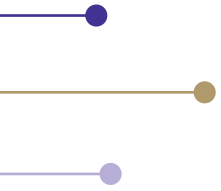




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Connect • Collaborate • Innovate



CISE brings together Computer Science, Engineering and the School of Integrated Sciences, creating a dynamic environment for innovative applied STEM programs.

Undergraduate

+

Integrated Science and Technology

Our ISAT major offers a multidisciplinary education that combines science, technology and social sciences. Students build a broad foundation in the basic sciences while developing skills in technology and creative problem-solving. Unlike traditional programs, ISAT applies scientific knowledge and technical skills to address society's most pressing issues. With concentrations in rapidly growing fields, students gain the versatile skills needed to thrive in various industries and professions, ensuring they are well-equipped for the challenges of the modern world.

+

Engineering

Our Engineering major allows students to explore various disciplines and the interdisciplinary space between them, emphasizing sustainable design and societal impact. Students can tailor their degrees by choosing concentrations in Civil and Environmental, Electro-Mechanical Systems or Geo-Environmental. Through hands-on projects, internships and research, students gain practical experience, ensuring graduates are well-rounded with diverse skill sets and ready for a career in any engineering field.

Graduate

+

Integrated Science and Technology

Our accelerated one-year Master's in ISAT with a concentration in environmental management and sustainability is a dual degree offered in collaboration with the University of Malta. The program provides a deep understanding of sustainability sciences and practical applications to address real-world environmental and social concerns. In addition to the core courses, concentrations offer opportunities to go deeper into areas of global sustainability impacts, policy and law, with electives in sustainable technological systems, food systems and biodiversity.

+

Computer Science

Our Master's in Computer Science with a concentration in cybersecurity is ranked among the best graduate programs in the nation and is offered 100% online, making it ideal for working professionals. One of the first in the nation to focus on cybersecurity and designated as one of the original seven National Centers of Academic Excellence in Information Assurance/Cyber Defense by the NSA and DHS, the program provides professional development and research opportunities for those in information assurance and cyber defense roles. It is highly technical and interactive and is closely associated with various security initiatives.

+

4+1 Accelerated MEng

JMU has partnered with the Virginia Tech College of Engineering to offer an accelerated Master's of Engineering program. Current students can gain early admission to Virginia Tech's MEng in Computer Engineering or Computer Science and Applications as early as the spring of their junior year. They can take up to 6 credits during their senior year that count toward their JMU graduation requirements and graduate credits for their MEng at Virginia Tech. Students can complete their coursework at VT in 12 months, spanning a fall, spring and summer semester with a 9-credit course load each term.

+

Intelligence Analysis

Our Intelligence Analysis major provides a multi-disciplinary education for students who seek careers as analysts, with a specialization in intelligence analysis. Students integrate knowledge from a variety of academic disciplines, learn innovative ways to structure their thinking to assess complex real-world problems, how technology can be used to acquire and evaluate data, and how to communicate it effectively to others. Course topics may include the eight intelligence domains: public sector, national security, military, homeland security, law enforcement sectors, private sector, cyber intelligence and geospatial intelligence domains.

+

Computer Science

Our Computer Science major equips students with a strong foundation in programming, mathematics, data structures, algorithms, software engineering and computer systems. Students select electives in robotics, artificial intelligence, human-computer interaction, cyber defense, database systems and web applications. They apply their knowledge through individual and team software development projects, preparing them for successful careers in computing.

+

Geography

Our Geography major offers a unique, holistic approach through the geographical perspective. Students explore how humans interact with their environment and how place matters to environmental, economic and cultural issues. Beyond the core courses, we offer concentrations in geographic information science and environmental conservation, sustainability and development to encourage a deeper understanding of geography. Students engage in fieldwork, focusing on real-world issues, and have opportunities to explore major cities and fascinating countries.

+

Information Technology

Our Information Technology major emphasizes highly relevant skills in cybersecurity, computer networking and end-user design and development. We go beyond the science behind computers, teaching students how to design and develop solutions across various computing and networking application areas. Our curriculum equips students with the knowledge and skills to meet the technology needs of businesses, government, healthcare, education and other organizations. Students apply their abilities in real-world contexts, ensuring they are well-prepared for future careers.

+

Biotechnology

Our Biotechnology major, shared with the College of Math and Science, offers a multidisciplinary education across biology, chemistry and integrated science and technology, preparing students for careers in the rapidly evolving biotech industry. The curriculum gives students a strong foundation in molecular biology, genetics, bioinformatics and bioprocessing while emphasizing hands-on laboratory experience and research opportunities. We foster innovation and critical thinking, preparing graduates to contribute to advancements in healthcare, agriculture, environmental science and more.

SUSTAINABLE DEVELOPMENT GOALS



CISE integrates the United Nations Sustainable Development Goals into coursework and research enriching students' academic experience and fostering a deeper understanding of global citizenship and empathy.

+

Minors

Climate Science
Computer Science
Environmental Information Systems
Environmental Management
Geography
Integrated Science and Technology
Materials Science
Robotics
Science, Technology, and Society
Urban and Regional Studies

Certificate Programs

Cyber Intelligence Graduate Certificate

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THE DEAN'S PERSPECTIVE



As I reviewed the stories in this year's magazine, I was reminded of how productive the past year has been in CISE.

It's been a year of change — our first new dean, economic disruptions and continued shifts across higher education. Yet, given the forward-looking nature of our academic programs, which are built for flexibility and adaptability, it is no surprise that CISE remains poised for long-term success.

Our students' work clearly demonstrates this. In partnership with our outstanding faculty and staff, they've created impressive and meaningful projects — from an app that helps to manage diabetes to accessible wheelchairs designed for the beach. A multidisciplinary team of faculty and students are securing a patent for eye-tracking technology to help prevent drunk driving.

Our students are not only innovating, they are excelling. A team of Computer Science and Information Technology students won the Virginia Cyber Cup Competition, and an Engineering team placed first overall in NASA's University Student Launch Initiative competition featuring teams from 70 top engineering programs from around the country!

We've expanded our global reach, establishing a second university partnership in Egypt with the Arab Academy for Science, Technology and Maritime Transport.

We are also strengthening our focus on workforce preparation through initiatives like the new Engineering co-op program, which provides students with valuable hands-on industry experience. Alongside the co-op program, our Fall and Spring Career Fairs continue to bring together students and employers in meaningful ways. We are continuing to expand our Industry Partner Program as well, offering even more opportunities for students and partners to connect, collaborate and prepare for impactful careers.

Our society faces a range of challenges, but CISE excels at tackling the toughest problems. I'm confident that we are preparing our graduates to not just succeed, but to thrive.

Dr. Jeffrey Tang

Interim Dean
JMU College of Integrated Science
and Engineering



LETTER FROM THE EDITOR



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The *CISE Magazine* is an official publication of JMU's College of Integrated Science and Engineering and is produced by the CISE marketing team for current and prospective students and their families, our industry partners, alumni, faculty, staff and friends of JMU.



The theme of this issue is simple and powerful: connection, collaboration and innovation. These aren't just buzzwords in CISE, but the foundation of how our college moves forward every day.

As I begin my 25th year at JMU, I've been reflecting on how much of our strength as a college comes from our relationships. The most compelling and impactful work I've witnessed over the years has always been built on shared effort: students teaming up across disciplines, faculty partnering with industry and community organizations, dedicated staff working behind the scenes and alumni returning to mentor and give back.

In my role as both writer and editor, I have the privilege of seeing these collaborations up close. I get to meet the people behind the projects, learn about their research, hear their stories and experience firsthand how collaboration drives innovation — not just in labs and classrooms, but in the real world.

In this issue, you'll read about students using artificial intelligence to transform public safety, faculty empowering undergraduates to contribute to global research and teams exploring solutions that cross boundaries.

It's tempting to think of innovation as a solitary spark — one brilliant mind, one big idea — but that's rarely how progress unfolds in CISE. We know the most meaningful breakthroughs happen when people connect, collaborate and build something together. That's the kind of innovation we celebrate in this magazine.

As you read this issue, I hope you come away with a deeper understanding of how we come together to solve complex challenges with curiosity, creativity and purpose — and how each connection strengthens our shared impact.

Lynn Radocha ('18)

Director of Marketing and Communications
JMU College of Integrated Science and Engineering



MAKING OUR SPACES EASIER TO NAVIGATE



When you step inside King Hall or EnGeo this fall, you'll notice brighter, clearer signage that makes navigating our buildings easier.

Over the past year, the College of Integrated Science and Engineering partnered with Iconograph and JMU Marketing to reimagine interior wayfinding. The first phase, completed in August, focused on installing building maps, directional signs and visual cues with high-contrast colors, larger fonts and consistent symbols.

"Whether you're searching for a lab, tracking down a faculty office or just trying to make it to class on time, our new signage will help you get there quickly," said Jeff Tang, CISE interim dean.

The next phase will begin in December and will build on that foundation with bold, large-scale visuals throughout the buildings. These graphics will add vibrancy and create a stronger sense of place that captures the spirit of CISE. Together, these enhancements will create not only a wayfinding system but also a welcoming environment that seamlessly blends function with design.

While the project begins in CISE, it will serve as a model for the rest of JMU. Future phases will bring the same clarity and consistency to other academic buildings, continuing our tradition of innovation and setting the standard for what's next. ●

JMU and Virginia Western Sign Biotechnology Transfer Agreement

By Eric Gorton ('86, '09)

James Madison University will now guarantee admission to its Bachelor of Science in biotechnology program for Virginia Western Community College students who complete an Associate of Science degree in science with a major in biotechnology.

The agreement, signed May 19 at VWCC's Roanoke campus, creates a direct pathway for students to continue their studies at JMU.

"We're excited to partner with Virginia Western to offer a pathway for biotechnology students to come to JMU to extend their studies," said Bob Kolvoord, JMU's interim provost and vice president for academic affairs. "Our program emphasizes hands-on learning, interdisciplinary coursework and opportunities for faculty-mentored research and industry internships."

VWCC's program provides a foundation in biology, chemistry and microbiology, while JMU's program expands into bioinformatics, bioethics,

policy and innovation systems. Students also strengthen skills in communication, project management and systems thinking.

"This agreement holds such significance for our biotechnology students who wish to further their education before joining the field," said Amy White, dean of VWCC's School of Science, Technology, Engineering and Mathematics. "As a JMU graduate, I'm thrilled to see this opportunity for our students."

Students transferring under the agreement will receive a waiver of JMU general education requirements. To graduate, they must complete 120 credit hours, including at least 60 from a four-year university and 30 at JMU.

"We look forward to connecting with these students through our co-advising program, JMU Next Transfer Advising, so they already feel like Dukes when they arrive," said Jolie Lewis, JMU's associate vice provost for academic support and director of transfer initiatives. ●

Engineering Launches New Co-Op Program

By Genevieve Bavisotto ('26)

JMU Engineering launched an exciting new opportunity for students in the fall of 2025. The Engineering Cooperative Education Program (Co-Op) will provide students with an immersive, full-time work experience in an authentic engineering environment that spans the academic year.

"This program offers students a unique opportunity to bridge the gap between academic learning and professional practice," said Rob Prins, interim department head, who led the initiative. "It's a chance for students to immerse themselves in the day-to-day realities of engineering work, explore their career

interests and make informed decisions about their future."

This initiative offers students a transformative opportunity to gain hands-on experience while remaining enrolled at JMU. They will maintain their JMU student status, retaining access to health insurance, campus resources and JMU privileges. The program, while extending their time to graduation, provides a year of income and invaluable industry experience under the mentorship of seasoned engineers.

Students will gain authentic work experience that extends beyond theoretical learning. They will explore various engineering fields and build meaningful connections with potential

employers. Many co-op employers use these placements to assess candidates for full-time positions after graduation.

The program began with a soft launch involving a small number of employers and participants. "We are taking a measured approach to ensure we can address any unforeseen challenges effectively," Prins said. "Starting small allows us to build a robust foundation for the program's future expansion."

"Our goal is to give students an authentic glimpse into their chosen career paths," added Prins. "This program is a testament to our dedication to equipping students with the tools they need to succeed beyond graduation." ●

New Sensory Room Leads the Way in Student Well-being

By M. L. Robinson ('24)

Step inside the new Sensory Room on East Campus — a space designed to promote relaxation, focus and comfort through calming sensory experiences.

The room features color-changing fiber optics that create a calming atmosphere, a mesmerizing bubble tube with a bench for quiet visual engagement and cozy bean bag chairs that offer a sense of security. A vibroacoustic lounge chair plays therapeutic frequencies to encourage relaxation, while gel mats engage the sense of touch.

Designed to reduce stress and support neurodivergent individuals, the room offers relief from overwhelming stimuli like bright lights and distracting noise.

The space was spearheaded by Kristina Blyer, associate vice president for health and well-being. Her vision grew out of

JMU's adoption of the Okanagan Charter. An international framework, the charter focuses on embedding health into all aspects of campus culture and leading health promotion action and collaboration locally and globally. "East Campus has traditionally lacked student-centered spaces like this," Blyer said. "It's been great to offer something meaningful to students who live, learn or attend classes there."

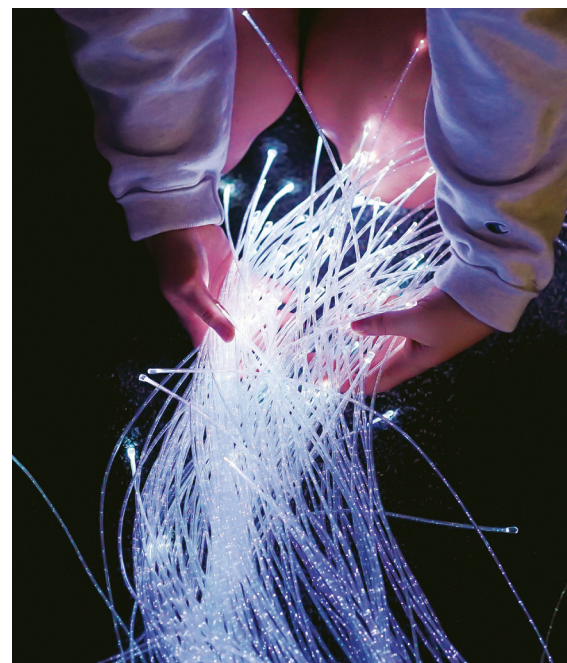
"I'm there all the time," said student Reese Secord. "The massage chairs are a huge favorite, and I love lying on the bean bag under the mirror on the ceiling! I feel like there's no stress. I love it."

"CISE has always been committed to fostering inclusive environments for all students," said Jeff Tang, CISE interim dean.

Developed in partnership between CISE and Student Affairs, the Sensory Room is located in EnGeo 0301. ●



Color-changing fiber optics and light tubes create a calming and relaxing atmosphere.



NEW APP IMPROVES TYPE 1 DIABETES MANAGEMENT

By Lynn Radocha ('18)

Type 1 diabetes (T1D) affects approximately 9.5 million people worldwide, including more than 1.8 million children and adolescents under the age of 20, according to the International Diabetes Federation and the T1D Index.

Managing T1D requires constant monitoring of blood sugar, meals, sleep and physical activity — every single day. Even with access to continuous glucose monitors and digital tools, many

people still struggle to understand how their daily habits affect their health in real time.

Recognizing the limitations of current tools, an interdisciplinary team of Information Technology and Health Sciences faculty and students, ranging from first-years to seniors, saw an opportunity to make a meaningful impact.

Their project, the Intelligent Monitoring and Intervention App for Personalized Type 1 Diabetes Management, led by IT professor Dr. Prajakta Belsare, goes beyond basic tracking. It

consolidates glucose monitor readings, smartwatch data and dietary inputs into a single interface — applying machine learning to detect patterns in sleep, exercise and nutrition — and delivers personalized, actionable insights.

Belsare's earlier research on behavioral health and digital tools revealed a significant gap.

She recalled one participant who meticulously tracked meals, sleep and glucose yet still felt confused. "The problem wasn't a lack of data. It was a lack of insight," she said. That realization shaped the team's goal: to turn scattered numbers into meaningful, real-time recommendations that reduce the risk of glucose spikes or drops.

IT students Somaia Mallek, Karalynn Yoder, Ellie Atkins, Michael Craig, Hale Anderson and Sarah Hershberger, along with health sciences major Nicole Centeno, are using React Native for mobile development, Python and APIs for data analytics, and behavioral datasets to test various modeling approaches. They're also exploring federated learning, a privacy-first approach that allows machine learning models to train directly on users' devices rather than centralized servers. "That means users maintain control over their health data," Belsare said. "It's an ethically responsible approach, and one we're excited to explore."





For Mallek, who is also majoring in health sciences, the mission is personal. “My younger sister has Type 1 diabetes,” she said. “She already uses an app connected to her insulin pump, so I’ve seen both the benefits and limitations. I wanted to help build something better.”

Mallek focused on meal-tracking features, allowing users to log food, view estimated carb counts and track intake against daily goals. “I’ve talked with my sister about what she likes and doesn’t like in the apps she uses,” Mallek said. “Those conversations shaped how I approached the design. We’re building this for real people, not just as a class project.”

Hershberger, a summer 2025 research scholarship recipient, joined to advance accessible digital health solutions. Her role focuses on data analytics —

identifying trends between behavioral data and “time in range,” with plans to expand the app’s ability to generate more personalized insights. “Now that we’ve laid the groundwork, I’m excited to see how insights evolve,” she said.

The team’s strength lies in its diversity of skills and perspectives. “Our group had people handling research, database setup, design, coding and even someone from the health field who works with diabetic patients,” Mallek said. “We all brought different strengths, and it really helped shape the final product.”

They have already developed a working prototype of the app, *Glucose Compass*, complete with a functioning dashboard and initial integration of sensor data. “That was a huge milestone,” Belsare said. “Now we’re refining the interface and beginning to implement machine learning models to uncover how irregular sleep, exercise or food habits might impact glucose levels.”

Students are building their technical skills and learning what it means to design ethically responsible health tech. “Alert

fatigue is real,” Belsare said. “We want to offer meaningful insights without overwhelming the user. It’s a design challenge that requires empathy.”

For Belsare, the real reward has been watching students grow from brainstorming ideas to making confident design decisions. More than a class project, she said, their work carries the potential to help people live healthier lives.

As the team moves forward, they plan to enhance the app’s predictive capabilities, test with real users and pursue partnerships with healthcare professionals and diabetes educators. The goal is not just to build a tool, but to support better outcomes for people navigating diabetes every day.

“If fully realized, this app could help shift diabetes care from reactive tracking to proactive, personalized management,” Belsare explained. “It could also become a model for supporting other chronic conditions that are influenced by daily behavior.” ●

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“This project helped me connect everything I’ve learned in Health Sciences and IT. But more importantly, it’s about helping people like my sister live with a little more confidence — and a little less stress.”

— SOMAIA MALLEK —

ISAT STUDENTS BUILD AN AQUATIC DRONE TO MONITOR LOCAL LAKE HEALTH

By Dorian Crawford ('27) and Lynn Radocha ('18)

Integrated Science and Technology majors Miles McIntyre ('25) and Nathaniel Horner ('25) made waves with their capstone research project — an aquatic drone. The drone is a custom-built, watertight, lightweight kayak outfitted with sonar, GPS, and a custom control system that integrates navigation, power and remote communication.

McIntyre and Horner used the device to map the depth and contours of Lake Shenandoah and Newman Lake — two bodies of water with different roles but shared environmental concerns.

The project began in 2023 when Dr. Tom Benzing, an ISAT professor (now emeritus), connected with Earth Systems Management, a company that develops aquatic drones for monitoring coastal and inshore waters. After visiting ESM's lab on Virginia's Eastern Shore, he saw an opportunity to adapt the technology for use in small inland lakes.

ISAT major Joe Dunnigan ('23) laid the groundwork for studying Lake Shenandoah, launching what would become a multiyear effort. McIntyre and Horner expanded the project's scope and took it into the field. "We picked up where he left off," Horner said.

Dr. Robert Brent, an ISAT professor, advised the project alongside Benzing. "Tom started the project before he retired and is still very involved," Brent said.

"I've retired, but I've always enjoyed the time I spent advising capstone students on projects like this one," said Benzing. "It's incredibly rewarding to engage with students in applying this kind of hands-on technology to solve environmental problems."

The team visited ESM's lab in Wachapreague, Virginia, where they observed a drone build and test run. "They showed us the parameters needed to map out a lake and how to run the drone," McIntyre said. Horner added that while many of the components, like sonar and GPS, are widely available, the guidance from ESM was essential in helping them troubleshoot and fine-tune their system.

Horner led the electronics and software development. McIntyre handled the physical construction, troubleshooting everything from waterproofing to mounting the thrusters. "Fitting components together and sealing everything properly took trial and error — but that's what made it fun," McIntyre said.

With faculty support, the students entered a formal collaboration with ESM,

including a nondisclosure agreement that allowed them to access and adapt design details of the company's hydro drones. "We signed an NDA, so we can't discuss everything in detail," McIntyre explained.

Once the drone was complete, McIntyre and Horner headed to Lake Shenandoah, just outside Harrisonburg, for a test run. Once a cold-water trout lake fed by underground springs, it's now warmer and shallower — impacted by development, sediment buildup and dam repairs.

The team collected data and processed it using ReefMaster, a mapping software. The software converts thousands of GPS and sonar readings into high-resolution bathymetric maps that show the depth and shape of the lakebed. Using contour lines, these maps help the Virginia Department of Wildlife Resources visualize the underwater landscape, monitor changes and plan for future management.

"Seeing the first map appear on the screen was one of those moments where it all came together," said Horner. "It was the physical manifestation of months of work."

After the successful maiden voyage, they expanded their scope to include Newman Lake, which was constructed in 1967, to manage runoff and prevent flooding. Over the years, the lake has

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"Getting involved in a project like this will be very similar to projects they'll have once they graduate."

— DR. ROBERT BRENT

accumulated sediment, impairing its ability to retain water. By producing a bathymetric map, McIntyre and Horner helped JMU Facilities Management determine whether dredging is necessary. "We can save them time and money without draining the entire lake just to find out," McIntyre said.

The team provided their data and maps to DWR and Facilities Management to support ongoing monitoring of the lakes' ecosystems.

Like many ISAT capstones, this project didn't begin or end with a single team. It's part of a larger, evolving initiative spanning multiple years, with different students contributing to its progress. McIntyre and Horner built on the work of a previous student, bringing the drone from concept to reality. Now, they're passing it off to the next capstone team. "We've already talked to another student who's interested in picking up where we left off," Horner said.

In ISAT, students hand off ideas, tools and data from one year to the next, enabling long-term impact and a more enriching learning experience. "We could add water quality sensors next or use it in coastal areas to locate oyster beds," Brent said. "It's a flexible platform, and there's a lot of potential."

ISAT capstone projects serve as a culmination of four years of interdisciplinary learning. Students work with industry professionals and are tasked with solving real-world problems while managing budgets and timelines.

"ISAT is all about taking a problem and trying to bring together all of the scientific understanding, regardless of discipline, and addressing it with appropriate technology," Benzing said. ●



Miles McIntyre and Nathan Horner review the drone's control system to ensure it's ready to collect bathymetric data from Newman Lake.



Editor's note: Since this story was published, we were saddened to learn that Miles McIntyre has passed away. You can find his obituary here: www.williamsfuneralhomes.com/obituary/Miles-McIntyre.

FROM JMU TO COSTA RICA: **ENGINEERING AN ACCESSIBLE PATH TO THE OCEAN**

By Alex Clarke ('25) and Lynn Radocha ('18)

For most, a beach trip means sunshine, sand and floating in the waves. For people with physical disabilities, though, that experience can feel out of reach.

As part of the CISE Energy and Environment International Summer Program in Costa Rica, a team of Engineering and Integrated Science and Technology students, Ethan Johnson, Charles McClernon (ISAT), Jace Arcone, Daniel Turner, and George Zacharias (Engineering), spent the spring semester designing an accessible beach wheelchair for the Punta Leona Beach Club and Nature Resort in Costa Rica.

"We already had a beach wheelchair, but it needed improvements," said Jose Calderon, the resort manager and a longtime partner of JMU's Center for Global Engagement.

"We wanted a chair that could be easily maintained and reproduced locally — a scalable solution tailored to the Costa Rican environment," said Karim Altaï, engineering professor and project advisor.

+ + +

**"This is the first time
we've seen our
work truly make a
difference. In class,
we design for a
grade. Here, we're
designing to bring
joy and access to
someone's life."**

— JACE ARCONÉ

Collaborating closely rather than dividing into rigid roles, the team sketched ideas, modeled parts in SolidWorks, debated materials, and combined the best features from each design iteration.

After presenting their initial designs to Calderon, he brought in Natalia Vindas, an adaptive surfer, accessibility consultant, and president of Costa Rica's Adaptive Surfing Association. A civil engineer herself, Vindas experienced firsthand how difficult it can be to access the beach after a spinal cord injury in 2008.

"My brothers had to carry me everywhere because there were no beach wheelchairs at the time," Vindas said. "Later, adaptive surfing opened that door again for me and gave me back the ocean. It's empowering. It's freedom. That's what these wheelchairs can offer, too."

Vindas pointed out details that the team didn't anticipate. Footrests that accommodate spasms, detachable belts for users with limited core strength, and padded armrests to improve comfort without adding flotation that could destabilize the chair in the surf. She also advised on material selection: minimizing maintenance in a salty, sandy, tropical environment, ensuring parts were easy to clean, and suggesting designs that might turn more easily on uneven sand.

"We hadn't thought about some of these details until Natalia walked us through them," said Johnson. "Her feedback showed us why user input matters at every stage."

After months of design and iteration, the team finalized their first prototype. The four-wheel chair featured a lightweight PVC frame, oversized beach wheels for soft sand and shallow water, stainless steel fasteners to resist corrosion, and a breathable mesh seat

that dried quickly and shed sand. They also incorporated Vindas' suggestions: padded, removable armrests for easy side transfers and a detachable belt that added safety without sacrificing comfort or agility.

"It had to be comfortable, safe and simple enough to reproduce on-site," said Zacharias. "We wanted the resort staff to be able to source parts locally if needed and build additional chairs themselves."

In July, after months of planning, prototyping and collaborating on campus, they traveled to Costa Rica to test their final design.

"We got to the beach early and tested the chair ourselves first," said Johnson. "It floated more than expected, but it handled well in the waves."

When Vindas arrived, the team carefully transferred her into the chair and guided her into the ocean. Together, they floated in the surf, supporting Vindas and observing the chair's performance. The buoyancy worked in their favor, though the chair leaned back a bit too far.

As the team gathered feedback from Vindas, a woman approached with her teenage daughter, Nikki, who had never been in the ocean because of her cerebral palsy. The team invited the duo to try the chair.

"We were nervous at first," said McClernon. "But when Nikki got in, with her mom's support, it was beautiful. She had an ear-to-ear smile, laughing as the waves came up behind her." Altaii agreed. "Nikki's smile and the smile on her mother's face made all this worthwhile."

"This is the first time we've seen our work truly make a difference," said Arcone. "In class, we design for a grade. Here, we're designing to bring joy and access to someone's life."



(L-R): Dr. Karim Altaii, Charles McClernon, Ethan Johnson, Jace Arcone, Daniel Turner, George Zacharias, Natalia Vindas.

"Seeing how much fun she had reminded us why we're doing this," said Turner. "This wasn't just a prototype anymore — it was real."

Feedback from Vindas and the encounter with Nikki highlighted the need for a second prototype — to serve a broader range of mobility needs. Using locally sourced materials, the team built a lighter, three-wheel version that was easier to maneuver in the sand, refined its structure for stability in the surf, and kept the design simple enough for resort staff to replicate.

"They're stepping out of their comfort zones and gaining international

experience," Altaii said. "They're learning how to communicate across cultures, how to adapt designs for different environments and how to serve a global community."

"This project showed us what engineering can be when you take it outside the classroom," said Turner. "It's not just about solving problems — it's about people." ●

FROM IDEA TO IMPACT: STOPPING DUI AT THE START

By Lynn Radocha ('18) and Genevieve Bavisotto ('26)

Every day, impaired driving claims nearly 37 lives in the United States. Despite decades of awareness campaigns and strict laws, impaired driving remains a deadly problem. While advancements in technology have transformed vehicle safety in many ways, one critical gap remains: stopping an intoxicated driver before they even shift into gear.

Dr. Rod MacDonald, a professor in JMU's Integrated Science and Technology program, spent over two decades researching impaired driving and policy-based interventions. Despite advancements in vehicle safety, he found no practical in-vehicle device to quickly test drivers and prevent operation under the influence.

He shared his concerns with Information Technology professor Dr. Ahmad Salman, who immediately saw the idea's potential.

Collaboration meets innovation

In 2022, MacDonald and Salman pitched the idea to a team of ISAT, IT and CS students to explore how technology could prevent intoxicated individuals from operating a vehicle.

"With my background in cybersecurity and artificial intelligence, I was able to guide the team on both fronts," explained Salman. "From selecting the right machine learning models and training strategies to implementing secure system architecture,

we wanted the system to be intelligent and trustworthy."

CS major Chase Coleman ('24) played a key role in programming the device's eye-tracking software. He worked alongside ISAT students Matthew Jenkins ('23) and Charlie Thomas ('24), who focused on integrating the system into a vehicle's braking mechanism. Their combined efforts resulted in a working prototype that integrates policy-driven research with cutting-edge technology.

Patrick Dodd ('25), a CS major, joined the team to develop the system's facial recognition software that identifies drivers and establishes personalized baselines for eye movement — critical for improving detection accuracy.

"Everyone's eye movement is a little different," Dodd explained. "We use facial recognition to recognize the driver and detect when something's off, especially for people with unique eye conditions."

Detecting impairment — before you drive

The system uses a Horizontal Gaze Nystagmus (HGN) test, a technique commonly employed by law enforcement. When a driver attempts to start the vehicle, a small screen on the visor displays a moving dot and a built-in camera tracks the driver's eye movement.

"If their eye bounces outside the normal range, it indicates the presence of alcohol or drugs in their system," MacDonald said.

"If the driver fails the test, the system prevents the vehicle from being shifted into gear by communicating with its electronic brake control system."

Dodd configured the prototype to run on a Jetson Nano, a compact, high-performance computer. "We needed something powerful but small enough for real-time testing," he said. After running into hardware compatibility issues with the camera feed, he switched from a Raspberry Pi to a USB camera, which enabled full prototype functionality.

A privacy-first approach to safety

MacDonald and his team prioritized privacy in their design. Any user-identifiable data collected to create personalized baselines, such as eye movement patterns and facial analysis metrics, is encrypted at rest and in transit with additional security measures to ensure sensitive information remains protected.

The device isn't for law enforcement or insurance companies. "If someone fails the test, the data is erased immediately," MacDonald said. "We don't want a situation where someone is sitting in their car, unable to drive, and then gets arrested for a DUI just because their car wouldn't start. The goal isn't punishment — it's prevention."

From research to real-world impact

According to the National Highway Traffic Safety Administration, more than 13,000 people die in impaired driving-related crashes in the U.S. each year. MacDonald hopes this technology will dramatically reduce that number.

"The goal is to drive that number to zero," he said. "But even if we could cut it in half, that would save thousands of lives every year."

Turning the prototype into a widely available product presents a challenge.

"We're researchers, not manufacturers," MacDonald said. "Our goal is to refine the technology and pass it off to an organization that can install it in vehicles nationwide."

To protect their work and prepare for commercialization, the team filed two U.S. patent applications. The filings cover the system's method, architecture and core features, including the impairment detection algorithm, eye-tracking protocols and integration with vehicle controls.

They recently secured funding to support these filings — a significant milestone as they explore licensing partnerships with industry stakeholders.

The timing may prove advantageous. The U.S. government is considering requiring passive impairment detection systems in all new vehicles as early as 2027. But MacDonald remains cautious. "Car companies are currently more focused on facial recognition and distracted driving," he said. "Our device is different. It targets DUI prevention directly, and we need manufacturers to see the value in that."

Testing, refinement and the road ahead

Before the system can be widely implemented, additional testing is needed. "We spun students in chairs to disrupt their equilibrium, which mimics the effects of intoxication and produces the same involuntary eye movements," MacDonald said. The results were promising 80% of the time.

Building on those early results, the team brought in CS graduate student Abdullah Alghoniemy ('25) to focus on detection accuracy. "That's the next big step," he said. "We want to make sure the device is reliable for everyone."

Looking ahead, the team sees potential beyond personal vehicles. The technology



Matthew Jenkins and Charlie Thomas install the device.

could also be adapted for use in heavy machinery, public transportation and fleet vehicles — any setting where real-time cognitive assessment can enhance public safety.

"ISAT students brought systems-thinking, IT students had hardware and cybersecurity knowledge and CS students delivered strong programming and algorithmic skills," Salman said. "These diverse perspectives came together to tackle a real-world challenge in a cohesive and productive way." ●



"This project highlights what makes JMU's College of Integrated Science and Engineering unique. That's the power of interdisciplinary teamwork."

— DR. ROD MACDONALD

ADAPTING WITH INTELLIGENCE: AI ISN'T ELIMINATING CS CAREERS — IT'S REDEFINING THEM

By Lynn Radocha ('18)

When ChatGPT and other generative AI tools burst onto the scene, they sparked more than just curiosity — they triggered anxiety.

For students considering careers in tech — and for their parents — questions quickly followed. Will there still be jobs for computer science majors? Are we entering an era where machines replace human problem-solvers?

JMU computer science faculty are offering a more grounded perspective: AI isn't replacing tech jobs. It's reshaping them.

"There isn't some fixed amount of programming that needs to be done," said Dr. Nathan Sprague, computer science professor. "The demand grows along with the technology."

Sprague acknowledges that AI tools can significantly boost productivity, and employers are experimenting with what that means for staffing. "This pattern isn't new. Historically, better tools haven't eliminated demand for programmers; they've accelerated it. While AI may change the nature of some roles, careers in computer science and information technology require a broader skill set."

Skills that still matter

While AI tools can generate snippets of

code or summarize documentation, they struggle with ambiguity, nuance and novel problems. That's where human expertise still reigns.

Empathy, ethical reasoning and contextual awareness are particularly critical when AI systems are deployed in real-world settings. Whether building user-facing platforms or safeguarding data, those working in computer science and information technology must balance what is possible with what is responsible. That's a decision no algorithm can make on its own.

"CS and IT graduates still need to know how to design systems, analyze problems and build solutions in new contexts," said Dr. Mike Lam, computer science professor. "Generative AI predicts content based on existing data. But most real-world problems aren't copies of what's come before."

"Foundational skills haven't changed," Sprague said. "A clever prompt can't replace the ability to break down complex problems or revise code. There's no shortcut to building that kind of expertise."

Learning with AI, not against it

CS faculty are integrating AI into their courses, but thoughtfully and intentionally, ensuring students

develop the skills they'll need to thrive regardless of the tools.

In Lam's upper-level electives, students can utilize generative AI for specific tasks, such as generating test cases or documenting code, but there's a catch. Students must first build core competencies the traditional way.

Sprague also encourages students to experiment with AI, but as a tool for deeper learning. In his view, the true goal isn't a completed assignment or a polished project. It's understanding. "The product we're working toward in our courses isn't just code or grades. It's insight," he said.

Sprague recalled a recent student project that used AI and computer vision to identify ancient Greek and Roman coins. "Using AI to help develop the code made it possible to work quickly through the nuts and bolts of getting a working system in place," he said. "This allowed us to focus on the research-level questions related to problem solving and algorithm design."

In Applied AI, a course taught by Dr. Afzal Upal, computer science professor and associate dean of JMU's College of Integrated Science and Engineering, students take a hands-on approach to designing intelligent systems. The class covers core topics, including knowledge representation, search algorithms, planning, machine learning and natural language processing. Students build intelligent agents using Prolog and Python, applying AI techniques to structured challenges that test both logic and adaptability.

"I use board games in my AI class to motivate students to explore the capabilities and limitations of AI systems," Upal said. "The students are assigned the task of designing algorithms that can play and win the game by using various AI techniques including A* search, minimax and simulated annealing."

The course also addresses the societal implications of AI, including national and international regulations designed to prevent negative outcomes. “The goal is to give students both the technical tools to build AI systems and the ethical framework to think critically about their impact,” he said.

A future full of possibilities

Beyond the classroom, AI is also creating new career paths. Lam points to growing opportunities in areas like prompt engineering and model tuning, where professionals learn to craft precise inputs and customize AI behavior to address complex or niche problems.

This isn’t the first time AI has captured the public’s attention. It is one of the oldest branches of computer science, with roots tracing back to the first digital computers after World War II.

According to Upal, the field has experienced several boom-and-bust cycles. Each boom is sparked by a technical breakthrough and followed by inflated expectations that AI would soon match or exceed human capabilities. When those expectations fall short, reality sets in and investment cools — but the long arc of progress continues.

Today’s surge, driven by large language models capable of generating natural language and even programming code, is another example. These tools are powerful, but they’re not replacements for humans.

“Just as the invention of calculators didn’t eliminate the need for accountants, large language models won’t replace large programmers,” Upal said. “Instead, they enhance productivity, allowing us to focus on more strategic, creative or complex aspects of problem-solving.”

LLMs and other AI tools still require years, if not decades, of research before they approach true human-level intelligence. Increased funding and attention to AI development will likely expand — not shrink — the need for highly trained computer scientists.

As demand for transparency and accountability grows, computer science and information technology professionals with AI literacy will also play key roles in areas like bias detection, AI auditing and ethical compliance. These aren’t just tech roles; they’re societal roles that shape how AI affects real people in real communities.

While some employers are still cautious, particularly in secure or federally contracted environments where the use of generative AI may be restricted due to privacy or compliance concerns, others are already exploring AI-integrated workflows. Students who understand how to work with AI are poised to stand out.

“A lot of employers aren’t requiring AI experience yet,” Lam said. “But that could change quickly.”

For students unsure about majoring in computer science or information technology, JMU professors have a reassuring message: curiosity, creativity and a willingness to solve problems are more valuable than ever.

“If you’re passionate about solving complex problems with computing, there will always be a place for you,” Lam said.

Sprague agrees. “Computer science prepares students to ask some of the deepest questions facing humanity. AI isn’t the end of that journey, it’s part of what makes it more exciting.”

The future of tech isn’t less human — it’s more human — and JMU students will be ready to lead it. ●



COMBINING AI AND ROBOTICS TO TRANSFORM PUBLIC SAFETY

By Zach Murphy ('27) and Lynn Radocha ('18)



Kyle Berkeley, Jeff Ekton and Max Langsam test their robotic dog prototype designed to use AI and advanced sensors for weapon detection.

School shootings are an unfortunate reality, and often, responses come too late. But what if there were a way to spot a threat before it unfolds, not just on college campuses, but in airports, public venues and beyond?

Thanks to a team of JMU Integrated Science and Technology majors, this futuristic scenario may be closer than you think.

Kyle Berkeley, Jeff Ekton and Max Langsam used their capstone project to explore how artificial intelligence, robotics, computer vision and light detection and ranging (LiDAR) can work together to enhance real-time public safety.

Their system combines a Raspberry Pi microcomputer and camera with the Unitree Go2 Pro robotic dog, creating a mobile, autonomous platform for weapon detection. The goal: to help universities, airports and event spaces identify threats quickly while minimizing risks to human personnel.

Originally, the team planned to embed their AI models directly into the Go2 Pro's internal software. But when they discovered the unit they received had limited access, they pivoted — mounting an external Raspberry Pi and camera on the robot to serve as an external “brain” capable of running their custom-trained convolutional neural network.

Starting with a pre-trained model from Ultralytics, the students retrained it using a custom dataset featuring images of knives and firearms, the weapons most common in mass shooting events. The Raspberry Pi's camera scans environments in real time; when the convolutional neural network recognizes a match, it sends an alert to a mobile device, notifying security personnel while keeping them at a safe distance.

Meanwhile, the Go2 Pro's LiDAR system maps and navigates its surroundings, giving the robot mobility while the Raspberry Pi focuses on object detection. In controlled trials, the dog successfully identified objects like pocketknives, and the students are now working to speed

up “inference time” — how quickly the AI processes images.

“We're trying to get our inference speeds into the millisecond range,” said Dr. Anthony Teate, ISAT professor and capstone advisor. “That's critical for real-time security monitoring. If there's even a one- or two-second delay, that could mean the difference between preventing an incident and reacting too late.”

To address this, the students are experimenting with faster hardware and refining their dataset to better distinguish between weapons and everyday objects, reducing false positives.

Beyond the technical achievements, the project also provided a powerful learning experience.

“A lot of classroom work is structured and you know exactly what steps to take,” Berkeley said. “This project wasn't like that. We had a broad goal, but we had to figure out every step ourselves.”

Ekton agreed, adding that the hardware side made the challenge even more valuable. “AI is evolving so fast, and we wanted to be part of that,” he said. “But doing it with hardware, not just software, is a whole new challenge.”

“These students are the first adopters,” Teate said. “The team ran into every challenge you could imagine, but now we have a roadmap for how future teams can take this even further.”

Looking ahead, Teate envisions new cohorts of ISAT students improving detection accuracy, reducing latency and integrating the system into larger security infrastructures. With additional funding, JMU could also unlock advanced firmware options for the Go2 Pro, giving future teams even greater control and flexibility.

Beyond the lab, the robotic dog has already proven to be an impressive ambassador for JMU. Berkeley and Langsam presented their work at open house events for prospective students, giving visitors a firsthand look at hands-on learning in action. ●

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“When students see this project, they get excited. They realize that coming to JMU doesn't just mean studying technology. You can actually build it, apply it and make a real-world impact.”

— DR. ANTHONY TEATE



EIGHT ENGINEERING STUDENTS, ONE ROCKET AND A NASA VICTORY

By Lynn Radocha ('18)

In a year marking the 25th anniversary of NASA's Student Launch competition, a team of James Madison University engineering students — now proud alumni — achieved something extraordinary: first place overall, outperforming more than 50 top-tier university teams, including MIT, Purdue, Notre Dame, Vanderbilt, Georgia Tech and Virginia Tech.

But their success wasn't just about rockets. It was about grit, teamwork and the way JMU Engineering prepares students for the real world.

From the ground up

Long before liftoff in Huntsville, Alabama, the team behind *Project Vulcan I* was laying a different kind of groundwork — assembling not just parts, but a team culture built on shared purpose and commitment.

"We chose this challenging capstone to develop new skills and prove that JMU engineers could be competitive in the aerospace industry," said Josiah Walker, member of the vehicle structure team.

The team began preparing before NASA announced the 2025 competition — studying past challenges to hit the ground running. Several members earned Level I certifications with the Valley Aerospace Team. This experience strengthened their technical skills and began a mentorship with Chuck Neff, VAST president.

"Constructing and flying rockets gave us hands-on experience with epoxy application, motor selection and simulations," said Owen Bailey, vehicle structure lead.

Their efforts paid off. Their proposal earned rare praise from judges as one of the best in years.

"Usually, the only feedback a team receives is whether or not they got accepted into the competition," said Walker.

With this encouragement, they developed their Preliminary Design Report — the first scored deliverable. "It required us to schedule the project, plan our budget, create a safety plan, and begin designing the rocket frame, avionics system and payload," Walker said. "We simulated full and subscale designs and identified the parts needed."

A small but mighty team

Unlike larger teams from well-resourced aerospace programs, JMU's *Vulcan I* was a crew of eight. "Many of these teams competed with 20–40 members," said Grant Whitlow, team lead. Everyone took on multiple responsibilities: leading subteams, managing outreach and collaborating across rocket systems.

Their thoughtful approach to leadership reinforced their dynamic. "We conducted a democratic vote for the leading positions, and everyone was perfectly fit into their roles from the beginning," said Matthew Smith, safety officer.

As deadlines approached for their full-scale demonstration flights in spring 2025, supply chain issues became a serious obstacle. "The national appeal of the competition meant all the teams were ordering components from the same group of vendors," Bailey explained.

Rather than let delays derail their timeline, they adapted — working long hours, refining their design and relying on Whitlow's persistence with vendors. "The day our parts arrived, we banded together and finished construction in just three days," Bailey said.

Their success was all the more remarkable given the demands of senior year. "This project was very demanding," said Katelyn Marshall, project manager. "But every team member was willing to dedicate the time it took — sometimes missing classes, working weekends or staying late. We made detailed schedules and supported one another."

The launch

Launch day arrived May 4 in Huntsville. As NASA's announcer counted down — "5, 4, 3, 2, 1" — the *Vulcan I* rocket lifted off flawlessly. The parachute deployed and landed directly in front of the judges, capping a near-perfect mission.

Weeks later, the NASA announcement came: *Vulcan I* had won first place overall — a remarkable achievement for one of the smallest teams in the field.

The team also earned first place in the American Institute of Aeronautics and Astronautics Payload Innovation Award and second place in AIAA's Reusable Launch Vehicle Award — a testament to their creativity, technical skill and thoughtful design adaptation.

The team reimaged the payload as a spacecraft-inspired enclosure with Lego astronauts. "These creative changes won the judges over with our style points, creating a name and brand for our team," said Walker, payload team lead. "We kept our design simple and high performing."

"When the judges gave us requirements, we conducted careful research and trade studies to explore many possible solutions while also considering our skills," Walker said. "We ultimately chose a system of computers and sensors that reduced risk and performed nearly flawlessly on competition day."

A JMU approach to engineering

JMU's approach to engineering education was a major factor in the team's success.



Students work on complex team projects throughout their undergraduate journey.

"From freshman through senior year, we work in teams and on projects in nearly every engineering course," Whitlow said. "That allowed us to set goals early, communicate openly, lead and hold each other accountable."

"JMU Engineering teaches students how to learn quickly, adapt effectively and build on a strong technical foundation," said Ethan Specht, software lead. "In circuits and instrumentation, we're taught material that would typically be spread across multiple semesters elsewhere. That gave us the knowledge we needed for our payload electronics."

Mentorship and unseen support

While the project was student-led, the team's success was made possible by the support of faculty, staff and mentors. Dr. Steven Woodruff, professor of engineering, was pivotal. He advised the team weekly and helped troubleshoot without micromanaging.

The team's relationship with Neff was equally essential. "His mentorship went far beyond expectations," Whitlow said. "He dedicated weekends to testing and took a week off from work for the competition," Bailey added.

"It was an honor to work with these students," Neff said. "They asked thoughtful questions and built on the answers. I look forward to supporting future JMU rocketry teams."

"Our success was heightened by the encouragement and support of our classmates, peers, parents and community partners," Whitlow said.

Inspiring the next generation

That commitment extended beyond the competition itself. The *Vulcan I* team reached more than 400 K-12 students through hands-on outreach.

The team tailored school presentations and educational materials for each age group. "We organized workshops where students built bottle rockets and moon landers to understand flight principles," said Lily DeBruycker, outreach lead. "Our goal was to spark curiosity."

"One of our favorite activities was running the Madison Aerospace Club, where students built and launched a Level 1 rocket," she added. "Watching their excitement was incredibly rewarding."

A defining experience

For every member, *Vulcan I* was transformative. It sharpened their technical knowledge, leadership and teamwork skills.

"This project challenged me to apply my knowledge in avionics, embedded systems and hardware integration to real-world problems," said Thomas Vancil, avionics and recovery lead.

The team's members are already launching their next chapters: Smith, Walker and Vancil are pursuing graduate study in aerospace engineering; Bailey is founding a startup; Whitlow joined Northrop Grumman as a systems engineer; Marshall and DeBruycker are working as project engineers; and Specht is exploring a career in defense contracting.

"We are incredibly proud of our capstone team for winning this year's NASA Student Launch competition," Woodruff said. "Their dedication, creativity and perseverance exemplify the very best of our program." ●



(L-R): Chuck Neff, Lily DeBruycker, Katelyn Marshall, Grant Whitlow, Owen Bailey, Ethan Specht, Matthew Smith, Thomas Vancil, Josiah Walker.

INDUSTRY PARTNERS PROGRAM

By Lynn Radocha ('18)

CISE connects industry leaders with talented students and dedicated faculty through our Industry Partner Program — a collaborative effort designed to create real-world impact.

CURRENT PARTNERS

- Accenture Federal Services
- CapTech
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Whether you're part of a Fortune 500 company or a growing local business, becoming a CISE Industry Partner means joining a community built on innovation, curiosity and shared success.

Our students bring technical expertise, problem-solving skills and a team-first mindset. Through partnerships, they work directly with professionals to tackle real challenges — gaining experience while making meaningful contributions from day one.

- Raise your company's visibility on campus
- Build brand awareness among future professionals
- Share your company's mission and values
- Connect with students eager to make an impact

We invite you to become one of CISE's most engaged and visible partners. Your involvement supports the next generation of technical professionals — and strengthens your talent pipeline in the process.

For more information, visit jmu.edu/cise/industry-partners. ●



Connecting Students and Industry

Chris Troughton, academic engagement lead at MANTECH, first connected with James Madison University's College of Integrated Science and Engineering at the 2021 Fall Career and Internship Fair.

"I was recruiting students for internships and full-time employment opportunities," he said. "When I heard about the CISE Industry Partners Program, I knew instantly it was a great opportunity to expand the partnership between MANTECH and CISE."

Troughton, who also serves as deputy program manager for a key contract

supporting the Marine Corps Warfighting Laboratory, understands that talent drives innovation. "We're always looking for new, technical talent that can energize our workforce and bring fresh knowledge and skills."

In 2022, MANTECH formally joined the CISE IPP and they're demonstrating how strategic collaboration between industry and higher education can lead to meaningful results.

"Since becoming a partner, we have been able to set up off-cycle MANTECH booths, sponsored a 'Women in Cyber' ice cream social, hosted students at our facilities in Stafford, Virginia, and sponsored several engineering and capstone projects. We've also participated in leadership panels, resume reviews and interview practice sessions," said Troughton. "In addition, we frequently engage with JMU Valor, a community supporting military-connected students."

Through these efforts, MANTECH established a robust talent pipeline, hiring numerous CISE students for internships

and full-time positions in robotics, unmanned systems and cyber defense.

"Connections and engagements are vital to success," Troughton said. "The IPP enables students to connect with industry, explore internships and job opportunities, gain security clearances and receive the guidance they need for continued growth and success."

MANTECH is eager to grow its capstone sponsorships and expand its team further.

"Capstone projects offer opportunities to mentor and evaluate students over sustained periods — relationships that often lead directly to hiring," he said.

"I love working with JMU students. They represent the next generation of the American workforce. The IPP makes it easy to connect with them and support their success — and ours."

His advice to other companies considering a partnership? "Do it. Invest in your future workforce. Invest in JMU students. Only good things will come from it." ●

MITRE

Cultivating Talent and Innovation

Lee Wilkinson, a project leader in MITRE's Intelligence Center, is a longtime champion of the CISE Industry Partner Program and has led MITRE's engagement since 2018.

"I met faculty from JMU's Intelligence Analysis Program in 2017 and quickly realized their approach to intelligence education was unique — something that could really benefit MITRE," Wilkinson recalled.

The partnership opened doors to broader collaborations across CISE, evolving into a robust relationship that

now includes participation in career fairs, pre- and post-fair information sessions, mentorship opportunities and capstone projects.

"The CISE IPP has granted me unparalleled access to faculty, staff and students — allowing me to help guide, mentor and shape the development of the next generation of professionals," he said.

CISE graduates have joined MITRE and made immediate, meaningful contributions: supporting counterintelligence and supply chain development, assisting with offensive counterintelligence campaign planning, and developing cross-platform applications and web services tailored to client needs.

"These are just a few examples of CISE graduates setting a new bar for excellence at MITRE," Wilkinson said.

For MITRE, the partnership goes far beyond typical recruitment. "The IPP allows us to get close to the faculty and students — to influence curriculum,

participate in capstones, mentor students and engage in ways that a career fair alone could never provide," he said.

Wilkinson also praised faculty for their commitment to student success. "CISE faculty work incredibly hard to ensure students receive a high-quality education that's relevant to today's workforce. Their active engagement with industry ensures that relevance — and I've even had the opportunity to help shape the curriculum in meaningful ways."

Many CISE students have interned at MITRE and have gone on to full-time positions. "It's been rewarding to meet students as sophomores, watch them grow and then hire them early in their senior year," Wilkinson said. ●

Talent Meets Opportunity at the CISE Career Fair

By Lynn Radocha ('18)

JMU's College of Integrated Science and Engineering offers more than a career and internship fair. It creates real opportunities for students to explore their interests, network with employers and take the next step toward a successful career.

Held twice a year during the fall and spring semesters, the CISE Career and Internship Fair connects students in biotechnology, computer science, engineering, geography, information technology, intelligence analysis, and integrated science and technology with employers actively seeking talent in these fields.

The boutique-style fair provides a welcoming and personal setting where students and employers can engage in meaningful, one-on-one conversations.

Will Jedrzejczak, an information technology major, attended the CISE Career Fair during his first year at JMU. "While exploring all the incredible opportunities, I spoke with Chris Troughton from MANTECH, who inspired me to apply for an internship," he said.

Will was offered a role as a software and technical engineering intern, where he worked on projects for the military. His coursework in data structures and advanced programming directly translated to the skills needed for the position.

"The CISE Career Fair played a crucial role in my success, providing a valuable platform to connect with industry professionals," Jedrzejczak said.

The Fall 2025 CISE Career Fair brought together more than 60 employers and 800 students, creating meaningful opportunities for networking and recruitment. Industry partners such as MITRE, Verizon, MANTECH, Merck, CapTech, and Racey Engineering were among those eager to connect with JMU's top talent," said Dr. Jeffrey Tang, CISE interim dean.

"I've been fortunate to hire more CISE students than I can count," said Lee Wilkenson of MITRE. "They're prepared to jump into complex roles — even in unfamiliar areas — and excel."

MANTECH regularly recruits students for both internships and full-time positions. "Every summer, we support technical internships at our Stafford, Virginia, site focused on robotics and unmanned systems," said Chris Troughton. "I also work to fill internships and full-time positions across the company with as many JMU students as I can."

CoStar has also hired more than 100 JMU students through internships and full-time roles. Many students performed exceptionally well during their internships, and as a result, they were offered permanent positions.

If you're an employer interested in attending the CISE Career and Internship Fair, please email Lyn Chandler at chandllc@jmu.edu. ●

"The CISE Career Fair played a crucial role in my success, providing a valuable platform to connect with industry professionals."

— WILL JEDRZEJCZAK

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Students connect with employers and explore career and internship opportunities at the CISE Career Fair.

CISE Showcase Puts Student Innovation on Display

By Lynn Radocha ('18)

You could feel the excitement. Conversations sparked and presentation rooms were standing-room-only.

Prototypes were in motion and project posters stood as proof of months — sometimes years — of hard work. Students, faculty, industry professionals and community members gathered for the JMU College of Integrated Science and Engineering Student Showcase, a two-day celebration of creativity and innovation held each April.

With more than 100 projects on display showcasing student work across engineering, information technology, integrated science and technology, intelligence analysis, computer science, biotechnology and geography. From environmental restoration and autonomous robotics to health technology and intelligent systems, the projects reflected the collaborative spirit and cross-disciplinary thinking that define CISE.

Students begin engaging in research as early as their first year, and capstone projects — spanning from one semester to two years — demonstrate the results of dedication, mentorship and applied learning. Whether working independently or in teams, students often collaborate across disciplines and partner with industry and community organizations.

This year's partners included Trout Unlimited, Shickel Corporation, MITRE, MANTECH, LifeNet Health and Earth Systems Management — organizations



From classroom concept to working prototype — students share their innovations at the CISE Showcase.

that help students apply their knowledge to address pressing local and global challenges.

Attendees engaged with interactive demonstrations, poster sessions, and presentations — many reflecting the United Nations Sustainable Development Goals woven throughout CISE coursework and research. The SDGs reinforce the broader impact of the students' work and underscore how innovation in CISE can contribute to global progress.

"The CISE Student Showcase is the highlight of the year for many of us in the college," said Jeff Tang, interim dean. "To see the incredible work produced by our students addressing real-world challenges and making a difference always infuses me with hope. The range of what is produced by our students and guided by our dedicated faculty is remarkable."

CISE emphasizes hands-on learning in a supportive, rigorous environment led by faculty who bring expertise and a passion for mentorship. With small class sizes, interdisciplinary curricula, and opportunities to engage in research, internships and study abroad, CISE students graduate as adaptable, creative problem-solvers ready to make a difference. ●

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"The CISE Showcase is more than a presentation of projects. It's a window into how our students are tackling complex global challenges."

— DR. JEFFREY TANG

Engineering Students Place Third at ASCE-UESI Surveying Competition

By Lynn Radocha ('18)

A team of JMU Engineering students made an impressive debut this spring at the American Society of Civil Engineers' Utility Engineering and Surveying Institute (ASCE-UESI) Surveying Competition, earning third place among seven universities across Virginia and West Virginia.

The event promotes leadership and innovation among undergraduate civil engineering students, preparing them for careers in infrastructure, environmental sustainability and geospatial technology. Teams were judged on field performance, accuracy and a written proposal.

Brady Lane, Will Toth, Mallory Hurst, Sydney Witcher and Nicholas LeMay applied real-world surveying techniques to challenges such as topographic mapping, determining inaccessible points and calculating cut-and-fill volumes. When equipment difficulties arose, the team quickly switched to manual measurements and hand calculations — adaptability that

helped secure their third-place finish.

Lane said the idea began in class. "Will and I had surveying experience from internships, and we thought it would be fun to put those skills to the test."

"This was JMU Engineering's first time competing, and I'm proud of what our students accomplished," said Dr. Daniel Castaneda, engineering professor. "Their teamwork, adaptability and spirit truly showed throughout the competition."

For Witcher, the competition offered valuable hands-on training. "I gained more confidence with surveying equipment and strengthened technical skills that will carry over into my fieldwork," she said.

"It's a proud moment for us and something we hope inspires more students to get involved in competitions like this," Lane said.

The competition was part of the 2025 ASCE Virginias' Student Symposium, which also featured networking, technical sessions and career development workshops. ●

Engineering Climbs in U.S. News & World Report Rankings

By M.L. Robinson ('24)

J MU's Engineering program continues to make waves nationally, climbing the ranks in the latest *U.S. News & World Report*. Now tied for No. 29 among the Best Undergraduate Engineering Programs without a doctoral component, it is a top choice for aspiring engineers. The program also ranks No. 5 among public, nonmilitary schools.

This recognition reflects the program's dedication to continuous improvement and to fostering an educational experience where students thrive.

JMU Engineering emphasizes a project-based curriculum, small class sizes and a collaborative learning environment, ensuring that students receive personalized attention and a supportive atmosphere. This approach prepares graduates to excel in their

careers and address real-world challenges with confidence.

The curriculum evolves each year based on feedback from alumni and industry partners. This constant refinement enables students to tailor their educational experience, creating an engaging and flexible learning environment that encourages exploration and innovation.

Recently, the program introduced three new concentrations and launched a work-based education initiative, giving students specialized opportunities to deepen their expertise while gaining valuable industry experience.

As JMU Engineering continues to grow and innovate, its recognition among the nation's best programs reinforces its role in shaping the next generation of engineering leaders. ●

M.S. in Computer Science Earns Top Ranking

By Dorian Crawford ('27)

James Madison University's online Master's in Computer Science program ranks among the nation's best, securing 24th in *U.S. News & World Report's* latest rankings.

"We're incredibly proud of this recognition, which highlights the dedication of our faculty and the strength of our program," said Jeff Tang, interim dean of JMU's College of Integrated Science and Engineering. "For years, our professors have combined their expertise with exceptional teaching, ensuring our students receive a high-quality education in a dynamic and engaging online format."

A key factor behind JMU's high ranking is its long-standing expertise in cybersecurity. Since 1999, JMU has been a leader in cybersecurity education and was among the original National Centers of Academic Excellence in Cyber Defense designated by the National Security Agency and the Department of Homeland Security.

Courses are taught by the same full-time faculty who lead JMU's highly regarded undergraduate Computer Science program, ensuring academic quality and consistency. Offered fully online and asynchronously, the program provides working professionals with flexibility while connecting them with faculty and peers through discussion boards, remote-access labs and recorded lectures.

Graduates advance into leadership roles in cybersecurity, IT and national security, with alumni serving at DHS, the U.S. Senate, and major firms including Lockheed Martin, Raytheon and Northrop Grumman. Others lead cybersecurity initiatives as executives, entrepreneurs and educators.

With a strong cybersecurity focus, expert faculty and a flexible online format, JMU's M.S. in Computer Science is preparing professionals to advance their careers and meet the growing demand for cybersecurity leaders. ●

JMU Wins Big at 8th Annual Virginia Cyber Cup Competition

By Dorian Crawford ('27)

Six students from JMU's Cyber Defense Club won the 8th Annual Virginia Cyber Cup Competition, held Feb. 21–22 at the Virginia Military Institute.

Team members included information technology majors Jake Dinh and Cole Walther, along with computer science majors Sophie Colonna, Andrew Shields, Logan Altomonte and Ray Steen. Computer science professors Brett Tjaden and Hossain Heydari served as faculty advisors, providing mentorship and technical guidance throughout the year.

Part of the larger Commonwealth Cyber Fusion conference, the event drew about 130 students and 30 faculty advisors from 13 colleges and universities across Virginia.

JMU topped the leaderboard in the capture-the-flag challenge, where participants identified security flaws in

websites, systems or programs. Teams then wrote code or used cybersecurity tools to exploit weaknesses and uncover hidden "flags," or keywords that scored points. The challenges spanned reverse engineering, hardware hacking, cryptography and network exploitation — putting a team's versatility and cohesion to the test.

Teams also met with businesses, learned more about cybersecurity, and participated in technology debates.

"Our team dynamic isn't necessarily 'leader' and 'followers,'" said Colonna. "We each have categories we're good at, and where our skills overlap, we collaborate to solve challenges." ●

JMU Signs Agreement with Arab Academy for Science and Technology

By Lynn Radocha ('18)



JMU CISE Interim Dean Jeffrey Tang signs a Memorandum of Understanding with AASTMT President Ismail Abdel Ghaffar, establishing an official exchange program.

On May 21, James Madison University signed a Memorandum of Understanding with the Arab Academy for Science, Technology and Maritime Transport, expanding JMU's international partnerships in Egypt.

Leading the initiative are Dr. Ahmad Salman, professor in the Information Technology program, and Dr. Samy El-Tawab, who serves as professor and director of the program.

Students will benefit from opportunities to study abroad, pursue dual degrees and engage in collaborative research or capstone projects. Faculty exchanges, co-teaching and

joint research efforts will also be key components of the partnership.

Shortly after JMU publicly announced its partnership with Alamein International University last year, Dr. Sherin Youssef, head of AASTMT's Computer Engineering Department, and Dr. Akram Soliman ElSelmy, dean of AASTMT's College of Engineering and Technology, reached out to Salman to learn more about the collaboration and expressed interest in establishing a similar agreement.

AASTMT brings additional scale and depth, with seven campuses and established Ph.D. programs. "That diversity of expertise and geography opens up even more possibilities for our

students and faculty," Salman said. "Their proactive and enthusiastic response, along with their strong academic foundation, made the partnership a promising fit."

"We were impressed by their engineering facilities," Salman said after a recent visit to AASTMT's Alexandria campus. "The university has clearly prioritized creating a robust infrastructure that supports hands-on learning and innovation. The labs are well-equipped with advanced technology and resources, which we believe will greatly enhance students' practical skills and prepare them for future challenges."

"This agreement builds on our momentum in developing globally connected programs," said Dr. Jeffrey Tang, interim dean of JMU's College of Integrated Science and Engineering. "It aligns with our vision to offer students international learning experiences while also creating new opportunities for faculty collaboration and innovation."

Initial pilot programs, including faculty exchanges and student mobility, are expected to begin in the 2026. Looking ahead, faculty hope to establish a joint master's program, expand international research efforts and pursue collaborative grant proposals and publications.

"Global partnerships like this are essential for preparing students to thrive in an interconnected world," Salman said. "They foster cultural understanding, adaptability and collaboration across borders." ●

IA Student Research Earns Global Recognition

By Lynn Radocha ('18)

A vessel surfaces near the Black Sea, appearing only as a shadow on satellite images. Its name disappears from official records, and its route defies logic. Only after tracing it back — through open-source logs, quiet ports and international waters — can its origin be confirmed: a tanker that vanished off the Libyan coast days earlier.

This is how modern conflict hides in plain sight, and students in JMU's Intelligence Analysis program are exposing it.

Using satellite data, campaign modeling and open-source intelligence tools, students map international behavior and forecast potential future developments. "This isn't theory," said IA professor, Dr. Giangiuseppe Pili. "They're analyzing conflict as it unfolds and learning to make sense of partial information. That's what intelligence work really is."

Projects begin with a question, often tied to real-world needs. Students gather fragments from public sources, organize and test assumptions, and build coherent pictures of what's happening in contested regions.

Their work is gaining international recognition.

Ivanna Renderos, Andrew Corbett and Luke Velasquez analyzed the geopolitical stakes of a melting Arctic, from satellite mapping to trade route forecasts.

Brett Evans and Ryder Finn co-authored a paper with Pili on Russian artillery warfare, published by the Royal United Services Institute, the world's oldest independent defense and security think tank. Widely shared across Europe and the United States, it marked a rare achievement for JMU undergraduates.



(L-R): Joel Kurien, Sam Rooker, Dr. Giangiuseppe Pili, Ryan Stevens.

Victoria Jones, Katie Fricke and Taylor Hankins presented in Washington, D.C., on the growing military alliance between Russia and Iran, analyzing how Iranian drones have reshaped battlefield strategies in Ukraine and are now being deployed in the Middle East.

Samantha Rickwalder and Jason Clark noticed changes in Chinese military exercises in the Taiwan Strait.

These projects, along with additional reports by Sam Rooker, Joel Kurien and Ryan Stevens, have all been accepted for review and inclusion in a NATO-affiliated research outlet.

"What impresses experts isn't just that undergraduate students are doing this work. It's that the work is worth reading and worth sharing," Pili said.

Pili's own NATO research on Russia's Mediterranean presence became a teaching case study, showing how open-source intelligence can reveal hidden supply chains. His students now apply those same methods to track Chinese vessels and other covert operations. "You don't need a security clearance,"

Pili explained. "What matters is strong methodology, critical thinking and persistence."

By semester's end, students briefed peers and faculty on their findings: evolving case files that spanned maritime tensions, arms diplomacy and shifting alliances. Each presentation reflected the same core: rigorous methods, sharp analysis and the ability to navigate ambiguity. Pili poses questions and pushes students to refine their logic, but insists they take ownership. "They're often in a better position to define what matters," he said. "They figure out how to solve the problem on their own, and they absolutely do."

For Pili, this represents a shift in intelligence education. "Students don't need classified data to create professional-grade insights," he said. "They're proving that open-source research can meet real-world needs."

Whether through NATO reports or symposium briefings, JMU students are already shaping conversations in international security — seeing through shadows where most stop looking. ●

MAPPING A LEGACY: 20 YEARS OF THE GEOSPATIAL SEMESTER

By Lynn Radocha ('18)

"This class is one of the most exciting classes I've ever taken. It makes you think, challenges you to be innovative and is something you can use."

— JULIE, FAIRFAX COUNTY

In 2005, James Madison University launched a small but ambitious pilot program: a partnership with four high schools across Virginia that allowed seniors to earn college credit while solving real-world problems using geospatial technology. Now celebrating its 20th anniversary, the Geospatial Semester has become one of JMU's longest-running and most impactful outreach programs.

"We started the Geospatial Semester to provide an opportunity for students in their final year of high school to have an experience that would energize them through the school year," said Dr. Bob Kolvoord, interim provost and co-founder of the program.

"Too many students 'retire in place' after their college applications are submitted," Kolvoord said. "We wanted to reengage them with meaningful work — geospatial technologies in particular — and help them prepare for what comes next: higher education or the workforce, where learning is more project-focused and far less about high-stakes testing."

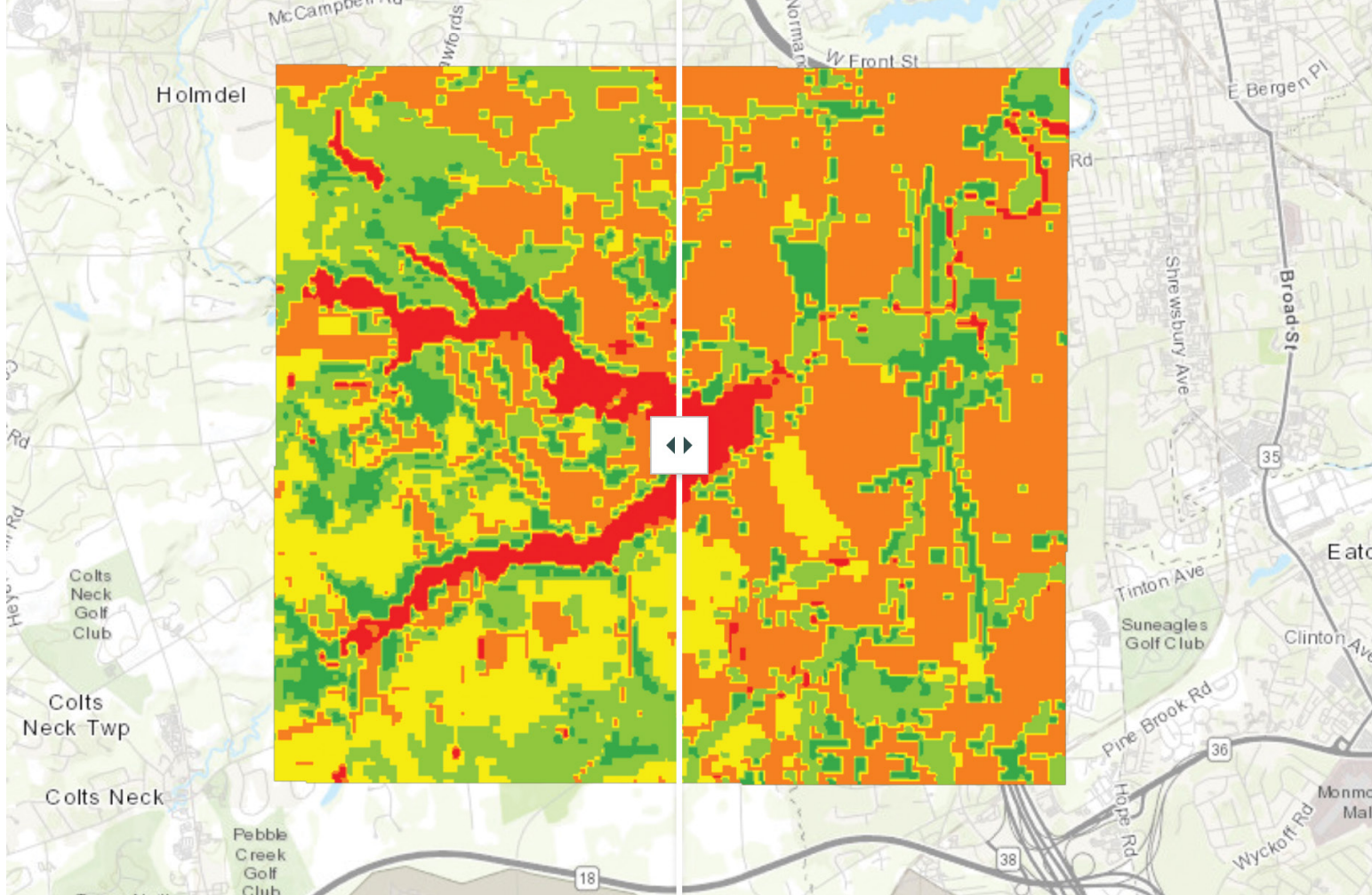
Launched during a time when Virginia's Standards of Learning testing dominated public education, the Geospatial Semester was designed to give teachers a break

from test preparation and support more inquiry-driven learning in the classroom.

Offered through a dual enrollment model, the Geospatial Semester allows high school students to remain at their home campuses while learning Geographic Information Systems, Global Positioning Systems and other spatial technologies. Supported by local instructors and mentored by JMU faculty, students apply these tools to community-based projects, earning JMU credit in the process.

The curriculum is designed to be flexible and student-centered. Each course culminates in an extended research project of the student's choosing, giving them agency over what they explore and how. "After 20 years, I think the key aspects are the applicability of geospatial technologies to a broad cross-section of problems and disciplines, and the power of giving students choice in their schoolwork," Kolvoord explained. "Students have used these tools to explore problems at all scales — from local to global."

Project topics have ranged from environmental and energy issues to public safety and land-use planning. In one award-winning effort, a student examined development patterns and flood risk in a coastal region of New



Student project modeled the flood risk in Lincroft, New Jersey, by combining terrain, hydrology, and land use data from 1995 and 2020. (Credit: ArcGIS Story Maps)

Jersey by modeling how water would move through the landscape. In another project, a group of students used Virginia DMV data to analyze the effect of speed cameras on traffic accidents across the state.

The program continues to grow steadily. Next year, the Geospatial Semester will be active in 31 schools across 10 Virginia districts — a 50% increase in enrollment from the previous year.

Kolvoord credits much of this growth to sustained district-level investment. “I think the increase was due to school districts continuing to see the value of the GSS for their students.”

While student outcomes are a key measure of success, the program’s impact on teachers is equally profound. “Teachers have shared a variety of positive aspects of being involved,” Kolvoord said. “Several teachers remark

that the GSS lets them rediscover the power of inquiry-based learning and reenergizes their teaching. Some have even stayed in the classroom after their nominal retirement date because the GSS was such a satisfying class.”

Students, too, leave transformed — often discovering career paths and disciplines they had never even considered. “They talk about the revelation of the power and ubiquity of these technologies,” Kolvoord said. “We’ve seen a strong flow of students from the GSS into JMU’s Geography and IA majors. In fact, 15 to 20 percent of Geography majors come from the GSS each year.” Alumni of the program now work across the geospatial industry in both the government and private sectors.

The Geospatial Semester has also earned national and international recognition. It has been replicated at institutions including Pacific University

in Oregon, the University of Redlands in California and Beijing Normal University. It was also featured in the plenary session at the ESRI Education Users Conference and received a Special Achievement in GIS award.

Faculty have conducted research on the program’s long-term impact, including studies showing improvements in students’ spatial thinking and problem-solving abilities. “We think the case for the impact of the GSS is very strong,” Kolvoord said. “We’d love to see it spread more broadly across the U.S. and other countries.”

Nearly two decades in, the Geospatial Semester remains a national model for mentored dual enrollment — one that combines academic credit with hands-on learning, teacher empowerment and meaningful collaboration between the university and the community. ●

BRIDGES TO COMPUTING CAMP: A LAUNCHPAD FOR POSSIBILITIES

By Lynn Radocha ('18)

Each summer, a quiet transformation occurs on JMU's campus — one that begins with curiosity and culminates in confidence.

The *Bridges to Computing Camp*, hosted by the Department of Computer Science in partnership with Church World Service, invites local refugee students to explore the world of computing through hands-on learning.

Now in its eighth year, the week-long camp has grown from a small pilot of six students into a vibrant, multi-track experience that reaches up to 30 participants each summer — with a waiting list.

A gap in opportunity

For Rebecca Sprague, who coordinates youth and employment programs at CWS, the idea for the camp came from noticing a gap — one that wasn't about ability, but opportunity.

"When refugee students arrive in Harrisonburg, many haven't had access to laptops or the internet," she said. "They're

"This is about more than skills — it's about helping kids who have lived through displacement, language barriers and educational gaps realize they belong in these spaces."

— REBECCA SPRAGUE

learning English, adjusting to a new culture and navigating a totally different education system. Asking them to jump straight into a computer science class in high school without any prior exposure. It's just not realistic."

Sprague also saw how limited awareness shaped students' goals. "Most had never heard of computer science as a career."

That's where *Bridges to Computing* came in — as a launchpad for possibilities.

Tracks that open doors

Students are paired with faculty, staff and teaching assistants who represent a range of experiences and backgrounds, and they participate in one of three tracks tailored to their specific interests.

The 2D design track opens the door to programming, allowing students to bring their own artwork to life. With a few lines of code, their sketches transform into animated designs and tangible creations using fabrication tools.

In the Web + VR track, students step into the digital world they're building. They learn how to design personal websites, craft virtual environments and showcase their ideas in immersive 3D galleries.

In the applied computing track, students explore Python programming, mobile app development, cybersecurity basics and the Internet of Things. They gain hands-on experience with platforms like MIT App Inventor and Arduino.

"They're learning more than coding," Sprague said. "They're seeing themselves as people who can do this, and they're having fun."

Showcasing what's possible

The week ends with a student showcase, often the most moving moment of all. "Whether it's a t-shirt they designed



with code, a virtual museum filled with personal meaning or a mobile app they built themselves, it's powerful to watch them present what they created," said Ellen Hedrick, camp coordinator and information technology advisor.

Many students go on to join after-school coding programs, attend JMU events like the D.I.G.I.T.A.L. or enroll in tech electives at Harrisonburg High School. Some even return as interns, helping lead younger students through the same program that inspired them.

Joseph Kha discovered computer science through the camp as a ninth grader. After attending Blue Ridge Community College, he transferred to JMU and is now a CS major.

Meeting a growing demand

While the program has thrived through university support and faculty dedication,

there's an urgent need for outside funding to meet the growing demand. This year, for the first time, Sprague had to turn students away.

"Once word spreads in the community, more kids want to join," she said. "And when older siblings go, younger ones follow. It's planting seeds that keep growing."

For corporate donors, Sprague sees a direct investment in the future workforce.

"There's a shortage of skilled tech workers. Here's a group of students who are eager, curious and bring valuable perspectives," she said. "They just need someone to open the door."

For individual donors, the impact is just as meaningful.

"This is about more than skills — it's about helping kids who have lived through displacement, language barriers and educational gaps realize they belong in these spaces," Sprague explained.

A department-wide commitment

What sets *Bridges to Computing* apart is how deeply it's embedded in the JMU computer science culture. "This is the only program where the entire department is involved," Sprague said. "From the department chair to the teaching assistants, they've created something collaborative, sustainable and truly welcoming."

"We're not just teaching syntax or tools," said Isaac Wang, computer science professor. "We're showing them what's possible when you keep learning. For some students, this is their first time imagining themselves on a college campus. If the camp helps shift that mindset, even a little, it's worth every hour we spend planning and teaching."

For student teaching assistants like Somaia Mallek, the experience is just as meaningful. "We laughed together and got to know each other. I heard their stories, goals and dreams," she said. "This camp gives them access to opportunities they might not otherwise have and helps build the kind of confidence that stays with you."

Each summer, *Bridges to Computing* offers more than a camp — it opens a door.

Please contact Maureen Witmer whitebme@jmu.edu if you are interested in contributing to future *Bridges to Computing* Camps. ●



Students and faculty celebrate another successful *Bridges to Computing* Camp at JMU.



Wellness, Environmental Stewardship and the Power of Science On a Sphere

By Lynn Radocha ('18) and Alex Clarke ('25)

When students step into the space where Christy Bradburn leads her environmental wellness program, they're met not by rows of desks and whiteboards, but by a softly glowing, suspended globe. This isn't just any classroom. It is home to Science On a Sphere (SOS) — a dynamic visualization system that creates an immersive learning experience and explores environmental health problems.

Bradburn, the student program coordinator with JMU's Institute for Stewardship of the Natural World (ISNW) and adjunct instructor in the Geography Program, utilizes SOS to teach students the importance of individual and community behaviors in affecting environmental health. Her Wellness Passport Program, *JMU Students Making a Difference in Environmental Health*, is offered to students enrolled in the university's HTH 100: Personal Wellness course.

The three-credit course explores the dimensions of health and wellness, and students may choose Bradburn's program from a variety of Wellness Passport events and activities offered by partners across campus. However, more than fulfilling the requirement for HTH 100, students gain something much more meaningful — new perspectives on the relationship between their health and the health of the environment.

"We want students to understand that environmental stewardship can

be incorporated into their lives," Bradburn said. "And more specifically, the role that individuals and community members can play."

Developed by the National Oceanic and Atmospheric Administration, SOS utilizes four projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe.

Bradburn rotates through datasets — on nighttime lights, human transportation networks, marine debris and air pollution — exploring environmental health problems. For example, air pollution and health risks are examined using a particularly striking dataset that compares air quality before and during the pandemic lockdowns. It's not just a science lesson. It's a lesson in cause and effect.

"It's a different way of learning," she explained. "When students can see data on a spherical Earth instead of a flat map or a paragraph in a textbook, it becomes real. They begin asking questions such as: Why does this pattern exist? What caused that change? What does this mean for us?"

Bradburn's approach goes beyond scientific understanding. She uses SOS to explore what it means to be an environmental steward, inviting students into conversations about responsibility and action.

"Environmental health isn't just about knowing the science, it's about understanding our connection to it," she said. "I want students to leave knowing

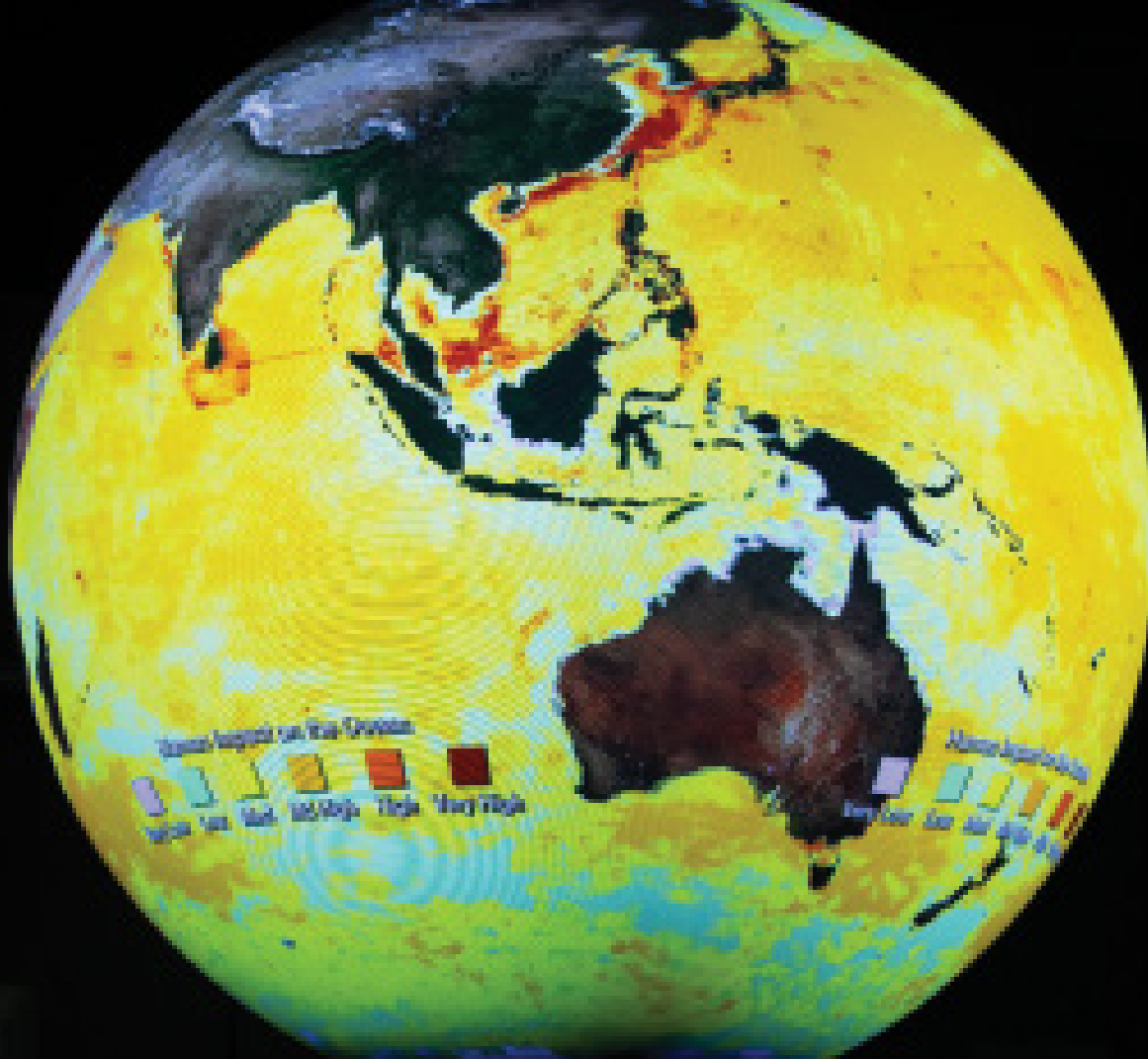
they can make a difference in their own lives and communities."

Students don't just passively observe; they engage. Bradburn encourages discussions about what they've seen and how it relates to their daily lives.

SOS is more than a tool for HTH 100. It's used by faculty and staff across disciplines to enhance learning. ISNW also incorporates SOS into its K-12 outreach, utilizing it to educate students about hurricanes, the water cycle and sustainability — fostering environmental literacy at every age.

Bradburn's program is just one example of how JMU is embedding sustainability and wellness across campus. In fall 2024, the university became the first in Virginia to adopt the Okanagan Charter. This global framework encourages colleges and universities to integrate health into every aspect of campus culture and to lead health promotion initiatives and collaborations, both locally and globally. Rather than offering a checklist, the Charter provides a shared language and set of guiding principles for becoming a health-promoting institution.

"Our goal is to keep people, place and planet at the center of everything we do," said Amanda Bodle, program manager for the ISNW. "It sets a culture, expectation and value for environmental awareness here at JMU." ●



Developed by the National Oceanic and Atmospheric Administration, SOS utilizes four projectors to display planetary data onto a six-foot diameter sphere, analogous to a giant animated globe.



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"We want students to understand that environmental stewardship can be incorporated into their lives."

— CHRISTY BRADBURN





The Power of Pollution

By Eric Gorton ('86, '09M)
and Jim Heffernan ('96, '17M)

Air pollution could be causing more frequent lightning strikes in urban areas, according to research led by geography professor Dr. Mace Bentley.

A three-year study, funded by the National Science Foundation and published last year in the journal *Atmospheric Research*, examined nearly 500,000 thunderstorms in and around Washington, D.C., and Kansas City, Missouri.

Using 12 years of lightning data from the National Lightning Detection Network and data from hundreds of air-pollution stations in the two cities, the researchers determined that in environments with high instability, adding more pollution increases cloud-to-ground lightning strikes.

Pollution from car and bus exhaust, cooling systems, generators and other engine activity injects billions of particles into the urban atmosphere. "These particulates or aerosols can be caught in the rising air produced by the urban heat island and lifted into developing thunderstorms," the researchers said.

"It gets brought into the cloud through the updraft," Bentley explained. "The updraft and downdraft then separate the pollution particles, which divides the



Multiple lightning strikes were seen shooting across the Manhattan skyline during a severe thunderstorm. (Credit: Alexander Krivenyshev)

electrical charges in the cloud and leads to more lightning production," he said.

In addition to Bentley, the team consisted of co-principal investigators Dr. Zhuojun Duan (Computer Science), Dr. Tobias Gerken (ISAT), and Dr. Dudley Bonsal and Dr. Henry Way (Geography). They were joined by a team of student research interns: Hayden Abbott and Chelsea Lang (ISAT); Hunter Donaldson, Lucie Griffith, Allison Tucker and Leah Wilczynski (Geography); and James Agresto, Declan McCue, Mia Pham and Endre Szakal (Computer Science).

The investigators each had specific roles based on their background and experience, according to the project's website. "The multidisciplinary nature of the research provides a cohesive framework to explore connections between the geographic, atmospheric and

computer sciences," it states.

Working with an international team of researchers, Bentley found similar results in Bangkok, Thailand, a tropical Asian megacity with high aerosol concentrations and frequent thunderstorm activity, from 2016 to 2020.

The research, published in September 2024 in *Earth Systems and Environment*, concluded that "aerosol impacts on thunderstorms are robust and, when examined in concert with instability, can augment lightning." It found that the concentration of particulate matter was significantly higher in thunderstorms containing more than 100 strikes.

"It looks like no matter where you go in the world, urban pollution is capable of enhancing thunderstorms and lightning," Bentley said. ●

Give Today. Transform Tomorrow.



Maureen Witmer

Strategic Gifts, Development Officer
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In JMU's College of Integrated Science and Engineering, students are turning bold ideas into solutions with real-world impact. Their projects don't just stay in the classroom. They reach communities, change lives and spark inspiration for the future.

The research, projects, competitions and outreach initiatives featured in this magazine are only a glimpse of what our students and faculty are accomplishing together. Each project is more than an academic requirement. It's a chance to solve complex problems, to collaborate across disciplines and to create solutions that ripple outward into the world.

Behind every breakthrough is more than creativity and determination. It's also the tools, materials and support that make bold ideas possible. That's what makes CISE different. Our students don't wait for the future. They build it.

That's where you can help. Your gift to CISE helps move ideas from concept to reality. It fuels the innovation that transforms class projects into working prototypes, competitions into career-defining experiences and outreach into opportunities for the next generation.



Together, we can empower the next generation of problem-solvers to create solutions that change the world.



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THE ROOFTOP GARDEN AT KING HALL

Perched atop King Hall, the rooftop garden is a living classroom where students, faculty and staff explore sustainability, biodiversity and urban gardening. With raised beds, a watering system, and a mix of vibrant flowers, fresh vegetables and herbs, the space continues to thrive as both a teaching tool and a peaceful retreat. It's a reminder that even unexpected spaces can bloom with possibility.

