fresh produce to Alabamians.

Undeterred by the crisis, Auburn horticulture researchers have carefully and painstakingly continued efforts to address the needs of Alabama’s commercial food producers. Fresh food production a priority

“Of the greatest source of a plant-based protein is pasture, and in the College of Agriculture, pasture research includes breeding and genetics for improved pasture and pasture from past such as meats, disease and dust, as well as soil fertility and plant nutrition,” said Dr. John Buesc, head of the Department of Crop, Soil and Environmental Sciences.

“Professor Dr. Ruediger Hauck has tested samples from a variety of poultry flocks for the presence of coccidiosis in intestinal tissue. In addition, interactions between coccidiosis and bacteria were investigated to lay the groundwork for developing and evaluating pre-and probiotic feed additives to alleviate the damage caused by the disease.

Assistant Professor and Extension Specialist Dr. Dhiema Bouziana has been investigating the potential for the transmission of salmonella on dust generated from poultry litter. Identifying the level of risk associated with dust-borne salmonella will denote the importance of implementing strategies to minimize the presence of dust within chicken grow-out houses.

Auburn horticulturists, driven by the land-grant mission, are laser-focused on developing and improving sustainable, nutritious and safe local food production systems to benefit Alabamians during this pandemic and beyond.

Food crops sustain global population

Scientists in the Department of Crop, Soil and Environmental Sciences were able to continue conducting research on important food crops such as peanut, corn, wheat and sorghum, all of which provide the proteins and carbohydrates necessary to feed and sustain a global population.

“One of the greatest sources of a plant-based protein is pasture, and in the College of Agriculture, pasture research includes breeding and genetics for improved pasture and pasture from past such as meats, disease and dust, as well as soil fertility and plant nutrition,” said Dr. John Buesc, head of the Department of Crop, Soil and Environmental Sciences.

Dr. Charles Black finds the efforts on the breeding and genetics of new peanut cultivars that are higher yielding due to improved traits of resistance to pests, especially viruses and fungi. His research efforts also address improved water-use efficiency through increased drought tolerance.

Despite the disruptions of many day-to-day activities in the spring and summer because of COVID-19, critical research that directly relates to food security continued, Buesc said.

“Our scientists were able to continue their research in plant breeding and genetics, crop physiology, agronomy, water quality, soil fertility, plant nutrition and the other associated soil sciences during a difficult time in the state of Alabama and our nation,” he said.

On the front line of COVID-19 management

When Dr. Robert Norton, professor of veterinary infectious diseases in the Auburn University College of Veterinary Medicine, was one of a Department of Defense Working Group in early February 2020, the COVID-19 pandemic was just beginning to gain a significant foothold in the United States.

The purpose of the working group was to develop protective strategies for individuals who had been infected by SARS-CoV-2 virus. Early in this effort, massive amounts of public health data were collected and analyzed.

“Rather than focusing on models, which continuously had to be modified because of new data, the group focused on overall trends,” Norton said.

“By the first week in March, the group shared the first of the analytical conclusions with Department of Defense decision-makers. This data indicated that the disease was primarily caused through respiratory infection.”

In a subsequent paper, Norton authored, “SARS-CoV-2 infections were rare and did not contribute significantly to the overall pandemic. Furniture are animate objects and surfaces that can become contaminated with pathogens, enabling the spread of disease.” Her conclusions contradicted significantly with those of other research groups, including those in the federal government, which later recognized that COVID-19 was, indeed, primarily transmitted in origin.

“Auburn researchers evaluates everything from traditional crops and growing practices to new crops and new uses of the art, cutting-edge technologies,” said Dr. Dhiema Bouziana, head and professor of the Department of Horticulture.

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“Some of the numerous fruit, nut and vegetable crops that we are actively researching include apple, blackberry, blueberry, cantaloupe, citrus, grapes (moscato, table and wine), many nurseries, lemons, pecans, pieris, pomegranate, strawberry, tomato, turnip and watermelon, he said. Current research projects are determining climatic adaptability, post-disease tolerance, stress/ nutritional quality, yield and potential for sustainable/organic production research. Lavre said.

“New, indoor aquaponics systems that combine the production of tilapia fish and lettuce, tomato, and other vegetables look at the combined production of both protein (fish) and vegetable for year-round food production,” he said.

Using gypsum mixed with pine shavings to assess the impact of limb quality in broiler production along with the nutrient value of the resulting litter.

Poultry scientists also continue research to gain a better understanding of coccidiosis — a sometimes deadly intestinal disease of chickens.

Dr. Desmond Layne said.

“Auburn’s livestock research intends to lay the groundwork for developing and evaluating pre-and probiotic feed additives to alleviate the damage caused by the disease.

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Diabetes was the seventh leading cause of death in the United States in 2017, based on the 83,564 death certificates in which diabetes was listed as the underlying cause of death.

According to the Centers for Disease Control (CDC) National Diabetes Statistics Report for 2020, cases of diabetes have risen to an estimated 34.2 million. An estimated 26.8 million people (10.2% of the population) had diagnosed diabetes, and approximately 7.3 million more people have diabetes but have not yet been diagnosed.

Diabetes mellitus, commonly known as diabetes, impacts all social, economic and ethnic backgrounds. Diabetes is a metabolic disease that causes high blood sugar (glucose). The spike in blood glucose is the result of the body’s inability to store or effectively use its own insulin, which is produced by cells of Langerhans found in the pancreas. Insulin helps regulate blood glucose levels — providing energy to body cells and tissues. Many people with type 2 diabetes can control their blood glucose by following a healthy meal plan and a program of regular physical activity, losing excess weight and taking medications.

Auburn University’s School of Nursing (AUSON) is conducting a pilot research study, Doggone Diabetes, to increase physical activity among people living with diabetes or prediabetes through a walking program implemented with animal-assisted therapy dogs. The Caring Foundation of Blue Cross and Blue Shield of Alabama has provided funds for the School to support the study, which is expected to continue for six months.

“The American Diabetes Association recommends that people living with diabetes mellitus and prediabetes should participate in 150 minutes of moderate to vigorous exercise each week spread over at least three days,” said Dr. Caralise Hunt, associate dean of academic affairs at AUSON, and principal investigator of the study. “Current literature indicates that many people do not achieve that goal. The Centers for Disease Control reports that only 52% of Americans get the recommended amount of aerobic activity per week,” Hunt added.

Hunt has worked in diabetes management throughout her career. “The numbers for Alabama are even worse,” Hunt added. “Approximately 610,458 people in Alabama (15.2% of the adult population) have diabetes. In 2017, the American Diabetes Association estimated that 1,394,000 people in Alabama (37% of the adult population) had prediabetes.”

Hunt believes that this study is important to the citizens of Alabama and beyond as the rates of type 2 diabetes and obesity continue to steadily increase. People, Pope, and Hunt began a conversation about how people enjoy being around the dogs and wanted to investigate whether the dogs would be a motivator for people with prediabetes and diabetes to increase their physical activity. The research hypothesis that incorporating animal-assisted therapy dogs into a walking program will encourage increased physical activity.

“Out primary goals for this pilot study are to implement a walking program and increase and sustain physical activity (walking) in study participants to 150 minutes per week. The plan is to recruit adults 19 and older living with prediabetes or diabetes from the campus and the Auburn-Opelika community. We will use a crossover design so that for one month, participants will walk with the dogs from AUSON animal-assisted therapy, and the following month they will walk with the group without dogs. This will allow us to study the effect of this therapy.

“If the intervention is effective, we would like to continue and expand the program. Our primary study outcome is minutes of physical activity per week. Secondary outcomes include evaluations of hemoglobin A1C, weight, BMI, waist circumference, blood pressure and heart rate,” Hunt said.

“This study is very important in light of the [COVID-19] pandemic. People with diabetes face a higher chance of experiencing serious complications from the virus. The risk of developing severe illness and complications from COVID-19 is lower if diabetes is well-managed. When people with diabetes do not manage their condition and experience fluctuating blood glucose values, they are generally at risk for several diabetes-related complications,” Hunt added.
CNSI FUELS WORK IN NEUROSCIENCE AND DRUGS OF ABUSE
by Matt Crouch

Established as part of the inaugural Presidential Awards for Interdisciplinary Research (PAIR) in 2018, the Auburn University Center for Neuroscience Initiative (CNSI) has added a new avenue for collaboration and creative research relating to a variety of neurological and substance-use disorders.

Led by co-directors Dr. Miranda Reed and Dr. Vishnu Suppiramaniam, the CNSI involves more than 60 investigators across the university with particular focus on Alzheimer’s and other neurodegenerative conditions, drugs of abuse, neurodevelopmental alterations and metabolic aspects of brain disorders.

Having a centralized and multi-disciplinary center for such work has already brought accolades and funding, including a recent $1.7 million grant to study the effects of marijuana use during pregnancy. Funded by the National Institutes of Health—National Institute on Drug Abuse, the project will look at the prenatal effects of THC while also investigating treatment options.

Led by Reed and Suppiramaniam, both of the Harrison School of Pharmacy’s Department of Drug Discovery and Development, the project is titled “Elucidation of molecular mechanisms of prenatal cannabis/marijuana exposure: Identification of targets and therapies.” The NIH-R01 grant is funded for five years with $352,843 in the first year for a total of more than $1.7 million.

With increased legalization of marijuana in recent years, a rising trend has been its use by expectant mothers as a way to ward off nausea and morning sickness. While many recognize the dangers of smoking, tetrahydrocannabinol (THC), is still found in other forms like vaping, gummies and brownies, and can have an effect on neuronal communication.

“Marijuana use during pregnancy is associated with elevated anxiety and depression. ‘The effect of THC on neurons is complex and is shown to have both excitatory and inhibitory effects on neurons,’” Suppiramaniam said. “It can lead to impaired learning and memory and also affect mood and emotions.”

Use during pregnancy can impact almost all the major neurotransmitter in the brain, including glutamate, adrenergic, serotonin and dopamine. This can lead to a variety of behavioral and memory issues, as well as future drug use, anxiety and depression.

“Marijuana use during pregnancy is associated with elevated risk for miscarriage, birth defects, developmental delays and learning disabilities, including lasting harm to intelligence, executive functioning skills and memory,” Reed said.

The second part of the study is identifying therapeutic targets for the treatment of cognitive deficits associated with prenatal marijuana exposure. Reed and Suppiramaniam have already identified one target, the polysialylated neural cell adhesion molecule (PSA-NCAM), which plays a critical role in learning and memory.

“Currently, we are exploring postnatal therapeutic options,” Suppiramaniam said. “We are exploring novel drugs and molecules that can be delivered to the offspring during the early adolescence period to stabilize the synaptic transmission processes and the endocannabinoid system is a critical master regulator of glutamatergic signaling.”

“The information will be used to test whether increasing PSA-NCAM with a novel drug can stabilize neuronal communication and improve the cognitive deficits observed after prenatal cannabis/marijuana exposure.”

In particular, they are studying the communication among neurons, synaptic functioning and the resulting consequences in cognition, learning and memory.

“For the current studies, we are examining alterations in the prefrontal cortex and hippocampus, brain regions that mediate executive functioning skills and memory,” Reed said. “We are focusing initially on alterations in the glutamatergic neurotransmitter system as it plays a critical role in these processes and the endocannabinoid system is a critical matter regulator of glutamatergic signaling.”

“Additionally, bringing investigators together under the umbrella of the CNSI has fostered collaboration and innovation in pursuing and receiving grants such as this R01 grant from the National Institutes of Health.”

“We are very grateful that the CNSI has partially provided support to enhance the existing infrastructure and to recruit expertise needed to carry out this project,” Suppiramaniam said. “It certainly provides a conducive and collaborative environment for exchange of ideas among faculty, staff and student scientists and is a catalyst for cutting-edge research.”

MORE THAN
$1.7 million
OVER FIVE YEARS
for this project

MORE THAN
60 investigators
ACROSS THE UNIVERSITY

The Auburn University Center for Neuroscience Initiative (CNSI) is supporting a team of researchers investigating the effects of prenatal exposure to cannabis/marijuana on brain development and function. The project, led by co-directors Dr. Miranda Reed and Dr. Vishnu Suppiramaniam, aims to elucidate the molecular mechanisms involved in prenatal cannabis/marijuana exposure and identify therapeutic targets for the treatment of cognitive deficits associated with prenatal marijuana exposure.

The CNSI, established in 2018 as part of the inaugural Presidential Awards for Interdisciplinary Research (PAIR), brings together more than 60 investigators from across the university with expertise in Alzheimer’s disease, other neurodegenerative conditions, drugs of abuse, and neurodevelopmental alterations and metabolic aspects of brain disorders.

The recent $1.7 million grant from the National Institutes of Health—National Institute on Drug Abuse will fund the project for five years, with an initial investment of $352,843 in the first year. This funding will enable the team to study the prenatal effects of THC and explore treatment options for those exposed.

The CNSI’s collaborative environment fosters the exchange of ideas and innovation, allowing researchers to explore complex neurological and substance-use disorders. The initiative includes a centralized approach to research, allowing investigators to work together across disciplines to tackle challenging issues.

With increasing legalization of marijuana, there is a growing interest in understanding its effects on the developing brain. The CNSI’s work is crucial in elucidating the mechanisms of prenatal cannabis/marijuana exposure and identifying potential therapeutic targets to mitigate the long-term consequences of exposure.

By bringing together experts from various fields, the CNSI is uniquely positioned to make significant contributions to our understanding of how drugs of abuse affect brain development and function. This interdisciplinary approach is essential for advancing the field of neuroscience and addressing the complex challenges posed by drug use.

The CNSI’s success in securing significant research funding underscores its impact and the importance of multidisciplinary collaboration in addressing pressing health issues. With continued support, the CNSI will continue to be a leader in advancing our knowledge of neurological disorders and the effects of drugs of abuse on the developing brain.
FINANCIAL LITERACY MATTERS

Research shows types of available financial services have major impact on households

by Joe McArdy

How much should one be saving today for retirement in the future? What do interest rates mean when you borrow money only to be paid later? How do fees compare to interest rates on loans? How does inflation impact your personal spending power over time? Answers to these questions, and more, are valuable to everyone, regardless of income, in making informed financial decisions.

That’s why understanding the terms used in these questions — and why they are important — often goes hand-in-hand with one’s financial success. Harbert College of Business finance professors Dr. Jim Barth and Dr. Jitka Hilliard, and doctoral student in finance Nguyen Nguyen, professors Dr. Jim Barth and Dr. Jitka Hilliard, and doctoral student in finance Nguyen Nguyen, find people who are more financially literate typically rely more heavily on alternative financial service providers such as payday lenders and pawnshops.

Their paper, “Does Financial Literacy Matter for the Type of Financial Services Used by Households” shows that increased financial literacy is associated with the use of more traditional financial firms like banks instead of alternative financial services, including high-interest payday operations. Importantly, they find that an increase in financial literacy among a greater number of individuals and households contributes to more financial inclusion — it becomes less costly and less difficult for individuals to obtain financial services from banks.

“People sometimes might not know enough, or fully understand the consequences of their financial decisions, because they were not provided with the information they need to make better choices,” said Barth, the Lowder Eminent Scholar in Finance. “People sometimes just aren’t trained in school to make more informed decisions.”

“The need for personal finance courses is becoming increasingly important because more, and more complicated, financial products exist today.”

A proposed solution?

“Start teaching people financial literacy at a much younger age,” Barth suggested. “Yes, it’s taught in some high schools, but there needs to be more done for more people. For example, you could be taught at the community level, perhaps by universities located within small communities where you have high rates of unemployment or elderly people who didn’t get the chance to go to college and/or weren’t exposed to personal finance courses.”

“People need to better understand their respective budgetary situations,” Barth added. “What funds are coming into a household? What funds are going out for mortgages, rent, utility bills or food?” Knowing this, a person is in a better position to make more informed decisions when borrowing money.

Informed decision-making at the ground level by consumers is ultimately good for the economy, Barth suggested. “If people make more informed decisions, then we will have a better working financial system,” he said. “In that case, we would expect people not to have borrowed too much and therefore have less trouble repaying it. This means fewer defaults, which makes for stronger financial institutions. Better financial decisions that are made are simply good for the economy — it means that funds are going where they ought to be going rather than going to the wrong place.”

A COMET’S LONELY JOURNEY

by Maria Gehhardt

Comets are left-over building blocks of planets, composed of ice, dust and gas. Dr. Dennis Bodewits, associate professor in Auburn University’s Department of Physics, unlocked information hidden inside these tiny stones built through laboratory astrophysics and observations with space telescopes.

“I am truly excited that our research on comet 2I/Borisov has received tremendous news coverage,” Bodewits explained. “Being able to promote Auburn University on a global scale helps to showcase the importance of our research and the impact we can make.”

Bodewits used both the Hubble Space Telescope (HST) and the Neil Gehrels Swift Observatory space telescope to research interstellar comet 2I/Borisov that traveled through our solar system in late 2019, and is only the second interstellar comet ever observed from outside our solar system.

Bodewits uses laboratory astrophysics to understand more about the water in comets. His research provides insight about the origins of the universe and tells us more about planetary objects from millions of years ago.

Comet 2I/Borisov contained very large amounts of carbon monoxide gas, and Bodewits used it to trace the origins of the object to planetary systems with much colder temperatures than ours. Such environments can be found around M-type stars, red dwarfs, which are the most common stars in our galaxy.

Nature Astronomy published the research from Bodewits titled, “2I/Borisov is a carbon monoxide-rich comet from another star.” The research received international coverage from USA Today, BBC News, Scientific American, EarthSky, New Scientist and numerous other media.

NASA showcased the research from Bodewits and Dr. Zexi Xing, a post-doc at Auburn, whose collaboration measured the water production of comet 2I/Borisov as it approached the sun. To view NASA’s video about this comet, visit aub.ie/comet.

Bodewits and Xing also participated in a live discussion on April 28 on Reddit’s AskScience forum, where they interacted with people from around the world, answering questions and sharing their research. To view a transcript of the discussion with more than 300 comments, visit aub.ie/askscience.

Xing, who studied at the University of Hong Kong and is from mainland China, recorded the activity of the comet using ultraviolet light. She led the work on the Neil Gehrels Swift Observatory space telescope published in Astrophysical Journal Letters and promoted by the American Astronomical Society.

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Research shows types of available financial services have major impact on households

by Joe McArdy

How much should one be saving today for retirement in the future? What do interest rates mean when you borrow money only to be paid later? How do fees compare to interest rates on loans? How does inflation impact your personal spending power over time? Answers to these questions, and more, are valuable to everyone, regardless of income, in making informed financial decisions.

That’s why understanding the terms used in these questions — and why they are important — often goes hand-in-hand with one’s financial success. Harbert College of Business finance professors Dr. Jim Barth and Dr. Jitka Hilliard, and doctoral student in finance Nguyen Nguyen, find people who are more financially literate typically rely more heavily on alternative financial service providers such as payday lenders and pawnshops.

Their paper, “Does Financial Literacy Matter for the Type of Financial Services Used by Households” shows that increased financial literacy is associated with the use of more traditional financial firms like banks instead of alternative financial services, including high-interest payday operations. Importantly, they find that an increase in financial literacy among a greater number of individuals and households contributes to more financial inclusion — it becomes less costly and less difficult for individuals to obtain financial services from banks.

“People sometimes might not know enough, or fully understand the consequences of their financial decisions, because they were not provided with the information they need to make better choices,” said Barth, the Lowder Eminent Scholar in Finance. “People sometimes just aren’t trained in school to make more informed decisions.”

“The need for personal finance courses is becoming increasingly important because more, and more complicated, financial products exist today.”

A proposed solution?

“Start teaching people financial literacy at a much younger age,” Barth suggested. “Yes, it’s taught in some high schools, but there needs to be more done for more people. For example, you could be taught at the community level, perhaps by universities located within small communities where you have high rates of unemployment or elderly people who didn’t get the chance to go to college and/or weren’t exposed to personal finance courses.”

“People need to better understand their respective budgetary situations,” Barth added. “What funds are coming into a household? What funds are going out for mortgages, rent, utility bills or food?” Knowing this, a person is in a better position to make more informed decisions when borrowing money.

Informed decision-making at the ground level by consumers is ultimately good for the economy, Barth suggested. “If people make more informed decisions, then we will have a better working financial system,” he said. “In that case, we would expect people not to have borrowed too much and therefore have less trouble repaying it. This means fewer defaults, which makes for stronger financial institutions. Better financial decisions that are made are simply good for the economy — it means that funds are going where they ought to be going rather than going to the wrong place.”

A COMET’S LONELY JOURNEY

by Maria Gehhardt

Comets are left-over building blocks of planets, composed of ice, dust and gas. Dr. Dennis Bodewits, associate professor in Auburn University’s Department of Physics, unlocked information hidden inside these tiny stones built through laboratory astrophysics and observations with space telescopes.

“I am truly excited that our research on comet 2I/Borisov has received tremendous news coverage,” Bodewits explained. “Being able to promote Auburn University on a global scale helps to showcase the importance of our research and the impact we can make.”

Bodewits used both the Hubble Space Telescope (HST) and the Neil Gehrels Swift Observatory space telescope to research interstellar comet 2I/Borisov that traveled through our solar system in late 2019, and is only the second interstellar comet ever observed from outside our solar system.

Bodewits uses laboratory astrophysics to understand more about the water in comets. His research provides insight about the origins of the universe and tells us more about planetary objects from millions of years ago.

Comet 2I/Borisov contained very large amounts of carbon monoxide gas, and Bodewits used it to trace the origins of the object to planetary systems with much colder temperatures than ours. Such environments can be found around M-type stars, red dwarfs, which are the most common stars in our galaxy.

Nature Astronomy published the research from Bodewits titled, “2I/Borisov is a carbon monoxide-rich comet from another star.” The research received international coverage from USA Today, BBC News, Scientific American, EarthSky, New Scientist and numerous other media.

NASA showcased the research from Bodewits and Dr. Zexi Xing, a post-doc at Auburn, whose collaboration measured the water production of comet 2I/Borisov as it approached the sun. To view NASA’s video about this comet, visit aub.ie/comet.

Bodewits and Xing also participated in a live discussion on April 28 on Reddit’s AskScience forum, where they interacted with people from around the world, answering questions and sharing their research. To view a transcript of the discussion with more than 300 comments, visit aub.ie/askscience.

Xing, who studied at the University of Hong Kong and is from mainland China, recorded the activity of the comet using ultraviolet light. She led the work on the Neil Gehrels Swift Observatory space telescope published in Astrophysical Journal Letters and promoted by the American Astronomical Society.
For researchers in Auburn University’s GPS and Vehicle Dynamics Laboratory, prepping autonomous vehicles outside in Alabama’s elements — from the scorching summer sun to pop-up thunderstorms — has become a near daily occurrence.

Whether researchers are debugging algorithms, installing sensors or running data analyses, much of the work from the GPS and Vehicle Dynamics Laboratory, or GAVLAB, is done outdoors — and easily impacted by changes in the weather.

That situation will improve greatly with the planned addition of a sophisticated new autonomous vehicle research facility at Auburn’s National Center for Asphalt Technology (NCAT) test track. The facility is expected to provide a garage with multiple bays and lifts for commercial trucks and passenger vehicles, office space for researchers, a conference room and an observation area overlooking NCAT’s 1.7-mile oval test track.

The building, estimated to cost approximately $800,000, will be one of the few autonomous research facilities in the nation attached to a test track.

“Our department is proud to commit resources, along with the Samuel Ginn College of Engineering, to support high-impact researchers. We think this facility will really help set us apart from other universities in autonomous vehicle research,” said Dr. Jeff Suhling, the Quina Professor and department chair for mechanical engineering. “Our department is proud to commit resources, along with the Samuel Ginn College of Engineering, to support high-impact researchers. We think this facility will really help set us apart from other universities in autonomous vehicle research.”

With a growing research thrust in transportation engineering, the autonomous research facility also demonstrates Auburn’s commitment to supporting these research initiatives.

“Dave and his GAVLAB team are one of our top research groups on campus, and their work has elevated Auburn to an internationally prominent position in navigation and vehicle dynamics for autonomous vehicles,” said Dr. Jeff Suhling, the Quina Professor and department chair for mechanical engineering. “Our department is proud to commit resources, along with the Samuel Ginn College of Engineering, to support high-impact researchers. We think this facility will really help set us apart from other universities in autonomous vehicle research.”

“I think it will be a great facility for us as a team, but also to showcase our work,” Bevly said.

Since Bevly joined the Auburn engineering faculty in 2001, the GAVLAB has built a strong reputation in autonomous vehicle navigation and developed a broad sponsored research portfolio, with projects ranging from the Department of Defense and the Federal Highway Administration to many private industry partners.

With various sponsors visiting each month, the facility’s planned observation area will give the GAVLAB team a high-quality space to demonstrate its research. Bevly’s group has also conducted demonstrations for legislators and the Alabama Department of Transportation.
MUSIC TO HIS EARS

Faculty member recognized as Steinway Artist

By Victoria Santos

Growing up in Manitoba, Canada, Dr. Jeremy Samolesky learned how to play two things — piano and hockey. When the time came to choose one, the decision was easy for Samolesky. As the youngest child from a musical household, he couldnt wait to play piano.

“My mom teaches piano, so most days after school we had kids from the neighborhood in our living room taking lessons,” Samolesky recalled. “I grew up hearing many different kinds of music — my parents played a lot of classic rock and disco, along with my brother’s punk and heavy metal, which I loved. My brother and I both took piano lessons when I was a kid, and since I was the younger in the family, I had to do what they were doing.

“When I was 7 or 8, I was allowed to begin taking piano lessons from the woman at the end of the street. My mom refused to teach us, I think, wisely. So, I would walk to my weekly lesson and immediately fall asleep with it. Access to the written music books at home enticed him to read music when he had finished his daily practice assignments.

“It was just like reading a novel, I would sit and read books of music from the start to the finish,” he said. “We had a Beatles anthology that was around 500 or 600 pages, and it would take me about six or seven hours to play from start to finish through the whole thing. I didn’t know it then, but those reading skills would become an incredibly valuable asset — it has made a big difference in allowing me to learn music quickly and play in a variety of styles.

“I loved practising so much to the point that my parents had to discipline me by limiting my practice time. That was their form of discipline.”

Samolesky serves as professor of piano and head of keyboard studies at Auburn. He received a bachelor’s degree in music from the University of Manitoba, and when it came time to pursue an education for master’s programs, Samolesky said he knew that most of the important music schools were in the U.S. He said he finished his undergraduate and worked for a year so that he could afford plane tickets to audition for master’s programs, “so that I could afford plane tickets to audition for master’s programs,” he said. “After much research, I picked out of my favorite schools, auditioned at all of them and got full scholarships to all of them. That was also part of my life, getting to choose exactly where I wanted to go,” Samolesky said.

“For my master’s, I found an amazing teacher, Dr. Rolan McCabe in Seattle at the University of Washington. After completing my studies there over three years, I attended the Juilliard School of Music for my doctoral studies. It’s one of the top schools in the country, and I was able to complete two doctorate degrees there in four years, so I had a total of 12 years of university studies before coming to Auburn.”

Perhaps it’s only fitting that someone so dedicated to playing the piano would become a Steinway Artist.

“I first applied to become a Steinway Artist in February 2019,” Samolesky said. “It has been a lifelong dream of mine to be included on the International Roster of Steinway Artists, a feat that I honestly did not think was possible a couple of years ago. Many of the greatest pianists in history are included in this roster, including Arthur Rubinstein, Vladimir Horowitz, Martha Argerich — so even to be considered a tremendous honor.

“If felt like I had nothing to lose by applying, and especially with Auburn University in the midst of our All Auburn, All Steinway Campaign, I thought that becoming a Steinway Artist could provide greater momentum as we move forward with the campaign.”

Applying to be a Steinway Artist is a lengthy process — one that requires meetings and unanimously positive votes from several international committees (including New York, Hamburg and Shanghai) and takes time consideration of the artist’s performance history, future and nature of performance venues, including a thorough examination of audio and video recordings.

Only a small handful of artists are welcomed to the Steinway Artist roster each year. Samolesky did not yet know of his accomplishment and was presented with the news during a ceremony in March at the Gogue Performing Arts Center.

“To say that I was surprised when I found out that I was awarded the Steinway Artist designation is an understatement. It still humbles me every day to be included among a class of pianists and musicians of the highest level, many of them that have been my lifelong heroes,” Samolesky said.

After Samolesky played Gershwin’s “Rhapsody in Blue” with the Auburn Symphony, a sold-out performance of the Wagnian, “I’m so excited to be part of the Auburn University Piano Studio were there to be a part of the honor, and I look forward to passing on to them the gift of music that I received from my teachers and mentors.”

The Steinway Artist relationship is built upon the mutual commitment to strive for the greatest level of achievement in performance and craftsmanship. The Steinway Artist designation is not intended to help launch or to promote new careers, but rather to recognize and honor exceptional musicians and the professional world stage today.

The College of Liberal Arts is excited to continue the All Auburn, All Steinway Campaign, and our exciting plans for the 2020-21 season. This includes several students and faculty performances and donor events throughout Alabama and surrounding states.

“The Steinway Artist designation speaks volumes about Jeremy’s tremendous talent and dedication,” said Dr. Joseph Mauger, dean of the College of Liberal Arts. “I congratulate him on this prestigious and well-deserved recognition, and I look forward to our continued efforts of becoming an All Steinway school.”

“Our students have already reaped the benefits from our new Steinway acquisitions that don’t end, and we are pumped to continue the campaign,” said Mauger. “The existence of Auburn Pianos and the Auburn Department of Music is electrifying, and we are thrilled to be a part of this incredible movement.

For more information about the All Auburn, All Steinway campaign, visit: go.auburn.edu/5330/ or email: auburn.university-steinway-student-faculty.html.

Dr. Jeremy Samolesky
We often hear about “the Auburn Family” and how great it is to be a part of it. This year, especially, has shown that to be true, as students, faculty and staff have pulled together to respond to the challenges of the COVID-19 pandemic. Auburn’s research enterprise has remained strong, as critical research continued, even while many other institutions opted for a full shutdown of their research efforts. Thanks to the dedicated work of researchers and staff across the university, and aided by careful adherence to best practices in safety, impactful research in Auburn has carried on, despite the difficulties of a public health crisis.

As our cover story explains, researchers in Auburn’s College of Agriculture have continued to do the important work of helping keep Alabama’s food supply safe and secure. Faculty members in other areas have tested coronavirus vaccine candidates, engineered emergency ventilator systems, and studied the social and economic implications of COVID-19. Issues of ventilator systems, and studied the social and economic implications of COVID-19. Issues of

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Auburn Research Park is evolving rapidly at the moment with multiple projects under construction. What’s going on?

For nearly a decade, Auburn Research Park has been a key contributor to the economy of our state and region. The 177-acre park was established by the state of Alabama, the city of Auburn, and Auburn University in 2007. In the years that followed, a park community formed—a community that encouraged engagement, partnership and exchange of ideas. Members of that community include the Auburn Research and Technology Foundation, the Auburn University MRI Research Center, the Center for Advanced Science Innovation and Commerce, the Edward Via College of Osteopathic Medicine, and, as of June of 2019, Big Blue Martina Facility, a state-of-the-art child care facility serving the university, park and city.

In 2019, the Auburn Research and Technology Foundation broke ground on a 100,000-square-foot Research and Innovation Center. This facility, located on David Grimes, will be home to Auburn’s Office of the Vice President for Research and Economic Development, as well as a range of commercial clients. The ground floor will house the New Venture Accelerator, a new event center (540 at the Park) and a restaurant operated by Amsterdam Cafe. We’ve just opened the doors to the Research and Innovation Center this fall.

In late 2019, East Alabama Medical Center broke ground on an 86,000-square-foot health sciences center that will house a free standing emergency department, an ambulatory surgery center with four surgical suites, as well as health science and medical research units. East Alabama Medical Center’s presence in the park will create additional opportunities for internships and clinical research, and will help serve the medical needs of Auburn’s growing population.

Supporting this growth on the west side of the park, we have a significant infrastructure project underway that will create a new entrance off of Shug Jordan Parkway, past Old Camp Auburn road, create a traffic circle and most importantly, deliver critical utilities to areas identified for current and future development. Both the health sciences center and infrastructure projects should be complete in March of 2021.

Combined, these projects (along with the new childcare center) represent nearly 90 million dollars of new investments into Auburn Research Park. --- Investments that will help drive our innovation economy.

What is Auburn Ventures?

Since its inception, Auburn Research Park has been a home to an entrepreneurial ecosystem, a place where tech and knowledge-based businesses are developed. As the park begins this next chapter, we want to brand that ecosystem and expand its scope.

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Auburn Ventures is the programming and people that make up our ecosystem—the experience of living and working in a vibrant discovery district. Auburn Research Park is truly a community of innovation where faculty and students pursue the next “big idea.” As a dynamic hub for creativity, Auburn Ventures will establish Auburn Research Park as a destination, promoting research-based business ventures while offering easy access to arts, entertainment, retail shopping, hospitality and event space, as well as residential opportunities.

We’re creating a convergence zone where Auburn’s best and brightest students with flexibility and agility, meet today’s and tomorrow’s challenges head on. Transforming technologies into needed products, and services is part of Auburn’s mission as a land-grant university. We look forward to welcoming both campus and community members to join us as we begin a new and exciting era of discovery.

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I believe that this is a practical world and that I can count only on what I earn. Therefore, I believe in work, hard work.