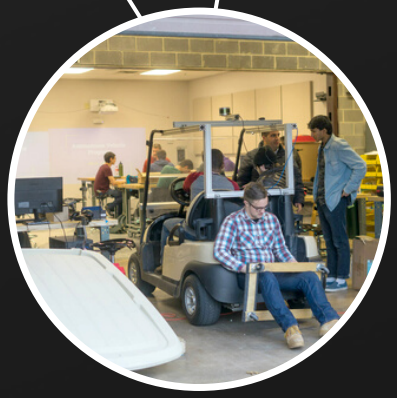
4-VA

JMU X Labs

2020-2021

Annual Report



10th Anniversary

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A Celebration of Black Innovation

inclusive innovation

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Virtual MAKEUP *becomes a* REALITY

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LETTER *from the* DIRECTOR

This is a special edition of the annual report as it marks the **10th anniversary of 4-Virginia (p. 2)**.Throughout the report, you'll see a few summary highlights of key programs and projects that we want to call out as exemplary programs and projects that represent the amazing work of the James Madison faculty, staff, administrators, and external partners.

The recently concluded 2020-2021 academic year proved to be an exciting and challenging one for 4-Virginia and JMU X-Labs. It was a rollercoaster of emotions—everything seemed to accelerate and pause simultaneously.

With most campus research labs closed and faculty pivoting between face-to-face and in-person learning, progress on collaborative research slowed dramatically (p.41). There were a few bright spots (p. 14) and the unscheduled break has created some renewed excitement to jump ahead quickly. A few projects were restarted during the summer of 2021, with a lot more underway for the upcoming school year and summer 2022.

For course redesign, I want to say thanks to **Dr. Lynette Watkins and our industrious Chemistry Department**. We were able to support the next phase of their major course redesign initiative. Their efforts to update the freshmen-sophomore experience has resulted in a new approach to covering the content that I've had the pleasure of watching through several classes and labs—and the overwhelming sense is that I wish they had taught chemistry this way when I was in college. I'm looking forward to seeing where they take the next phase and hope they can leverage the experience for several publications and possible research funding opportunities.

This spring we launched an intentional course sharing collaboration project with a small subset of 4-VA partners. **Lujean Babb, the new campus coordinator at Virginia Tech**, and **Major Marthe Honts at the Virginia Military Institute** joined with us to create a case study using computer science courses. The idea being to work through all the tough challenges that limit our ability to share courses efficiently and effectively among state institutions at scale. We've assembled a wonderful team of faculty and administrators at each institution, so we're looking forward to significant progress by our next report.

JMU X-Labs has continued to branch out and explore courses, content, and methods. For the first time we looked inward – specifically addressing the future of higher education with a mixture of disciplines as well as undergraduate and graduate students. Several concepts developed might make their way into future programming (p. 9). We've continued to build relationships with external partners and upgraded our infrastructure to improve collaboration and our ability to handle more complex hybrid situations. Pushing the envelope on teaching, learning, and collaboration with technology has resulted in budding relationships with education technology companies – that open new doors for the institution and our students.

We're looking forward to a renewal of in-person instruction and the opportunity to try new things and explore new challenges in the coming year.

Nick Swayne

Nick Swayne
Executive Director, 4-VA and JMU X-Labs

4-VA

JMU X Labs

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PUBLISHED SEPTEMBER 2021
WINCHESTER PRINTERS, INC

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10th Anniversary

4-VA

Advancing The Commonwealth

4-VA started as a concept that united four of Virginia's large public universities. Could we innovate higher education by working together, sharing courses, collaborating on research projects, helping adult students complete their degrees, and redesigning courses to improve student outcomes?

Making internal progress on any of these projects is a challenge - doing so in collaboration with three other independent institutions is hard work. We've made lots of progress in several areas and identified others that require a greater concentration of effort. In the process, we've added four new schools to the team.

2012

Degree Completion

Starting in 2012, many hospitals began requiring their registered nurses (RNs) to have a Bachelor of Science in Nursing (BSN) degree. To fulfill that need, 4-VA funded the development of the RN to BSN Program through JMU Outreach & Engagement (now PCE). The courses provide flexible online learning opportunities while allowing students to maintain employment. This remains one of the most successful degree completion programs supported by 4-VA.

2013

Breaking in the Icehouse

Our first prototype of JMU X-Labs opened in the Icehouse with a unique distributed space that served as home base until Lakeview Hall opened in the summer of 2015. We were able to test a variety of innovative instructional models, new technology, and collaborations.

2015

University Innovation Fellows

2015 kicked off our collaboration with the Stanford d.School (Hasso Plattner Institute of Design at Stanford) with our first cohort of University Innovation Fellows. UIF continues to serve as a source of new ideas and energy - generated by our students. JMU remains one of the lead institutions for this innovative, student-focused program.

2015

The move to Lakeview Hall

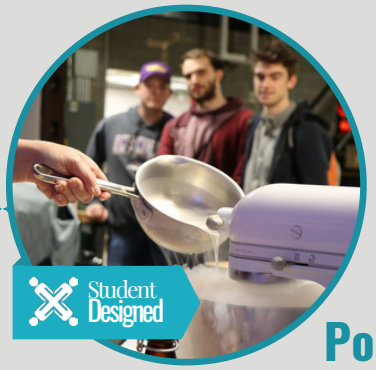
After several delays due to renovations on the Newman Lake Dam, we moved into Lakeview Hall. The innovation learning lab concept now known as JMU X-Labs launched its first pilot that fall.

2015

Drones Pilot Course

Collaborative research leads to an innovative educational model. We "discovered" innovative faculty through the collaborative research grant program. Pulling them together for a single class in the new X-Labs transformed the way we thought about education and launched a new course sharing and design journey that garnered national attention for the institution.

2015



Pop-Ups

After collaborating and defining a course redesign (X-Labs classes) the UIF students created small ones that rotate and pop up throughout the week. Students can participate and learn/be introduced to innovative tech.

2016

Biology Course Redesign

With funding from 4-VA, the JMU Department of Biology built a 4-week course-based undergraduate research experience (CURE) designed for large enrollment introductory biology labs. Dr. Oliver Hyman and Dr. Ray Enke are using the NSF IUSE grant to continue the project 4-VA originally supported back in the summer of 2016.

2015

Course Sharing and Course Redesign

JMU X-Labs started as an experiment to create innovative and meaningful ways to design and share unique courses between institutions. The pilot course from that fall (2015) was so successful, we launched X-Labs as an independent program to accomplish those goals more intentionally. The number and types of classes continues to grow - gaining significant notoriety through an article in the Chronicle of higher education (pg. 5).

2017

Governor's Technology Award

JMU X-Labs received a Governor's Technology Award in 2017 for their innovative use for technology in Education.

2019

Robotic Process Automation (RPA)

Senior alum and BRMi president, Mike Battle, had a vision for creating a class to allow students to keep up with the current industry standards. In partnership with X-Labs and BRMi, The Robotics Process Automation course was created to provide students a learning path for the technology and teach business and education applications for RPA.

2019

Fab Lab

Continuous improvement and reflection are part of the innovation process. Noting the underrepresentation of women at Open Lab, Pop-Ups, and classes, we set out to discover why and how we might adapt and change what we do and how we do it—in order to make the place more accessible for women and underrepresented populations. For Fab Lab 1, we expected 30 people—over 200 showed up. For the second annual Fab Lab, that number jumped to 350—proving that intentional innovation works.

2018

Autonomous Vehicles

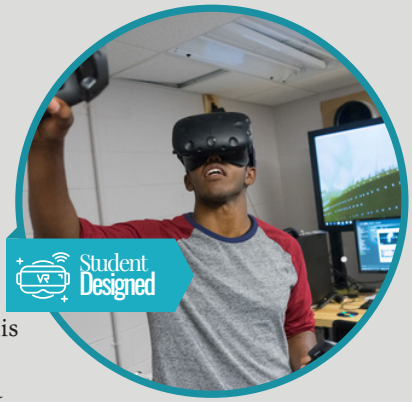
In 2018, JMU student Richard Xu, developed an idea for one of the most innovative X-Labs courses—Autonomous Vehicles. (p. 62). The course was designed to bring the autonomous concept out of simulation and into the real world with hands-on experience. In September 2018, the Autonomous Vehicles class won the Governor's Technology Award for innovative use of technology in education!

2018

Blockchain

In 2018, Skylar Wolen approached Nick once again with a new idea. With cryptocurrency on the rise so does the demand for experts in this field. The Blockchain pilot course worked on creating a book called Blockchain: Technology, Application & Societal Implications. The book was designed to be a comprehensive introduction to the topic of blockchain that aims to educate its readers.

Augmented and Virtual Reality



2017

Skylar Wolen, a JMU student and a Bluestone Hacks participant, looked to Virtual Reality to solve his problem for the hackathon. With just a weekend's work, Skylar was able to create an application for the Oculus. Through his experience, he approached Nick Swayne with the idea of creating an Augmented and Virtual Reality course at the lab. His research, innovative ideas, and determination lead Skylar to develop the pilot course for the Spring of 2017.

2019

Chronicle of Higher Education

After a year of in-depth investigative reporting, Senior Editor Beth McMurtrie published her article entitled "No Textbooks, No Lectures, and No Right Answers. Is This What Higher Education Needs?" in the February edition of *The Chronicle of Higher Education*. As a follow-up, *The Chronicle* published a special edition on Critical Thinking and Creativity that highlighted JMU X-Labs by contrasting five exemplary institutions that included Stanford, Lehigh, Olin, and Colorado College.

2020

Collaborative Research 1.2 Million Dollar Grant

In 2017 and 2018, 4-VA awarded grants to George Vidal and his team to work with UVA on the genetics of neurodevelopmental differences that cause autism and schizophrenia. This support helped them demonstrate their capacity to deliver exceptional research results and led to a $1,053,000 grant from the National Institutes of Health in 2020, the largest research grant the agency has ever given to a single scientist at JMU.

2020

Salesforce Development Course

As a JMU alum, Skylar Wolen came back yet again with an innovative idea. Salesforce is an industry-popular low-code software development platform that has not arrived in most college curricula. In the Fall of 2020, Skylar helped to create a course designed to familiarize students with the powerful tool and provide hands-on learning with Salesforce to build students' technical skill sets.

Looking toward the Future

JMU X-Labs employs the same systems of innovation we teach to reflect on what we do, consider what we should be doing, and meet future challenges through transdisciplinary, collaborative learning. This year we've taken on the future of learning at JMU, visual and performing arts, oceans, ecology, and racism.

We've begun working with several top-tier international universities. We're developing new products. We've added a new Director of Research. We're more than six years into this amazing experiment, and it seems like we're just getting started.

What will the future hold? Where will we be in 10 years?

JMU Labs

CLASSES

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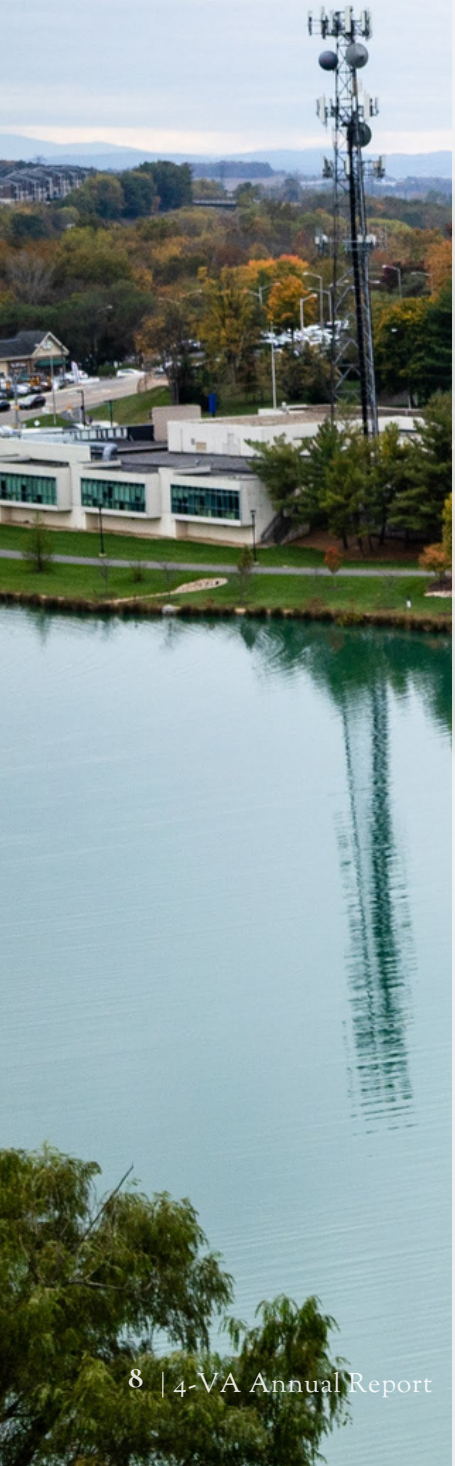
Arts Innovations

Faculty from the the College of Visual and Performing Arts partnered with JMU X-Labs to pivot their Sophomore Studio class during the COVID-19 pandemic.

Read more about the class on p. 10.

Above | Students from the Arts Innovations: Sophomore Studio class perform on top of the Forbes parking garage.



JMU X-Labs

2015

2015
Medical Innovations - Pilot
Drones - Pilot

2016
Applied Math/Robotics - Pilot
Drones
Math Teaching Methods - Pilot
Medical Innovations

2017
Applied Math/Robotics
Augmented/Virtual Reality - Pilot
Drones
Fueled - Pilot
Hacking for Defense - Pilot
Hacking for Diplomacy - Pilot
Medical Innovations

2018
Augmented/Virtual Reality
Autonomous Vehicles - Pilot
Blockchain - Pilot
Drones
Fueled
Hacking for Defense
Community Innovations - Pilot
Creativity and Innovation - Pilot
Hacking for Diplomacy
Internet of Things - Pilot
Medical Innovations

2019
Arts Innovations - Pilot
Augmented/Virtual Reality
Autonomous Vehicles
Community Innovations
Drones
Fueled
Hacking for Defense
Robotic Process Automation - Pilot
Hacking for Diplomacy
Internet of Things
Medical Innovations

Classes

-2021

2020

Augmented/Virtual Reality
Community Innovations
Drones
Hacking for Defense
Robotic Process Automation
Arts Innovations
Hacking for Democracy - Pilot
Hacking for Diplomacy
Internet of Things
Medical Innovations
Salesforce App Development - Pilot

Fall 2021

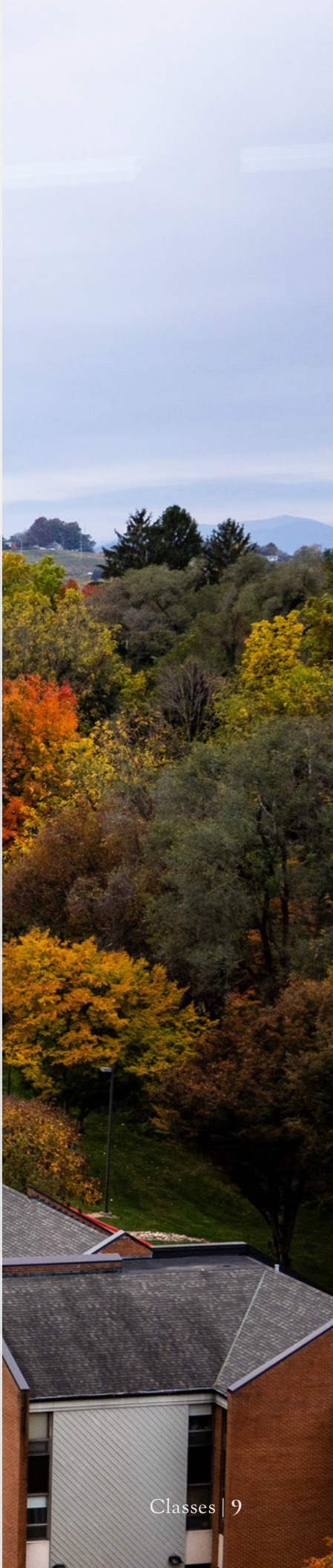
Arts Innovations
Augmented/Virtual Reality
Hacking for Diplomacy
Hacking for the Environment
Hacking for Oceans
DEI/AR in General Education
Internet of Things
Medical Innovations
Robotic Process Automation
Salesforce Development Course

Spring 2021

Arts Innovations
Augmented/Virtual Reality
Community Innovations
Future of Education
Hacking for Defense
Internet of Things
Robotic Process Automation
Salesforce App Development

Upcoming

Augmented/Virtual Reality
Future of Education
Hacking for Assessment
Hacking for Water
Quantum Computing
Intelligent Automation
Advanced Salesforce Applications



The PERFORMING Arts Go VIRTUAL

Arts Innovations: Sophomore Studio

BY KIM FISHER

The JMU portion of the BOND International Virtual Live Performance Festival was held on the top of the Forbes parking garage. Anonymous Ensemble, a Brooklyn-based group, worked with the Sophomore Studio students to include them in this international virtual performance experience. The festival offered tangible possibilities for virtual creative practice with professional artists, and gave students a better understanding of how to engage with JMU X-Labs more functionally in their own projects throughout the course of the semester.

"Working on projects [at JMU X-Labs] can help you explore ways of doing things that you didn't know were possible for performance design."

OLIVIA PALMER
Sophomore in Musical Theatre

When confronted with the unexpected circumstances that accompanied the COVID-19 pandemic, faculty from the College of Visual and Performing Arts approached JMU X-Labs with the idea of using the demands of the pandemic to create a new form of performance. Using the foundation of our Arts Innovations class, we provided them with support and novel spaces, and they worked with theater, dance, music, and playwriting students, inspiring them to generate new ideas.

Associate Professor of Theatre Ingrid De Sanctis and Assistant Professor of Dance Matt Pardo (see interview on p. xx) encouraged the students to look for creative ways to use technology to design, produce, and perform, and they were impressed with the results.

"I am proud of how the students have stepped up to the plate to understand technology, creative practice, and performance in new ways," said Pardo. "The arts have been devastated by the pandemic, and JMU X-Labs has helped us to change the paradigm when it comes to teaching, performing, and devising in the arts. Our students have challenged and inspired us and JMU X-Labs has provided an amazing platform for that."

Above left | Students performed their first assignments either online through Zoom using sound and filters, or by interacting live with the lab equipment, which was projected through Zoom to the rest of the class.

Above right | "Olivia Palmer had a breakthrough moment using three different screens in the lab simultaneously," said Pardo. "She used these screens to support her performance of a movement composition she had created. In addition to choreographing the movement, she also choreographed the screens to exist in relationship to her movement. The project utilized technology in a way that furthered the student's artistic idea and allowed her to shift the thinking on what is possible, compositionally, in artistic practice. It was an inspiring and awesome moment!"

The SHOW MUST Go

BY KIM FISHER

We asked Associate Professor of Theatre Ingrid De Sanctis and Assistant Professor of Dance Matt Pardo from the Arts Innovations: Sophomore Studio class some questions to get their perspectives on how they pivoted the curriculum in response to COVID-19. In the midst of a pandemic that requires little to no physical contact, how do you modify theater productions, adapt to new, limited settings, and share performances with a public who can't be in front of the stage?

JMU X-Labs: What were the challenges that you were trying to address/overcome when you reached out to JMU X-Labs?

Matt: Ingrid and I both recognized that there was a huge opportunity for us to have this class focus on content that would develop our students' devising methodologies and collaborative skills in new and innovative ways. Both dance and theater, our two areas of expertise, have been particularly hard hit by the global pandemic and we are being forced to reimagine our normal ways of creating and engaging in our own artistic practices. Our collaboration with JMU X-Labs was an opportunity for us and our students to work to innovate creative practice using technology and we are so thankful for the support and resources that this center has offered us. JMU X-Labs has allowed us to innovate with intention and has given our students a way to take ownership of their creative practice in new and exciting ways.

Ingrid: Sophomore Studio is a class designed to create opportunities for theater, musical theater, and dance majors to work together and devise new materials. These creative collaborations are the foundations of the class and when everything went online last spring, we had to navigate collaboration online. How do we do this and how do we teach this and is this possible?
In the spring, I was surprised and amazed by how the students navigated this online shift and when this fall was approaching, it was clear the course needed a redesign. Associate Professor Seán McCarthy mentioned JMU X-Labs when I shared the challenges and, after meeting with Matt Pardo, Nick Swayne, and the team from JMU X-Labs, we were thrilled by adding platform to a class build and process and production. Thanks to Matt, the three p's of the course (process, product, platform) were named and we have entered the unknown and risk-taking world—but are so confident that we are teaching students to keep creating work and getting their work out in the world in a new way.

"I was so intrigued by the way that JMU X-Labs encouraged students and faculty to challenge norms and to commit to the experimentation process."

MATT PARDO
Assistant Professor of Dance

JMU X-Labs: What motivated you to reach out to JMU X-Labs with this idea?

Matt: As a new faculty member, I was thrilled when Ingrid approached me with the idea to engage JMU X-Labs as a critical partner in Sophomore Studio. I was excited about the potential for the students to integrate with technology at this level. More than that though, I was so intrigued by the way that JMU X-Labs encouraged students and faculty to challenge norms and to commit to the experimentation process.

On

"The Sophomore Studio project with JMU X-Labs is a highlight of new thinking about how students can engage with arts curriculum. There is a level of entrepreneurship involved in working through these new processes ...each time will be better than the next, but changing the playing field in this way expands what is possible for all involved.

Pre-pandemic I never would have imagined that you could successfully teach a ballet class or ceramics studio online for an entire semester, but the CVPA faculty rose to the occasion and made incredible adjustments and found creative solutions to be successful with new technology and new spaces."

RUBÉN GRACIANI
Interim Dean, College of Visual and Performing Arts

In talking with Nick Swayne about the potential for innovation in the creative process, it became very exciting to consider having students be the ones to innovate and shift our paradigms in devising class-time projects. At our core, artists engage in this type of work daily and so partnering with JMU X-Labs was very exciting for this class, which gives students an opportunity to create new creative works in collaborative settings.

JMU X-Labs: What has your experience of the class been so far?

Ingrid: The back and forth with in-person and online classes has created challenges for training and access, but JMU X-Labs personnel have been so flexible at every moment. Our practice class session in the lab took more time and was challenging but that is all part of the process. From the first meeting with Seán and Nick with Matt, we knew that everything would take more time and we are all learning so flexibility is part of the process. In the end, the students are seeing, firsthand, the process of learning and collaboration and gaining tools in a season when we could lose heart about live performance.

"[A]s a teacher, this is a radical and exciting approach to collaborative teaching...In the end, creating opportunities for students to continue to create and share is so exciting."

INGRID DE SANCTIS
Associate Professor of Theatre

Matt: Though navigating COVID has presented significant challenges for many faculty, JMU X-Labs has allowed us and our students so many wonderful opportunities for growth this semester. So far, the students have engaged in small and large group training sessions, have had an opportunity to work in the labs individually if they chose, and have created solo projects that engage technology in a manner that furthers their artistic intent. We could not be more thrilled about the way the semester is shaping up, even at this early stage, and we are so grateful for the support, excitement, and care that every JMU X-Labs representative has given us.

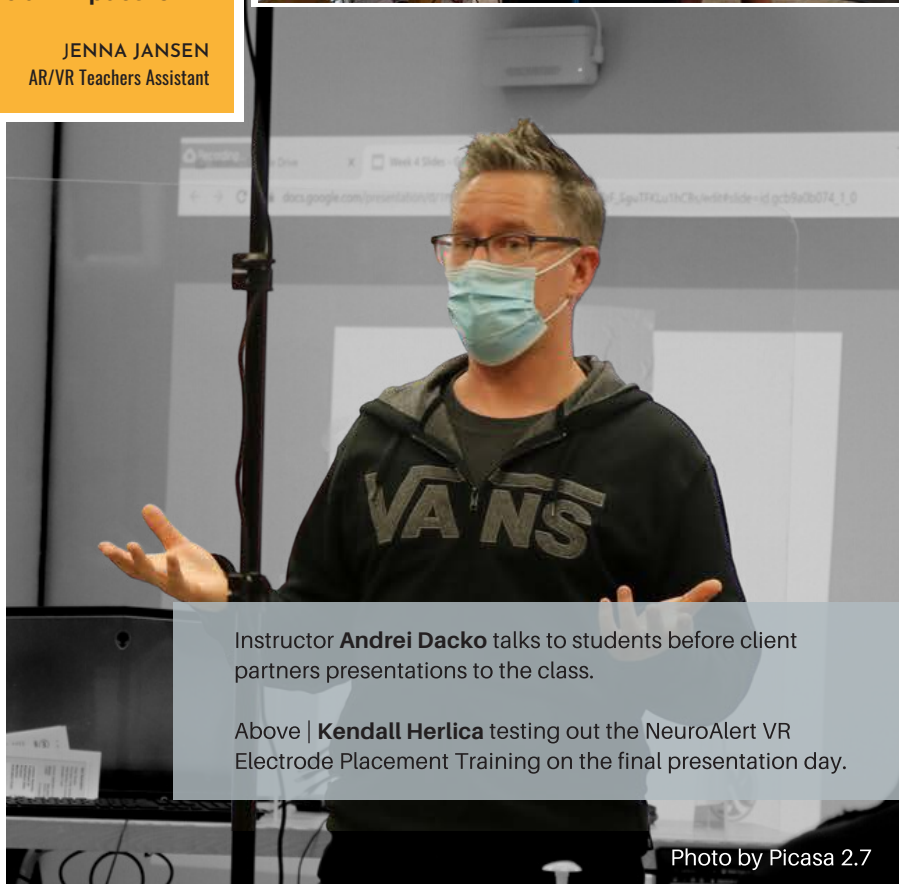
Augmented AND Virtual REALITY

BY JAMIE ZEIGLER

Faculty

ANDREI DACKO Instructor
JENNA JANSEN Teachers Assistant

> **"The students aren't working to get the A. They are creating and working hard for their community partners. They understand the value of their project and want to make something that is going to make an impact for these companies."**
>
> JENNA JANSEN
> AR/VR Teachers Assistant



Instructor **Andrei Dacko** talks to students before client partners presentations to the class.

Above | **Kendall Herlica** testing out the NeuroAlert VR Electrode Placement Training on the final presentation day.

Photo by Picasa 2.7

Andrei Dacko has been engaged in the innovation of experiential learning for over a decade. As the owner and sole proprietor of Breakthru LX, Dacko develops training solutions using a mix of unconventional design, 3D and spatial computing in order to deliver truly disruptive learner experiences. When Dacko heard about JMU X-Labs he was intrigued by the project lead course design in higher education. Dacko has taught project-based classes in high schools and jumped on the opportunity to be the instructor of the AR/VR course at JMU.

Being a novice to AR/VR, it was instrumental for him to be transparent with the students and have the background knowledge from his TA Jenna Jansen, who has taken this course previously. Dacko told the students on the first day that they are all learning this for the first time together, especially because Unity—a cross platform game engine for interactive, real-time content— just released Unity Learns—an application to acquire the skills for creating in the Unity Editor.

Dacko was thankful this class is available, as the move towards AR/VR enables multi-disciplinary students to use skills and technologies not seen in other class formats. Being able to meet this learning need adds to the team dynamic and execution on creating complex solutions to real life problems. The focus is put on skill building, collaboration and learning to work in a project-based environment. Working under pressure for a community partner made each team of students rise to the challenge and produce a viable working product.

Following the goals of Agile methodology, to iterate early and often, the students went above and beyond to deliver their products to their community partners.

Above, middle & right | The class was visited by BIM Manager of Riddleberger Brothers, Inc, **Steve Clutter**. **Carter Elliot**, **Brandon Duda**, and **Shelby Rathbun** learned alongside their classmates how virtual and mixed/augmented reality is being applied to modern construction, and they even got some hands-on experience. Below | **Wes Jamison** and **Lauren Love** get help from **Professor Dacko** on setting up their presentation.

8 MAJORS

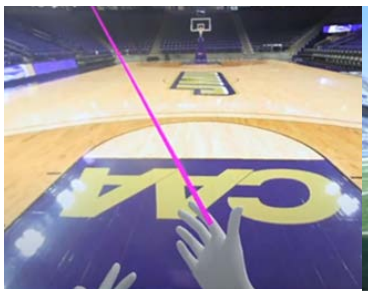
3 PROJECTS

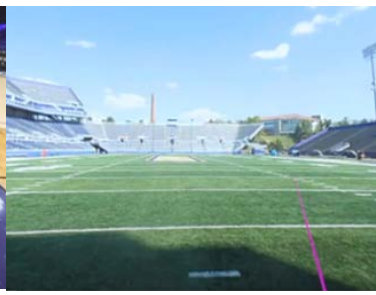
> **"This class has been very unique where we all share our learnings together. Learning a new skill, following it through and creating something that I am proud of is what it is all about."**
>
> WES JAMISON
> Senior, Computer Information Systems/ JMU Campus VR Tour

JMU Campus Virtual Reality Tour

The JMU virtual reality tour captures the physical beauty of JMUs campus as well as the special community within. The goal of this project was to create a useful tool to give prospective students and interested family members an accurate scale of the JMU campus.

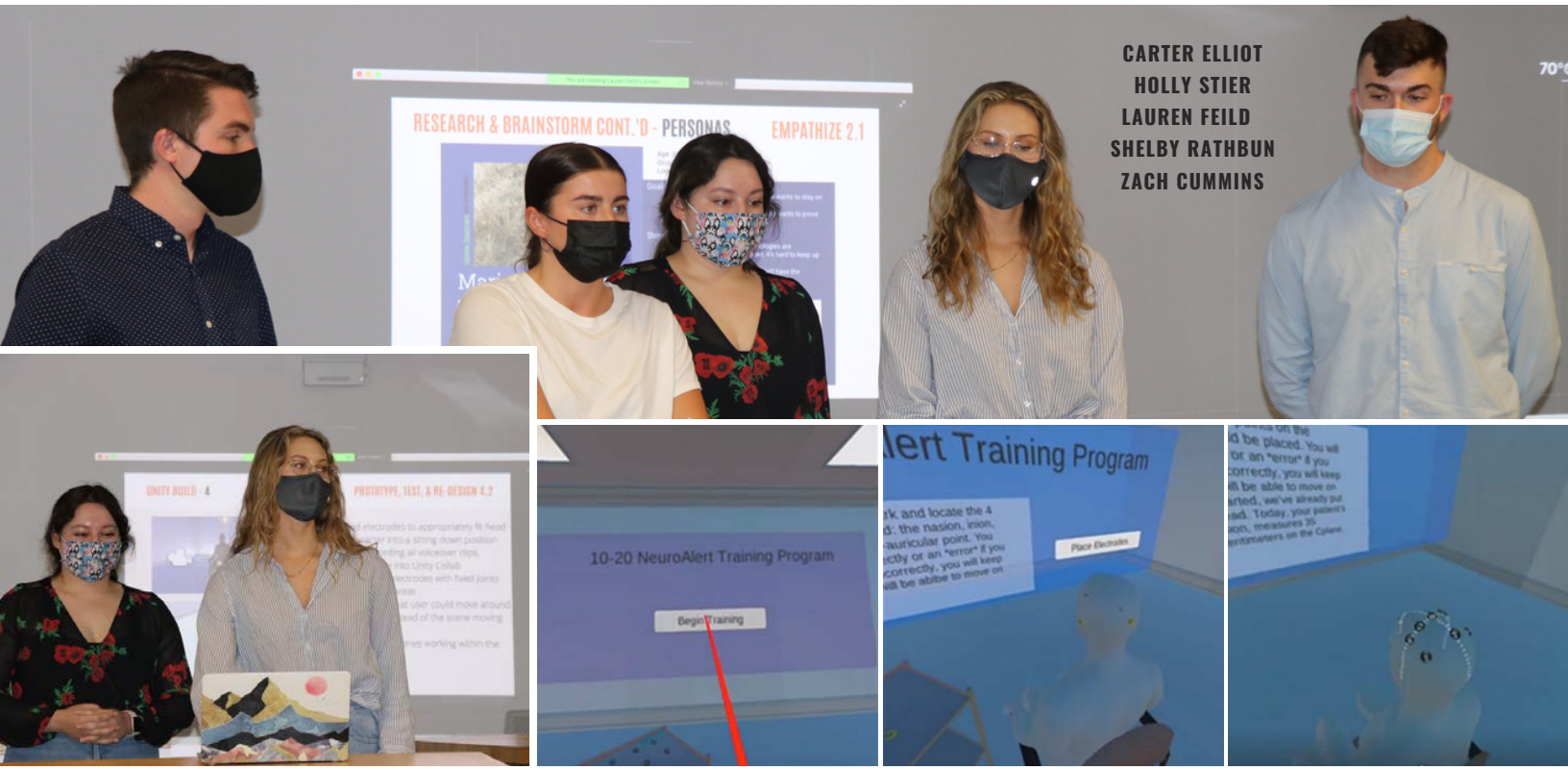
From being the smallest team and having to start their project from scratch, the JMU VR tour hit many road blocks on their way to success. Due to their perseverance, dedication and willingness to learn they were awarded the XR cup by Professor Dacko.





> **This cup is not going to the team that is the most technically savvy team, the best looking team—it's not going to the team that just has A's across the board. Every year we shall award the XR cup to the team that has demonstrated getting through the biggest adversity and demonstrated the most perseverance based on circumstances beyond their control.**
>
> ANDREI DACKO

NeuroAlert | VR Electrode Placement Training



During surgery, specialists monitor the function of a patient's brain and nerves using techniques such as EEG and EMG to provide feedback to the anesthesiologist and the surgeon, which helps mitigate the risk of damaging the nervous system. This process is called intraoperative neurophysiological monitoring, or IONM. In partnership with NeuroAlert, a leading provider of IONM, AR/VR students will identify and map out biological markers in the brain using augmented technology in order to help technicians more easily determine where to place probes that help guide the surgeon.

NeuroAlerts 10-20 electrode placement training VR simulation teaches users how to use NeuroAlert's electrode technology. By using this training experience, users will gain experience in locating the major landmarks and placements necessary for the 10-20 system. Users are able to replay the simulation until they have mastered the ability of locating landmarks and placements.

Working with NeuroAlert was a challenge for the majority of the team not coming from a medical background. Having a strong foundation of research and understanding helped to prioritize the goals of the project. Through interviews they came to understand that accuracy in the training was most important to give users the best experience.

Unique implementations of the VR simulation:

- *Training practice mode:* learning each individual point and knowing where to place electrodes before going through the simulation
- *Voice Over:* Users can listen to the instructions rather than read (have both available)
- *Teleportation:* Users can throw the electrodes and they will go back on the virtual table (back to start)
- Once electrodes are placed on the head they stick and users can't accidentally move them.

> **This is a great start to a training program. It gives people a good understanding of placement. The problem solving you guys engaged in was genius. I learned a lot from you guys!**
>
> RAHUL GOLE
> NeuuroAlert Contact

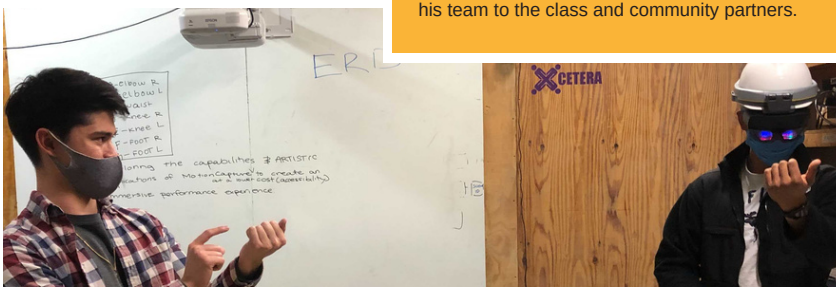
VR Career Discovery Experience

Students are often pushed towards college pathways when many great well-paying careers exist that do not require that. The goal is to showcase these career pathways to students in grades K-12 to give them exposure to, and peak their interest in, jobs they may not understand and allow them to have fun while doing so. The initial industry focus is in manufacturing.

The experience is designed around the Shickel Corporation factory floor providing users a self guided virtual experience. Users may interact with objects, watch videos and learn what a factory job entails. Most factories do not allow children under the age of 16 to enter the factory floor—a virtual replica can provide students early on with experiences they could only have once it was time to enter the workforce.

Creating the virtual workspace to resemble video games gives K-12 users a sense of familiarity to ensure an easy learning curve. The self guided feature immerses students into experiential learning allowing them to learn and understand at their own pace. The value of exploration is pertinent in the development of problem-solving and forward thinkers. JMU X-Labs strives to create positive learning experiences for all students to learn and innovation with intention.

The Shickel VR Factory Floor is just one example of showcasing career pathways for K-12 students. At the beginning of the semester the intention was to work with multiple businesses including the Shenandoah Valley Airport and Winchester Regional Airport. The team felt they could better meet the needs by focusing on one business and it paid off. JMU X-Labs looks forward to continuing their partnership with Staunton City Schools and to build innovative AR/VR projects.



Above | Sample images taken from the VR experience.
Left | **Dean Nemphos**–junior CIS & Computer Science double major–presents VR project with his team to the class and community partners.

> **It was a really fun opportunity and most importantly gained a lot of skills, like modeling, UI and scripts. You can't just do it with one person. You need to all work together and put in the work!**
>
> BRANDON DUDA
> Senior, Engineering

> **You flipped your mind set to what you think you should do to what your client needs. You listened to their needs and you nailed it.**
>
> ANDREI DACKO

Community

Food Insecurity & ALICE

Food Insecurity Instructors
Erica Lewis – Nursing
Cathy Copeland – Writing, Rhetoric and Technical Communication
Michelle Hesse – Dietetics
Stephen Kubricki – Statistics

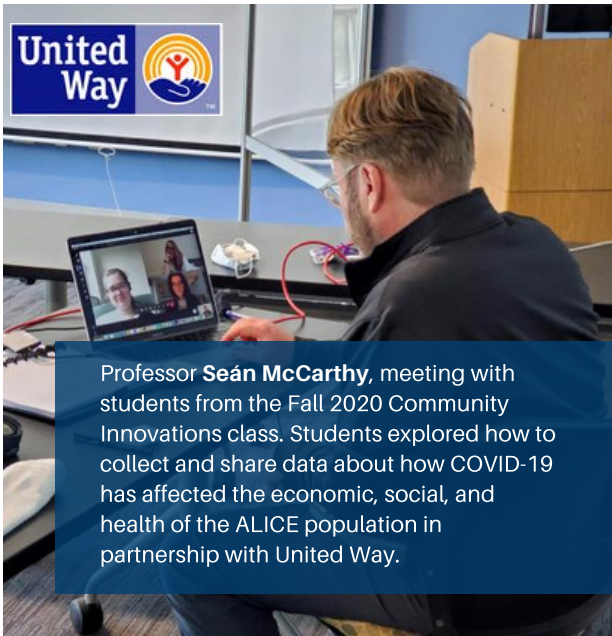
ALICE Instructors
Seán McCarthy – Writing, Rhetoric and Technical Communication
Rob Alexander – Political Science
Dinesh Sharma – Statistics
Aaron Kishbaugh – JMU X-Labs
Jamie Williams – Community Service Learning
In Partnership with United Way of Harrisonburg and Rockingham County

Community innovations has multiple iterations for each semester, tackling different needs in our community. ALICE was the focus for the fall of 2020. In the spring 2021, both Food Insecurity and The Future of Learning were offered.

Michelle Hesse (Dietetics) Catherine Copeland (WRTC)
@stephenkubricki (Statistics) Dr. Erica Lewis (Nursing)

Food Insecurity

Students from nursing, the chronic illness minor, dietetics, WRTC, & statistics applied foundational knowledge of food insecurity, examined local data sets and use disciplinary skills, in teams, to improve problems of food insecurity in one of several population groups under study. While the course was built on foundational concepts of food insecurity on a national and state-wide scale, students focused on problem solving around local issues related to poverty and food insecurity. The course was envisioned together with the MSU Hub for Innovation in Learning and Technology, who will run a parallel course in the fall of 2021.



Professor **Seán McCarthy**, meeting with students from the Fall 2020 Community Innovations class. Students explored how to collect and share data about how COVID-19 has affected the economic, social, and health of the ALICE population in partnership with United Way.

> **During our first class, students in my small group reported the class appealed to them because they were able to work with other professions and put their disciplinary skills to use to make a real world difference. I really couldn't ask for a better life's work!**
>
> ERICA LEWIS

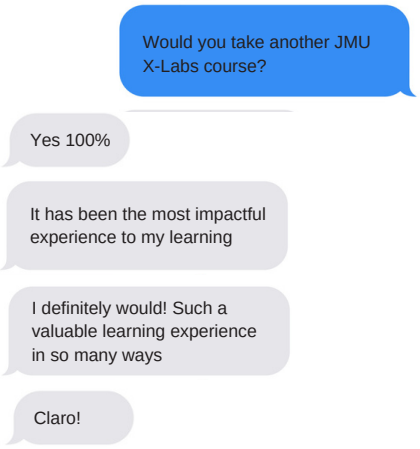
Innovations

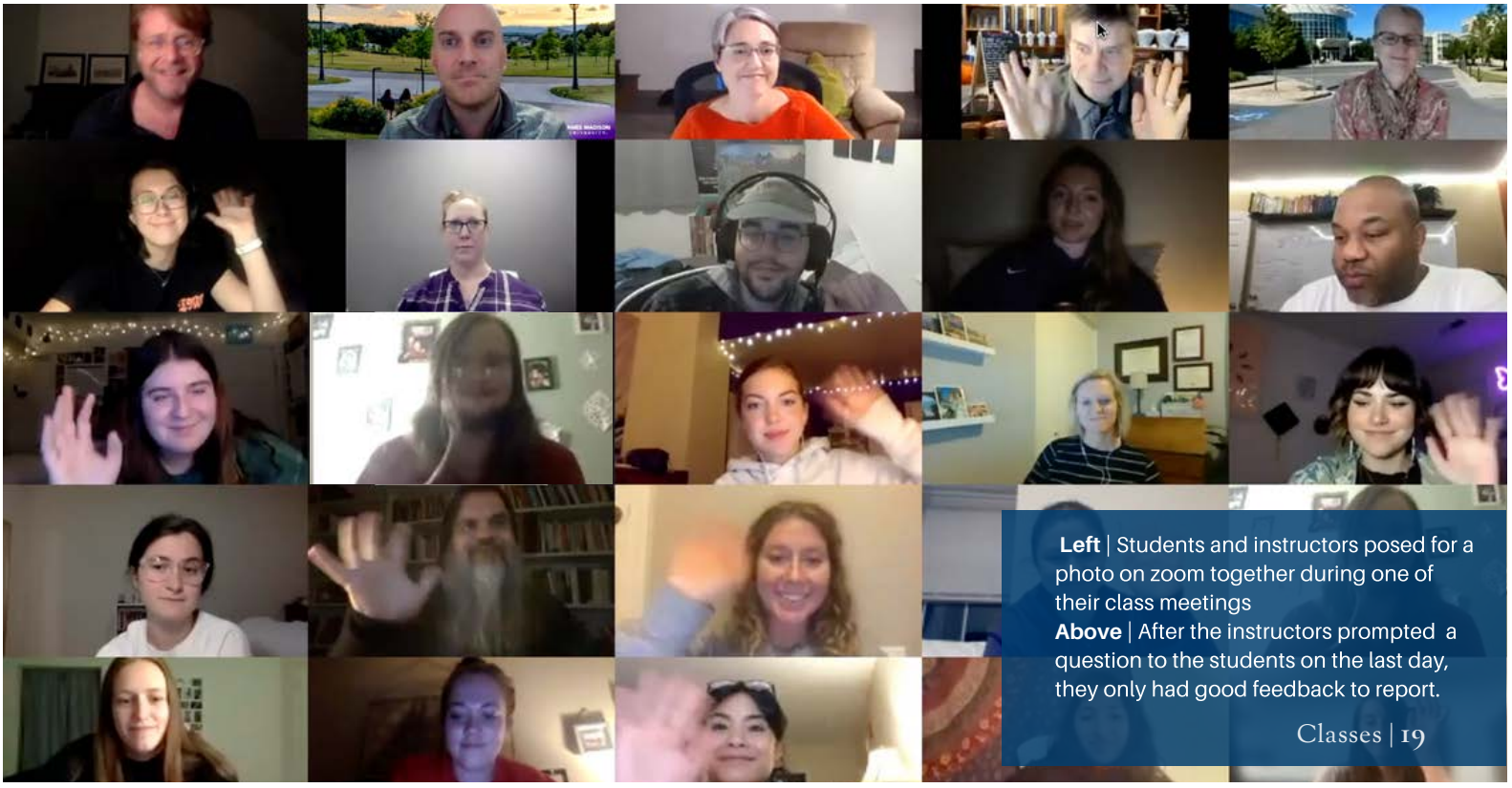
Future of Learning

Working in interdisciplinary teams, with students and faculty in this JMU X-Labs course prototyped ambitious hybrid and online education projects with the expected goal of contributing to the future of learning at JMU. Students explored best theory and practice in hybrid and online learning, gained experience working in interdisciplinary teams while using a variety of innovation and design methods, and practiced skills that enable effective responses to complex and pressing problems.

At semester's end, course participants showcased their work to members of the university administration and faculty, who assessed those ideas for potential future development and implementation.

Instructors
Seán McCarthy – Writing, Rhetoric and Technical Communication
Jonathan Stewart – Associate Director of Finance
Diane Wilcox – Education
Emily York – Integrated Science and Technology
Kenn Barron – Psychology





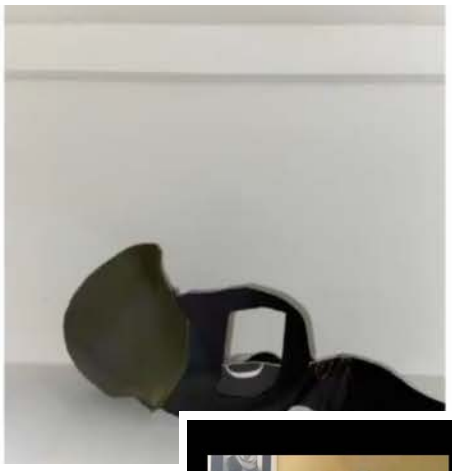
Left | Students and instructors posed for a photo on zoom together during one of their class meetings
Above | After the instructors prompted a question to the students on the last day, they only had good feedback to report.

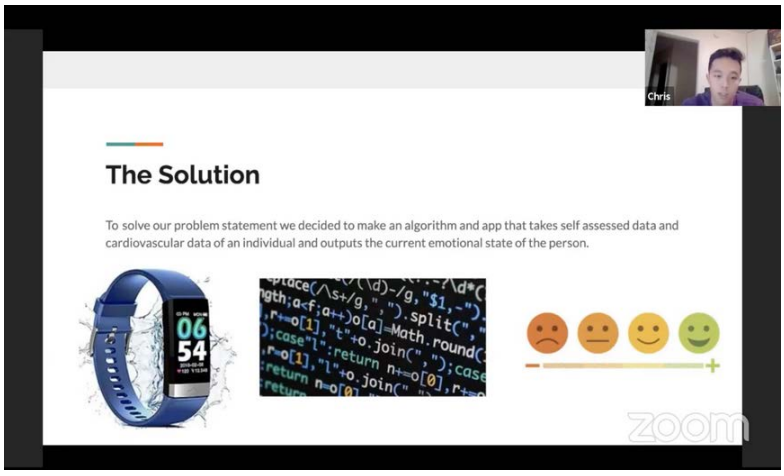
Instructors
Patrice Ludwig – Biology
Kevin Giovanetti – Physics
Bryan Cage – Biology
Dmytro Babik – Computer Information Systems

Industry Partners
Fred Briggs – Applied Impact Robotics

Medical Innovations

BY KIM FISHER





COVID-19 Innovations

In this course, engineering, health, kinesiology, and nursing students work in multidisciplinary teams to develop and communicate solutions to a community health challenge. For the Fall of 2020, student teams did deep research, developed empathy maps, designed prototypes, and performed usability testing to address various challenges brought on by the COVID-19 pandemic, resulting in several mask prototypes, a website, and app, and an online game to address the following:

- How might we address constraints to wearing masks, such as acne-prone skin or difficulty breathing, while still protecting others and following mask guidelines?
- How might we reintroduce stability and consistency to improve college students' emotional and physical health?
- How might we encourage children to be active with their peers, while being safely socially distanced, to improve their well-being?

Above | In the fall of 2020 all classes were meeting virtual due to the pandemic. Screenshots were taken from the Facebook Live final presentations on Innovations for COVID-19.

Instructors
Patrice Ludwig – Biology
Kevin Giovanetti – Physics
Bryan Cage – Biology
Jonathan Spindel – Integrated Science and Technology

Industry Partners
Fred Briggs – Applied Impact Robotics

Internet of Things

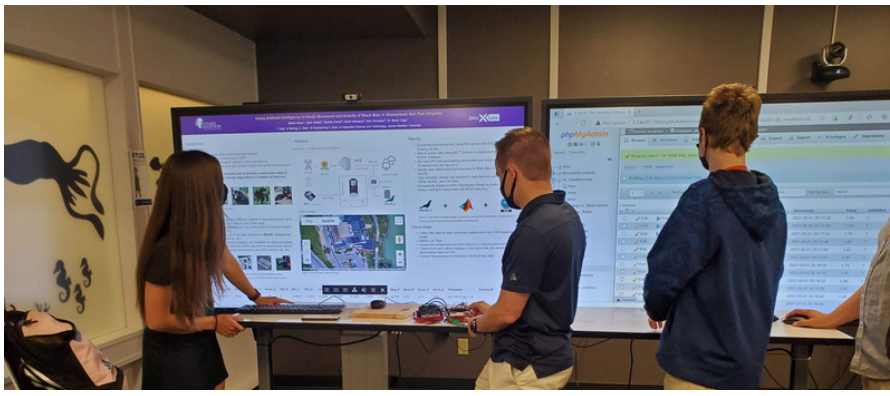
BY KIM FISHER

In the Fall of 2020, students collaborated with Northrop Grumman to find ways to effectively monitor bears in their natural habitat. The team developed a collar with sensors that measure temperature, location and motion with an ESP32 as the microprocessor base for retrieving sensor data, and they are researching how to monitor the health and condition of the bears as well. However, they discovered that there are significant problems measuring bio-indicators using a collar-mounted sensor.

NORTHROP GRUMMAN

Searching for options, they discovered small devices that can be implanted under the skin and prospects for this approach are under study.

They also explored and prototyped LoRa network data links that would push the data to an intermediate device on a UAV that would then upload data to a server with web services, databases and tools to build an information portal. AWS cloud-based services are one option which would provide the toolkit to create the portal.



Above & left | Spring 2021 students get ready in their stations to present what they have accomplished throughout the semester.

Photos by Nick Swayne

Hacking for Defense

BY KIM FISHER

In the spring of 2021, JMU X-Labs hosted its fifth H4D class where transdisciplinary student teams pursued solutions to a variety challenges. For more details on each project, visit https://jmuxlabs.org/hacking-for-defense-h4d/.

Instructors
Cathy Copeland – Writing, Rhetoric and Technical Communication
John Hulsey – Political Science
Fariss Mousa – Management
Mert Tokman – Marketing

Military families with dependents with special needs needed a better way to navigate healthcare and educational options within the Exceptional Family Member Program in order to plan for assignment changes and identify support programs. This team created an app interface which helps EFMP families find resources and support anywhere in the country.

There is a strong correlation between low morale, high alcohol consumption, and suicide with soldiers who view their leaders negatively. In response, this team designed the 10-week Fort Bragg Leadership Development Program to help identify counter-productive leadership styles and to improve leaders' engagement with their subordinates and peers.

When Army Reserve Safety Officers needed a way to quantify and catalog lead-contaminated facilities to protect soldiers who are most at risk of exposure, this team leveraged ESRI's ArcGIS software to display and analyze data to track contamination across facilities. The ArcGIS Map provides safety teams a visual of each situation and allows them to allocate resources accordingly.

Program Managers needed an overarching business unit reporting tool in order to increase visibility and efficiency of collaboration across business units. To address the issue, this team created a SharePoint environment to shadow the current infrastructure and operations of the pre-existing SharePoint, offering a new way of reporting that is useful and easy to use for all staff.

The pre-existing schedule reporting tool, known as "The Beast," has made requesting time off a cumbersome process for JPRA employees. This team's most promising solution is a multi-functional, dynamic, cloud-based scheduling software that enables users to create, manage and view schedules from any location, and it is already utilized by the DoD.

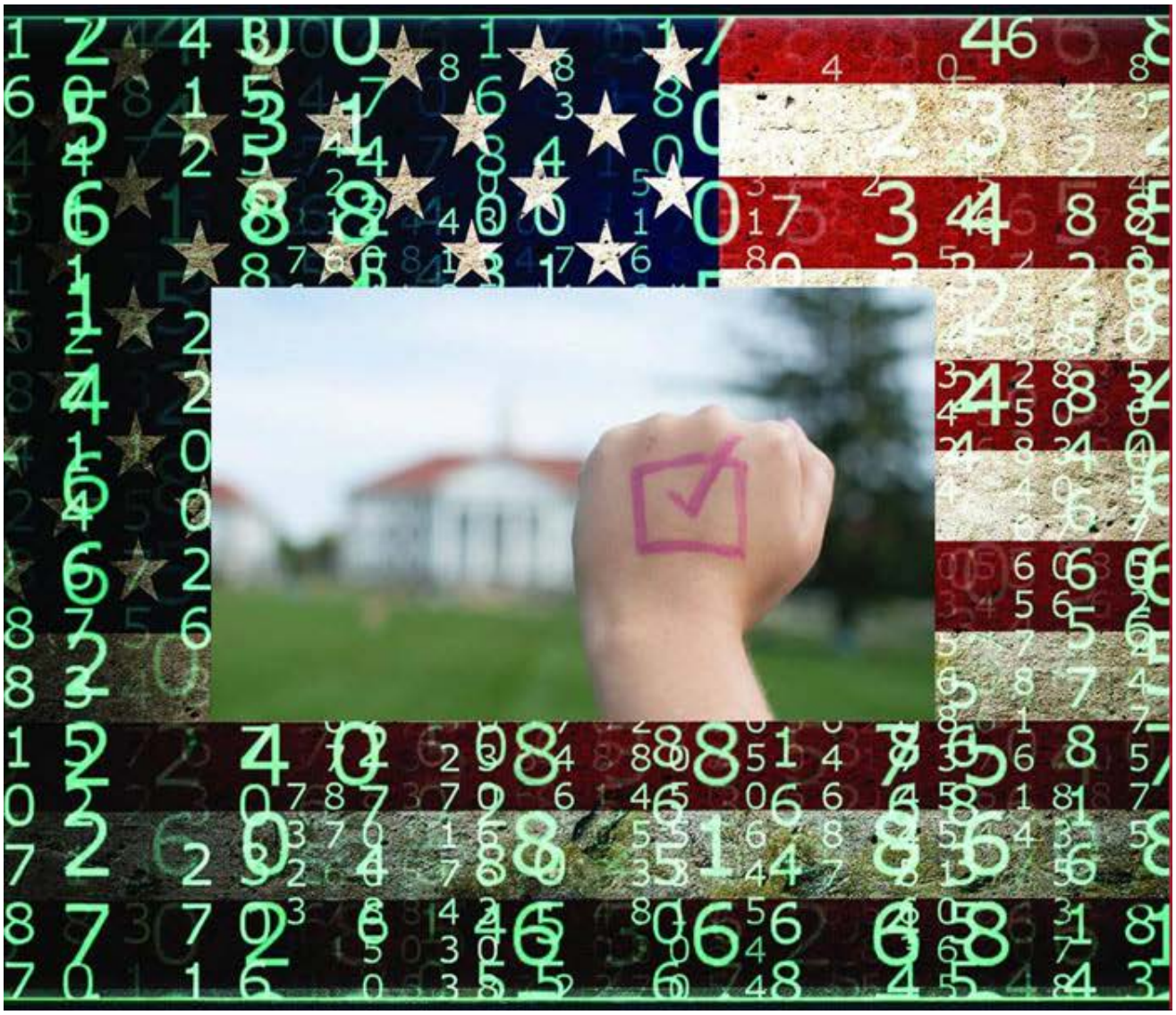
AWARD WINNER

PROJECT PERICLES ENGAGEMENT FELLOWSHIPS

BY KIM FISHER

Hacking for DEMO

Addressing Complex Challenges Facing our Society and Democracy



JMU Civic

Instructors

Cathy Copeland – Writing, Rhetoric and Technical Communication
Adrienne Hooker – School of Media Arts & Design
Carah Ong Whaley – Political Science and JMU Civic

CRACY

At a unique time in our country's history, when political polarization runs rampant in the midst of a novel coronavirus pandemic, how can we teach students how to sift through the melee to determine what's real? How do we help them emerge as educated leaders with the ability to empathize with different perspectives and work together with their fellow Americans despite those differences?

In our pilot Hacking for Democracy class, students addressed complex issues and challenges for the 2020 elections, including how the presidential nominating process and Electoral College structure the game, and the impact and role of political parties, superPACs, interest groups and the media, with a special focus on the increasing role of social media. They also examined the role and impact of campaign strategy, tactics and operations, polling, campaign finance, presidential debates, and the importance of who turns out and why.

One thing that this class gave me—that not many other classes have, over my academic career—were some real-life lessons. In the next elections, I will know the proper ways to educate myself in order to remain confident while I am voting, and also, I can help educate other people.

CAITLIN NELSON
Writing, Rhetoric and Technical Communication

There have been few times in college where I consistently looked forward to every class, but I always felt motivated not to miss class since we learned so much every week.

JAMIE PANKO
Political Science

Students educated people about the importance of voting, ensured ballot access and voting rights, and mobilized "Get Out The Vote" initiatives at JMU and in surrounding communities.

THE VALUE of Democracy

BY KIM FISHER

After the fall 2020 Hacking for Democracy class, we asked one of the instructors, Carah Ong Whaley, about the challenges facing democracy in our country and how students can take ownership of their education and get involved in meaningful ways.

JMU X-Labs: At such a unique time in our country's history, why is a class like Hacking for Democracy important?

Carah: JMU student voter turnout jumped from just 8.8% in 2014 to 32.8% in 2018 according to our campus National Study or Learning, Voting, and Engagement (NSLVE) report compiled by Institute for Democracy and Higher Education. Preliminary analysis by the Center for Information and Research of Civic Learning and Engagement suggests that 52%-55% of voting-eligible young people cast a ballot in the 2020 presidential election. The rise in student voting rates is encouraging and hopefully a sign of things to come, but increased election participation alone is insufficient to build a more just and inclusive democracy.

Even with record turnout in 2018 and likely 2020, half or more of eligible young people are not voting in elections. More concerning is that young people are placing less value on living in a democracy. Yascha Mounk and Roberto Stefan Foa found that young people have become jaded and cynical about the value of democracy as a political system. According to their analysis of World Values Survey panels, one-in-four millennials considered democracy to be a "bad" or "very bad" way of running the country and 26% responded that it is "unimportant" in a democracy for people to "choose their leaders in free elections."

"Virginia has elections every year and we hope we can continue this course so that more students have the opportunity to develop the skills, knowledge and agency to participate in elections as a front door to even deeper engagement in the civic life of our communities."

CARAH ONG WHALEY
Associate Director
James Madison Center for Civic Engagement

Moreover, undemocratic sentiments and openness to authoritarian alternatives have risen by some 30 percentage points since the 1990s among those who are both young and rich.

As the country grapples with a mass pandemic, multigenerational crises of racial injustice and inequity, waning public trust in political institutions, climate disruption and migration crises, colleges and universities need to produce students equipped to confront the unresolved public issues we face while reimagining and reinventing our weakened democratic practices, norms and institutions.

Our research and experience show that students care deeply about issues, but are not connecting political and civic participation as a means to address those issues. For example, surveys of political behavior conducted by our Center for Assessment and Research Studies show that the majority of JMU students (20 out of 22) have not participated in most political behaviors. There are only 2 behaviors in which 50% or more of students report participating: 1) community service or volunteering for non-political organizations/programs and 2) boycotting products.

"...young people have become jaded and cynical about the value of democracy as a political system."

JMU X-Labs: How did the students respond to this type of multidisciplinary experiential learning and participation in the election process?

Carah: Students responded very positively to the course and the experiences. Several students in the course either changed their major or are pursuing graduate school in politics and public policy as a result of their experience.

As a result of course learning, students developed the knowledge, skills and agency to directly engage their peers in discussion. As one student noted, "I think the most effective strategy was the work that involved peer to peer contact. I feel that with an election so polarizing, the best way to encourage other students to vote is to talk with your friends; not necessarily about politics, but the importance of voting in such an important election."

Students learned from engaging with elected leaders. When asked what was one of the most effective elements of the course, students responded: "Getting students to create a voter education guide to help us learn more about the candidates and the election."

JMU X-Labs: What are you most proud of about the class?

Carah: Hacking for Democracy not only educated and engaged students in the course and across campus, it also contributed to the broader community. Town Halls with candidates from City Council all the way up to the presidency were broadcast on social media and engaged individuals across the country. Candidates from the school board all the way up to the presidency also provided responses to pressing issues for our Voter Guide, which provided valuable information for students and residents of the broader Shenandoah Valley. In addition, information about voting in the voter guide created by our course was translated into several languages for local residents for whom English may not be their first language.

Another important impact was that students in the course served as Election Officers, working polls on Election Day. Election Officers play a critical but often overlooked role in a representative democracy, serving on the front lines of election administration. The need for election officers increased in 2020 as a result of the COVID-19 pandemic and the higher risks the coronavirus poses to older adults. In the 2018 general election, around 6 in 10 U.S. poll workers (58%) were ages 61 and older, including roughly a quarter (27%) who were over 70 (Pew Research Center). As a result, young people, who are traditionally not as engaged in elections as their counterparts in older age demographics, had the opportunity to learn more about elections, election administration, and representative democracy, while contributing to the broader public good in our community. We also helped stuff absentee ballots in a year when more than 2/3 of young people in Virginia cast their ballots early and by mail.

"...colleges and universities need to produce students equipped to confront the unresolved public issues we face while reimagining and reinventing our weakened democratic practices, norms and institutions."

Hacking for Diplomacy

BY KIM FISHER

Instructors
Cathy Copeland – Writing, Rhetoric and Technical Communication
John Hulsey – Political Science
Kathleen Moore – Integrated Sciences
Kurt Paterson – Engineering

In partnership with the National Geospatial-Intelligence Agency (NGA) and United Sikhs, teams of four students (from majors including computer science, engineering, international affairs, intelligence analysis, and political science) focused on the following problems:

Sino-Indo Relations – Students worked in partnership with the NGA to develop a product that helps explain the present and future of the relationship between China and India's relationship as it relates to the team's primary research question: "How will the long-term trends of the investment, utilization, and control of water shape the future of the Sino-Indo strategic rivalry in the South Asian region, and what are the implications of these actions?"

Megacities – When population surges occur, cities are left without a way to track the resulting informal settlements that emerge, making these types of population growth difficult to manage. This team developed a system with which such settlements may be mapped so that megacities can keep records of them as well as create a model of patterns city officials can use to see where future settlements may emerge.

Team Croconile - This team was tasked with visualizing current and projected water abstractions—any structure that extracts water from surface or underground sources—along the Blue Nile River and analyzing their impacts on the Nile Basin region.

UNITED SIKHS
Recognize the Human Race as One

Team United - Team United worked with United Sikhs to develop a comprehensive security strategy in order to adequately protect the Sikh population in Afghanistan that are often victims of terrorist attacks and religious persecution. This strategy included a combination of foreign policy, advocacy efforts, political engagement, and direct assistance to at-risk populations.

Above | Students participate in the RPA class.
Left | Trevor Brown speaks at the final RPA presentation.

What is ROBOTIC PROCESS AUTOMATION?

BY KIM FISHER

As an emerging technology, Robotic Process Automation (RPA) has consistently been in recent news for its impact on transforming a broad spectrum of industries, such as telecommunications, federal loan processing, and even law firms and healthcare. But what exactly is RPA and how is it helping us in so many different areas? We talked with BRMi Technology Senior Director Trevor Brown —who also teaches our RPA class—to find out.

JMU X-Labs: A lot of people hear the terms "Robotic Process Automation" or "RPA" and think there are robots involved. Can you tell us what RPA is so that people have a context?

Trevor: RPA, or Robotic Process Automation, is technology using software that mimics the actions of humans. The terms "robotic" or "robots" can be misleading, as folks seem to believe there's an actual physical robot involved. To simplify, a robot is an executable on a workstation that performs actions that you have taught it to perform. These actions are typically light on the cognitive side, but the capacity to incorporate higher levels of cognitive abilities is expanding at an accelerating pace.

JMU X-Labs: RPA seems to get a lot of attention in the technology arena as a panacea for many things, and at the same time, it's panned as an insignificant trend. How do you think it should be identified or characterized?

Trevor: Great question. RPA is one part of the puzzle that can have a real impact on business. We like to group these technologies as intelligent automation technologies, which also encompasses machine learning and other forms of artificial intelligence (AI). My opinion is these groupings of technologies are groundbreaking, in terms of impact to the business, and will have significant growth over the next 5 years.

But back to your panacea of many things—people will continue to be at the center of business-related decision making and will utilize these tools to deliver more efficiently, and most importantly, the use of these tools will free up time from the routine to provide more value-driven work.

JMU X-Labs: We've offered the RPA class a few times now —what would you say draws students to the course and RPA as a platform?

Trevor: This course can be an extension of the major course requirements for so many students. Yes, I do believe students hear the description "robotic" and think they will learn to program robotic dogs or something, but the reality is most of the students come to the class with an IT-centric business acumen or computer science background and see this as another opportunity to apply technology to their IT acumen.

JMU X-Labs: Can you give us some examples of projects that students have worked on? Are any of them particularly interesting to you?

Trevor: So let's extend the first question you asked about RPA in general. If RPA is software we teach to perform normal, repetitive tasks, it's fairly easy to think about the use-case opportunities. What do students do over and over? For example, every semester they have to plan for the next and build a course load that meets their requirements. There's some research that has to be done, attributes of a class have to be evaluated, and a course load defined. This is time consuming, so why wouldn't you apply some automation to this task? We can develop bots that take input of a typical class load, define some requirements, and let the bot do all the work.

Another great example was the rec. center class scheduling portal. Finding a class of interest and signing up for that class had a first-in first-out policy, right? Well again, using a bot to search for classes based on criteria can easily be handled by a bot. The fact is, anything you can do that is repetitive and uses underlying systems for research and downstream processing can be handled by a robot. In business, we see many stove-piped processes that are done over and over that have business value, but not necessarily for the worker. Employees are driven by thinking and being creative. We get bogged down in the process and not the end results. Let's develop bots that can augment our work so we can be challenged in different ways.

JMU X-Labs: This semester we got a lot of interest from an industry representative who was very interested in undergraduates with RPA experience. From what we've heard, they think we're the—or at least one of very few—universities offering RPA as an elective. What have they been interested in and how are students responding?

Trevor: The fact is, industry will covet students coming out with this experience. It will continue to be an integral skill that is utilized across most business areas. I don't identify this skill as an IT-heavy skill, but more as a business-driven skill. The fact is, these platforms today are the next generation of software that we identify as low- or no-code development. So you're using your foundation of solving business problems with an IT focus.

"The fact is, industry will covet students coming out with this experience. It will continue to be an integral skill that is utilized across most business areas."

TREVOR BROWN
Senior Director, BRMI Technology

The democratization of these platforms allows a fairly low barrier to get up to speed. Most of the students I have encountered have already participated in big industry internships, and they hear about these technologies through various means. Companies that are aggressive in strategy will want to see these skills as a baseline of acumen. In terms of the class, we know it's a special opportunity to have this class at JMU. It's a proven model that we hope can be expanded within any university course selection.

JMU X-Labs: What's next in RPA? Should we develop a course sequence so that students learn the basics and then a more advanced applications course? Maybe integrate the applications course with one of our other problem-based courses and see what students can develop to solve real world problems?

Trevor: As I mentioned earlier, RPA is a stepping stone. Of course, you have to learn the basics, but this is an emerging technology that will move very quickly into other forms of intelligent automation. I see various classes that extend the foundation into applying more cognitive ways of performing tasks. A dedicated class in applying RPA would be great, as well as introductions into machine learning, chat bots, and other AI forms, all using the same RPA platforms well within the future.

Deloitte.

salesforce

Application Development

BY JAMIE ZEIGLER

SKYLAR WOLEN
Industry Partner, Deloitte

KELLY STICKELL
Industry Partner, Deloitte

In partnership with Deloitte Consulting, we offer Salesforce training as a 3-credit online class. With the fall 2020 pilot class being a success, it was offered spring 2021! This course is a one of a kind opportunity to learn about the industry-popular platform, Salesforce. In addition to obtaining foundational knowledge of the robust Customer Relationship Management (CRM) tool and its many capabilities, students will also received hands-on learning time with the application to build their technical skill sets. Like all JMU X-Labs elective classes, students immersed themselves in the technology working to develop solutions to real-world problems.

In the spring 2021 guest speakers from Salesforce hosted a Panel for the students. They also all happened to be JMU Alumni—Woodson Martin, John Taschek, Drew Roberts and Lynne Zaledonis. For the final projects, students built a mock alumni relationship system in Salesforce and presented to Deloitte practitioners, the final two teams presented to Deloitte Senior Salesforce Leadership. Two students from the class were offered internships at Deloitte– Jake Decker and Virginia Claire Sumner.

VIRGINIA CLAIRE SUMNER
First Year, Accounting

"The class was quite humbling because it was very outside of my comfort zone. I am comfortable navigating my computer and usual apps and softwares, but learning to navigate and utilize Salesforce was definitely a challenge. I had to be okay with not knowing everything and enjoy the learning experience."

Jake Decker was a senior Computer Information Systems major in the Spring of 2021 . Decker took the internship with Deloitte working on a Salesforce Project with the US Space Force. Providing him the opportunity to become familiar with the software, this class gave Decker a huge leg up coming into a Salesforce role. Decker is now studying for the Salesforce Administration certification to help further is knowledge and career.

UNITED STATES
SPACE FORCE

JAKE DECKER
Senior, Computer Information Systems

Accounting major, Virginia Claire Sumner was a first year student at JMU for the 2020-2021 school year. With the Salesforce Application Development course being her first X-Labs class, Sumner knew it would be a great opportunity to learn and expand her knowledge. One of her biggest takeaways from the class was understanding the impact of networking.

The course instructors were two Deloitte employees who connected the students virtually with professionals across different sectors of the corporate world. While Sumner will be interning in the Deloitte Tax Office, being provided the opportunity to consult and connect with cross-disciplinary industry partners gives her the opportunity to expand her network.

Featured RESEARCH

Octocopter: The Autonomous Mission

See page 42.

Above | Dr. Ahmad Salman tested the autonomous mission for the Octocopter.

Collaborative RESEARCH GRANTS 2012-2021

Projects listed originated at JMU

Principal Investigator	Project Name
2012	
Bob McKown	Feasibility of a Canine Study for Tear Lacritin as a Treatment for Dry Eye
Christine May	Virginia Trout Streams Research Collaboration
Costel Constantin	Kapitza Conductance of Al_2O_3/GaN Interfaces
GMU, JMU, VT and UVA	Virginia Early Childhood Foundation Preschool Study
Nathan Wright	Structure/Function studies on dispersin homologues in Enterotoxic bacteria
2013	
Alleyn Harned	Virginia Clean Fuels Student Partnership 2013-2014
Anca Constantin	The WISE Search For Megamasers
Anca Constantin	The First Panchromatic Constraints of the Role of Water Masers in Galaxy Evolution Process
Anne Henriksen	Using the Mouse Four-Core Genotype Model and Estradiol to Elucidate the Effects of Gonadal vs. Genes on RNA Sequences in the Cerebellum
Anne Henriksen	Using High-Throughput, Next-Generation Sequencing to Identify Transgenerational Effects of Bisphenol A on the Epigenome
Carol Hurney	Exploring Tail Development from Three Ends
Christopher Berndsen	Structure of human BST-2 with BST-2 antagonist Vpu
Costel Constantin	Thermal Conductivity and Thermal Boundary Conductance Measurements of Metal/PEDOT:PSS Interfaces as a Function of Electrical Conductivity
Elizabeth Johnson	Laboratory Techniques in Geology: Redesign of a STEM course to prepare students for graduate school and Employment
Giovanna Scarel	Effects on thermoelectric power generation of the source-device distance
Isaiah Sumner	Computational Insights into the Motion of the Protein, GroEL
Jacquelyn Nagel	Sustainable Innovation: Integrating teams in Biology, Design and Engineering
James Herrick	Genomic analysis of multi-drug antibiotic resistance encoded on mobile genetic elements in Virginia stream bacterial populations
James W. Wilson	JMU-ESRI Geoportal Collaborative: A Proposal to Develop a Research Collaborative
Kenn Barron	Development of a Real-Time Data Collection Intervention Platform for Classrooms: The Rapid Assessment Platform and Intervention Delivery (RAPID) system
Kevin Giovanetti	Development of a High Stability, Precise, High Voltage Power System: a Critical Component for the Muon g-2 Experiment at Fermi National Laboratory
Klebert Feitosa	Bringing Together a Community of Soft Matter Researchers in Virginia

LouAnn Lovin	Fraction Schemes and Operations: An Extension to Prospective PreK-8 Teachers
Louise Temple	Finding and Analyzing Methicillin Resistance Genes in Viruses from Environmental Samples in the Shenandoah Valley
Louise Temple	Laying the Groundwork for a Viral Detection System for Pertussis (whooping cough) Diagnosis: a Partnership between JMU and University of Virginia
Louise Temple	Analysis of Mobile DNA Elements Containing Methicillin Resistance Genes Discovered in Viruses from Environmental Samples in the Shenandoah Valley: a Partnership between JMU and VCU
Louise Temple	Evaluation of potential vaccine strain of *Bordetella avium* in turkey poults
Maria DeValpine	A collaborative course redesign combining online delivery methods with historic nursing research at two Virginia universities
Michael Renfroe	Quantitative analysis of antioxidants in Fresh and Dried Herbs and Spices
Michele Estes	Reaching the Greatest Number of Learners: Improving Access to STEM Undergraduate Education Through Online Engineering Labs for Students Across Virginia
Ray Enke	Establishing a collaborative undergraduate research program: Characterizing epigenetic regulation of gene expression during development of the vertebrate retina
Rob Prins	Energy Usage Analysis of an Electric Motorcycle and its Implementation as a Tool to Inform Cross-Country Route Planning
Robert Nagel	Distributable Stereo Hearing Test Kit
Ronald Raab	Antimicrobial activity in the bedbug, Cimex Lectularius
Ronald Raab	Novel lacritin mitochondrial signaling in the treatment of dry eye
Roshna Wunderlich	Design of Innovative Virtual Human Anatomy Modules to be Shared Across the Commonwealth
Seán McCarthy	The Networked Writing Project for Virginia
Susan Halsell	Seeding a Research Collaboration: Regulations of Dendritic Morphogenesis in Genetic Model Organism, Drosophila melanogaster
Susan Halsell	Molecular Dissection of Noxious Cold Nociception
Teresa Harris	Effects of Preschool Attendance on Middle School Outcomes in Virginia
Trudy Cole	Visual Literacy, Beyond Linguistic Communication: a Collaborative Research Project

2014	
David A. Stringham	Music Technology Engagement for Adults with Intellectual and Developmental Disabilities
Elizabeth Berkeley	Fossil Evidence for Early Human Predation on Rhinos
Giovanna Scarel	Giving to JMU international visibility in infrared power generation and its link to non-linear phenomena
Grace Barth	Connecting MDID and Omeka: Two Powerful Open Source Products
Jacquelyn Nagel	Manufacturing Innovation through Sustainable Design
Kenn Barron	Development of a Real-time Data Collection and Intervention Platform for Classrooms: The Rapid Assessment Platform and Intervention Delivery (RAPID) System
Klebert Feitosa	Probing Short-range Interactions of Interfacial Bubbles
Lincoln Gray	Deployment of a Working Prototype for Stereo Hearing Tests
LouAnn Lovin	Fraction Schemes and Operations: An Extension to Prospective PreK-8 Teachers
Louise Temple	Development and testing of a heterologous vaccine to treat Bordetella avium and other poultry pathogens
Nicole Radziwill	Increasing Engagement in Programming and Problem Solving Using Data Science and R
Ray Enke	Gene expression analysis in the developing vertebrate retina using next generation sequencing
Remy Pangle	Developing a Collaborative Teaching Model through Planning Regional KidWind Challenges at 4-VA Universities
Shannon N. Conley	Towards Assessing the Breadth of Expertise in Science and Engineering Education

2015	
Christine May	Revealing the Current Relation between Stream Acidification and Fish Species Richness: What is the Trend after Almost Two Decades of Recovery?
David McLeod	Using µCT to Study Amphibian Morphology and Systematics
Keigo Fukumura	Observational Signatures of Relativistic Black Hole Accretion in the Context of X-Ray Astrophysics
Kevin Giovanetti	Promoting Nuclear and Particle Physics Collaboration among Virginia Colleges
Maria deValpine	Health care disparities in the Alaskan 1918-1919 Influenza Epidemic
Samy El-Tawab	Improving Transit Bus Operations using Low Cost Bluetooth Technology

2016	
Anca Constantin	The Search for the Origins of Supermassive Black Holes
Ashleigh Baber	Ethanol Chemistry on Titania/Gold Model Catalysts
Costel Constantin	Investigating the Giant Seebeck Coefficient of Manganese Oxide Powders as a Function of Particle Size
Deborah Gleason	A collaborative digitization of the Dora Cline Fechtmann archival collection at two Virginia universities
Erica Lewis	A 4-VA Collaborative Interprofessional Education Proposal: Innovations in Collaboration
Giovanna Scarel	Amplification of the electric contribution in infrared power generation
Jonathan Miles	Virginia-Led Consortium to Develop an Offshore Wind Workforce Training Capability for the U.S.
Louise Temple	A Virginia Collaborative Effort to Analyze Genomes of Recent Whooping Cough Bacteria
Marta Bechtel	Characterizing the Role of Flaviviruses in Human Cartilage Arthralgia
Seán McCarthy	From Liquid to STEAM: Fostering Interdisciplinary, Engaged Approaches to the Study of Water in International Contexts

2017	
Allison Ames Boykin	Validity evidence for the diagnostic rating system, application to ethical reasoning in action: The Madison Collaborative (Validity Evidence for the Diagnostic Rating System, Application to Ethical Reasoning in Action: The Madison Collaborative)
Brian Leventhal	Stats Refresher Boot Camp Workshop: Sharing what we've learned and how to do it yourself
Carissa Henriques	Course Redesign for "Social Entrepreneurship and Design for Social Impact"
Christina Kuo	Characteristics and clinical correlates of speech impairment in Parkinson's disease
Christopher Berndsen	Using X-ray crystallography to support basic research into human and plant processes
Costel Constantin	Correlating the growth dynamics with electrical, optical, and magnetic properties of manganese doped indium tin oxide thin films deposited by magnetron sputtering (Correlating the Growth Dynamics with Electrical, Optical, and Magnetic Properties of Manganese Doped Indium Tin Oxide Thin Films Deposited by Magnetron Sputtering)
Course Redesign	
Erika Kancler	Radiology for Anatomists: Building Interactive Medical Images to Enhance Anatomical Learning
Giovanna Scarel	Modeling charge density in infrared power generation
Joy Myers	In Search of Effective Practices and Pedagogies in Elementary Writing Methods Courses in the Commonwealth
Karim Altaii	Redesign of Energy Fundamentals (ISAT 310)
Kevin Giovanetti	Preparing students and teachers for innovation PSTI (Preparing Students and Teachers for Innovation PSTI)
Kevin L. Caran	A Novel Multidisciplinary Approach to Combat Pathogenic Bacteria
Klebert B. Feitosa	Smart surfaces for tuneable fluid-structure interactions (Smart Surfaces for Tuneable Fluid-Structure Interactions)

Leontina Adriana Banu	Workshop on the Science, Instrumentation and Education Program at the Madison Accelerator Laboratory
Lincoln Gray	To quantify uncontrolled variance in deployed stereo-hearing tests
Mark Rankin	The independent works of William Tyndale (The Independent Works of William Tyndall)
Masoud Kaveh Baghbadorani	Optical Properties of Hybrid Organic/Plasmonic Nanowires Heterostructures
Michael H. Renfroe	Developing Industrial Hemp Markets in Virginia: Academic and Industrial Partnerships
Michael Rockwell "Rocky" Parker	Decrypting the genetic and hormonal basis of female mimicry in snakes
Roshna Wunderlich	4-VA Collaborative Research mini-grant proposal: Characterization of the intrinsic foot muscles using novel elastomer gel deformations and electromyography
Samy El-Tawab	Development of Transit Bus Performance Monitoring System using Low Cost WiFi Technology and Cloud Computing in/out of James Madison University Campus
Shannon Nicole Conley	Expertise in a post-truth world: skepticism, the public, and experts in the United States and abroad (Expertise in a Post-Truth World: Skepticism, the Public, and Experts in the United States and Abroad)
Stephanie P. Kurti	Does acute and/or chronic exercise protect older adults from high fat meal induced lipemia, glycemic, and inflammation?
Teresa Harris	Creating an Early Childhood Professional Pathway: The AA to BA Articulation Project
Thomas E. Moran	An online interactive approach to developing competency in motor skill assessment (An Online Interactive Approach to Developing Competency in Motor Skill Assessment)
Timothy G. Thomas	Effect of Education for Sustainability (EfS) in Teacher Preparation
Yonathan Admassu	Use of unmanned aerial vehicles (UAVs) for slope stability studies

2018

Ashleigh Baber	Optimization and X-ray Characterization of TiO_2/Au(111) Model Catalysts for Propene Oxidation
Carol Dudding	Use of Interactive Virtual Reality Simulations in Student Clinical Training
Costel Constantin	Correlating the Growth Dynamics with Electrical, Optical, and Mag- netic Properties of Manganese Doped Indium Tin Oxide Thin Films Deposited by Magnetron Sputtering
Elham Torabi	Medicaid Fraud and Abuse: causes, complications and solutions
Erica Lewis	Addiction Crisis Problem Solvers 101: Solving for NOW
George Vidal	Neuronal and genomic basis of integrin-mediated intellectual disability in the developing cerebral cortex
Hao Zhang	Dynamic Decision Making in Cybermanufacturing Systems
Ioana Niculescu	Workshop on Quark-Hadron Duality
Jeanne Horst	Meeting Assessment Professional Development Needs across Virginia: A Virtual Drive-In
Kevin Borg	Digital Humanities and Public Writing Collaboration: A Graduate-level, Campus-Community Engagement Model
Margaret Sloan	Regional Strategic Leadership Conference
Marquis Walker	Characterization of the signaling role of TRPM1 in mammalian pupil light reflex
Masoud Kaveh Baghbadorani	Next Generation Energy Storage Devices: Semiconductor Based Capacitors
Nathan Wright	Exploring obscurin's role as a force sensor
Patrice Ludwig	Investigating Intertidal Oyster Reefs Using Photogrammetry
Paul Mabrey	Debate as a tool to improve civic learning and faculty engagement in support of institutions meeting SCHEV's civic engagement education core competency
Samy El-Tawab	LoCaTE: Localization and Utilization of Health Center Patients and Staff Through an IoT Environment
Zareen Rahman	Math on a Sphere: Deriving Context from Geophysical Data

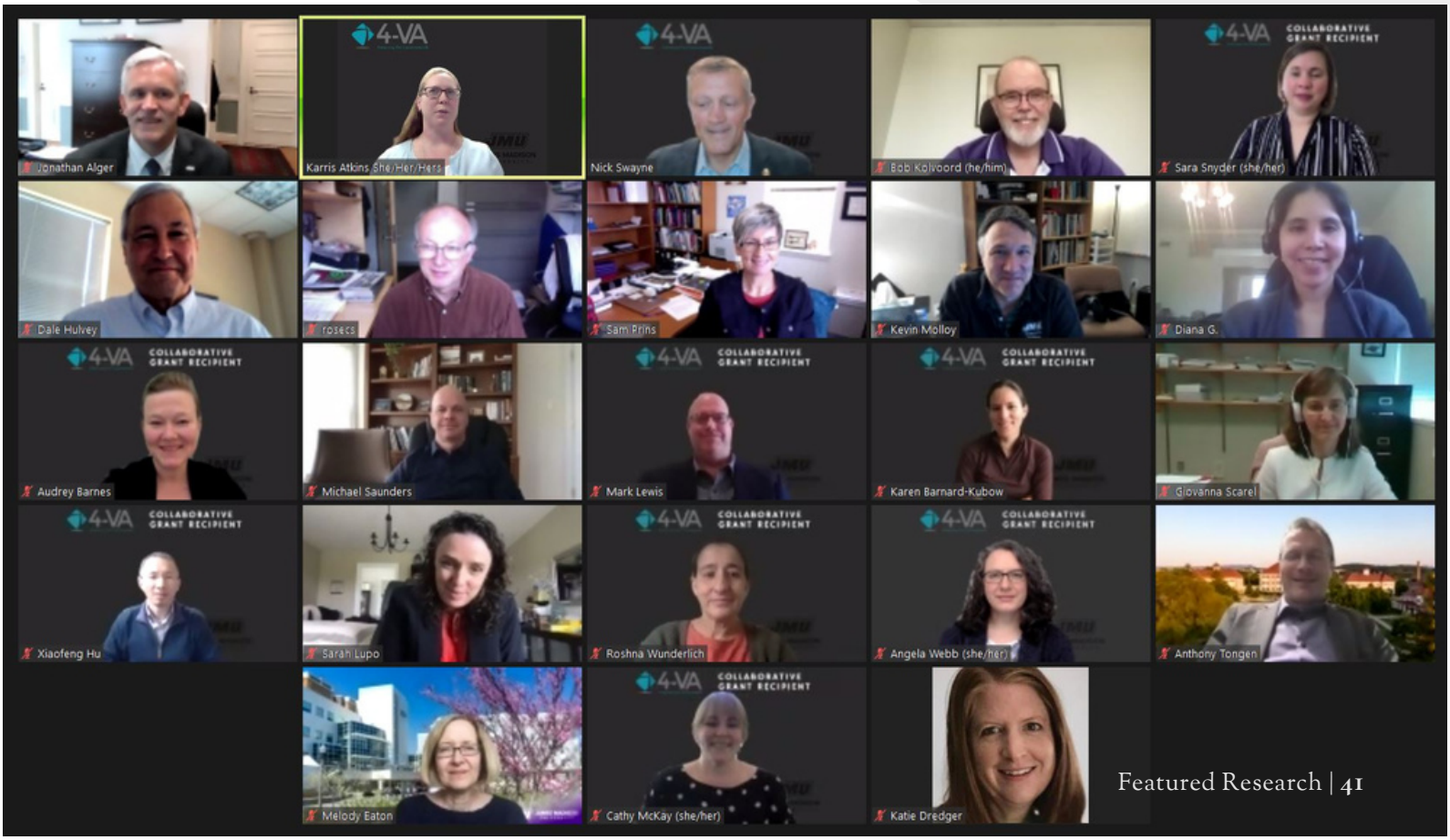
2019	
Ahmad Salman	Enhanced Secure Mobile Data Collection using Unmanned Aerial System (UAS)
Callie Miller	Simulating Filament Morphology in F-actin Networks
Carol Dudding	Immersive Virtual Reality Simulations to Improve Patient Safety
Christina Rost	Multifunctional Entropy-Stabilized Thermal Barrier Coatings
Costel Constantin	Optical Properties of Semiconducting Transition Metal Dichalcogenides.
Dana Moseley	How do urban environments affect the conservation, song, and migration of a locally breeding bird?
Elizabeth Edwards	Does pre-prandial continuous moderate intensity, high-intensity, or accumulated exercise have the largest impact of postprandial lipemia, glycemia, and inflammation in older adults?
Gretchen Peters	Boronic Acid Hydrogels for Drug Delivery
Jennifer A. Taylor	Public Service Motivation and Career Placement and Outcomes in Virginia
John Guo	Beyond Conventional Paradigms: A Complementary Design of Behavioral Approach and Visual Analytics in Cybersecurity Research
Lori Beth De Hertogh	Diabetes Health Humanities Symposium
Louie Wurch	Do heterotrophs drive diel cycling of carbon secretion by toxic cyanobacteria?
Nick Luden	The Impact of Post-Exercise (Simulated) High Altitude Exposure on Satellite Cell Behavior Following Resistance Exercise
Oliver Hyman	Enhancing DNA Barcode Research in Large Enrollment Biology Labs

2021	
Angela Webb	Success in STEM Education and Outreach Across the Commonwealth: Promoting Models of Excellence in the Era of COVID-19
Audrey Barnes	The Case for Collars: Developing Modular Technology to Track Endangered Lemurs
Cathy McKay	Collaborative research on disability to impact societal norms, bias, and opportunity
Chris Rose	Transcriptome analysis of plasticity in tadpole growth and development
Diana Galarreta-Aima	COVID-19 and Central Shenandoah Valley Spanish-Speaking Communities: Exploring Impact and Perceptions of Covid Toward Enhanced Rapid Response Health Communication and Care
Giovanna Scarel	Testing the efficacy of radio waves to activate biological receptors
Harry Hu	Substrate-dependent Conformal Behavior of Graphene
Karen Barnard-Kubow	Investigating contact zones to understand speciation
Kevin Molloy	Incorporating Active Learning Pedagogy for Undergraduate Data Mining and Machine Learning Courses
Maria deValpine	Leveraging the â€œVoiceâ€ of Public Health: A proposal to develop academic/practice collaborative research and publication in Virginia
Mark Lewis	Collaborating to Improve Literacy Instruction in the State of Virginia
Michael Saunders	Dietary Nitrates & Exercise Performance: Influence of Training Status and Altitude
Sara Snyder	Understanding pre-professional studentsâ€™ perceptions on interprofessional collaboration within Virginia school psychology and BCBA training programs
Zareen Rahman	Productive Struggle and High Cognitive Demand Tasks – Implementing Emergent Findings into K-12 classrooms

TAKING A PAUSE THROUGH COVID-19

BY KARRIS ATKINS

The arrival of COVID-19 at the start of 2020 has had lasting impacts on our lives, our courses, and our research. For much of the summer and fall semesters of 2020, research paused, hanging in the ether, waiting start again. However, even through the uncertainty, several of our faculty have managed to progress and thrive. Here we feature some of our 4-VA grant recipients who have made progress with the support of their 4-VA grants and by pushing through COVID barriers.



OCTOCOPTER
THE AUTONOMOUS MISSION

BY AHMAD SALMAN, PH.D

We want to have the drone perform an autonomous mission where it flies to specific location and take videos/images of that location, encrypts them on the fly and destroy the original. Once the drone finishes the execution of the mission, it flies back to the base station and performs a secure connection with a trusted server and downloaded the encrypted footage where it gets decrypted and analyzed on the secure server.

We have successfully completed a pre-programmed autonomous mission on our Octocopter by setting the GPS coordinates for the waypoints we want it to stop at and programming the takeoff and landing protocols and the mission was executed flawlessly. We have also successfully created the encryption protocol which encrypts images and videos taken by a Go Pro camera attached to the drone and destroy the original footage so that the drone itself or the camera do not maintain unencrypted sensitive data in case of loss or capture.

Above & Left | Dr. Ahmad Salman and his research team successfully completed the pre-programmed autonomous mission for the Octocopter.


BURTON
NIKE

A BIT OF FLY
in the Mammalian Eye

BY MARQUIS WALKER PH.D

In mammals, the retina is the sole source of light detection for initiating vision and circadian behaviors. In the retina there is a class of photoreceptors called intrinsically photosensitive retinal ganglion cells (ipRGCs) which express an invertebrate-like photopigment, melanopsin. Light signals from ipRGC are required for the regulation of melatonin biosynthesis, sleep/wake cycles, and pupillary light reflex.

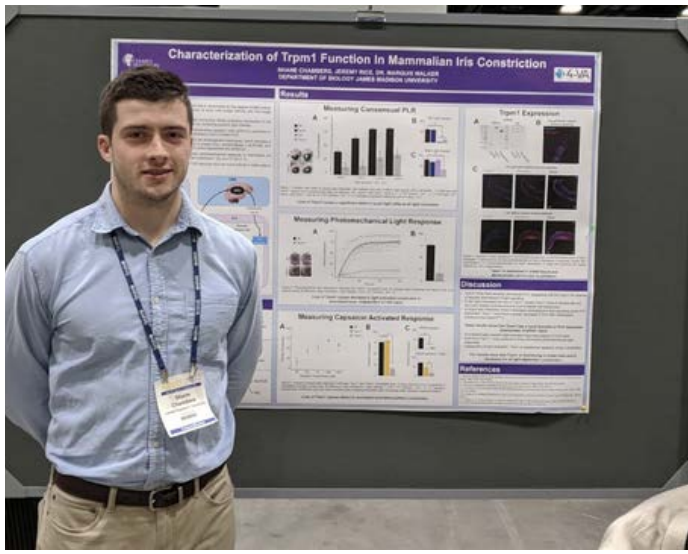
The Walker lab is interested in characterizing how melanopsin contributes to non-image forming behaviors in mammals. We have been working collaboratively with the laboratory of John Phillips at Virginia Tech to determine if this photopigment contributes to magnetic sensation in mammals. As a part of this work we have aimed to identify novel molecular targets for melanopsin signaling.

Recently, it has been shown that melanopsin is required for initiating a signaling cascade that drives intrinsic light responses in the murine iris tissue.

Intrinsic light responses in iris tissues are evolutionarily conserved in many non-primate vertebrates. The terminal ion channel in this signaling cascade had remained unidentified.

Undergraduate driven research supported by 4VA in the Walker lab has allowed the lab to identify the novel role for the transient receptor potential cation channel melastatin 1 (Trpm1) in this signaling cascade. The lab has been able to demonstrate that the Trpm1 is required not only for the intrinsic light responses, but is required for all sensory driven constriction of the iris.

This work will be presented at the upcoming annual meeting of the Society for Neuroscience in November 2021. We have also written this work in an original manuscript that we are currently submitting to peer-reviewed journals for publication.



Above & Left | Students who have worked on different parts of the research with Dr. Walker.

Investigating Contact Zones
TO UNDERSTAND SPECIATION

BY KAREN BARNARD-KUBOW, PH.D

The goal of our 4-VA funded research is to characterize the phenotypic and genomic signatures of cytonuclear incompatibility in a secondary contact zone between divergent lineages of the native wildflower, Campanula americana. The first part of this work was to better map the secondary contact zone by identifying new populations within the zone and genotyping them for chloroplast lineage. We just got back from the Smoky Mountains where two undergraduates in my lab, Tyler Gandee and Emily Butters, and I spent several days searching for new populations.

We drove along the Blue Ridge Parkway, and explored multiple hiking trails, using iNaturalist sightings to help guide our search. The trip was a great success, as we found 10 new populations! Over the next few weeks, Tyler and Emily will work on genotyping these populations for chloroplast lineage using a protocol they have worked on optimizing over the summer. Emily has been funded for the summer through 4-VA, and the trip to the Smokies was also made possible by our 4-VA funding.

Right| Undergraduates, **Tyler Gandee** and **Emily Butters** assisted Dr. Barnard-Kubow in the Smoky Mountains for her research.

JMU Labs

EVENTS

JMU X-Labs staff members organize events that promote scholarship across campus, outreach in the community, and engagement with students from all disciplines.

JMU X-Labs also offers a variety of make-and-take workshops that provide low-barrier access to students, introducing them to design thinking and supporting their creative and innovative ideas and solutions.

> Back in the summer of 2019, I was directed to JMU X-Labs on the CHOICES tour. They took a few hours of their time to show me the facility, the powerful VR-producing computers, drones, a first-party rotatable computer from Dell, and gave me some helpful advice. After that conversation, I knew that JMU was the school for me.

GRANT WHITLOW
Engineering

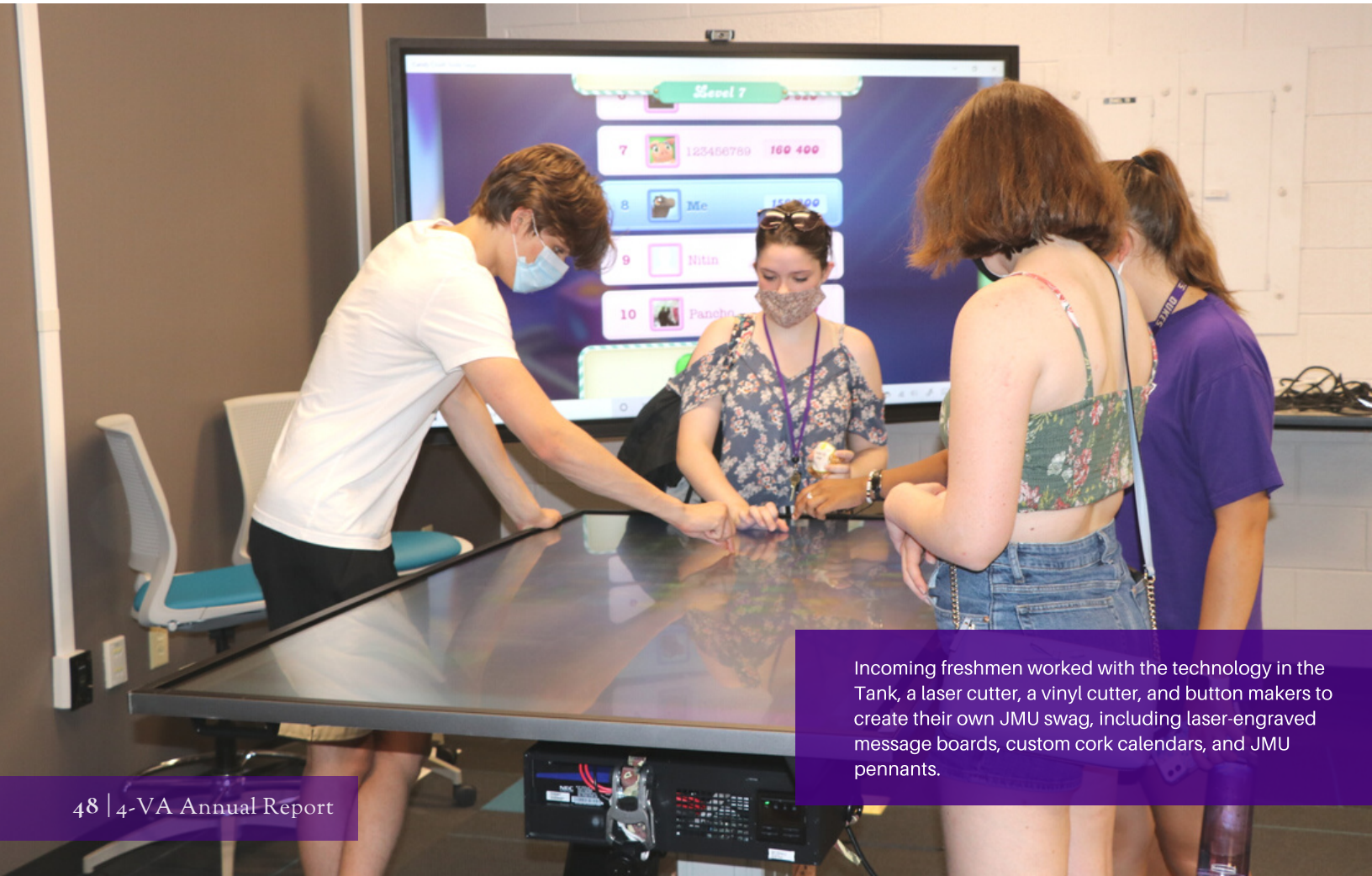
Students participate in various introductory activities at the1787 Freshman Orientation.

ORIENTATION 1787

What's the best way to let new JMU students know about the innovation ecosystem at JMU X-Labs? Invite them to come experience it for themselves, of course! And so, we did.

With new making resources at hand, students discovered that they suddenly had access to innovative equipment, supplies, and a whole new community of people to help them design, create, and develop their ideas. Several sophomore, junior, and senior FROGs (First yeaR Orientation Guides), said it was their first time in the lab as well. One student said it was favorite 1787 activity and another even came to a second session and brought a friend!

Creating that culture of creativity across campus is one of our main goals, and despite pandemic-induced limitations on the number of participants allowed in the lab at any given time, 70 freshmen from 13 different majors attended this year.



Incoming freshmen worked with the technology in the Tank, a laser cutter, a vinyl cutter, and button makers to create their own JMU swag, including laser-engraved message boards, custom cork calendars, and JMU pennants.

Freshman ORIENTATION

BY KIM FISHER

The class of 2024 participates in JMU X-Labs' innovation ecosystem for the first time!

13
Different Majors

1. Biology
2. Communication Sciences and Disorders
3. Computer Information Systems
4. Computer Science
5. Health Sciences
6. International Business
7. Management
8. Marketing
9. Media Arts and Design
10. Nursing
11. Political Science
12. Psychology
13. Studio Art

Family & Friends GAME NIGHT FRIDAYS

PARENT RELATIONS
JAMES MADISON UNIVERSITY

BY KIM FISHER

Student interns created a repertoire of virtual online activities to accommodate the Family Weekend shift during the pandemic.

Above | Participants are shocked and entertained to find out which one of them committed a crime in this classic "whodunnit" developed and hosted by interns Carley Belknap and Brooke Harmison.

Since Family Weekend was postponed this year because of the pandemic, the JMU Office of Parent Relations offered alternative virtual programming called Fall Family Fridays, which provided the perfect opportunity for our interns to innovate new ideas for connecting with new students and introducing them to the JMU X-Labs culture of creativity.

Following the same process that we use for innovation, the interns brainstormed ideas for collaborative or competitive activities that students, families and friends could participate in—all online.

Inspired, they researched, developed and built their concepts into reality, did user testing to refine their products, designed posters and composed messages for online marketing, all of which resulted in a variety of challenging, mind-bending activities shared through live sessions called Family and Friends Game Night Fridays with JMU X-Labs.

What better way to celebrate the Halloween spirit, keep your mind sharp, learn about JMU X-Labs' innovation ecosystem, and stay COVID-safe all at the same time!

Alumni JMU ALUMNI ASSOCIATION

SHADOWBOXES

BY JAMIE ZEIGLER

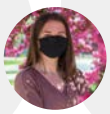
JMU X-Labs partnered with the JMU Alumni Association for their Spring 2021 Reunion Week. Putting their minds together, Emily Winter and Intern Carley Belknap designed the perfect shadow box for the Create & Collaborate pop-up. Alumni followed along on Zoom as JMU X-Labs led them through the process of assembling their own JMU themed shadow box. The design featured Wilson Hall in the foreground of the stunning Shenandoah Valley mountains. Alumni were encouraged to decorate their scene making each shadowbox unique.

With 90 shadow boxes distributed, Alumni from all over the country received their packages by mail and tuned into the Zoom pop-up. Shayla Brown, JMU Alumni Associations Graduate Assistant, spent her days at X-Labs preparing the shadow boxes for shipping alongside the X-Labs team. This collaboration helped to bring together the JMU community and create lasting connections that are needed during the isolations of a pandemic.

"I was able to come to X-Labs every day for about a week and work with Jamie and the interns. Everyone was really nice and helpful, and made the process as productive as possible. Our order was somewhere between 80-90 boxes and then we made a few extra for employees like myself to take home and build!"

SHAYLA BROWN
Graduate Assistant

"I got to help host a reunion event over Zoom where participants painted and assembled their shadow boxes. It was so cool to hear all the memories and friendships of alumni from different decades, especially the ones that had graduated 50 or 60 years ago."



CARLEY BELKNAP
Junior in Computer Science

CREATING AN INNOVATION ECOSYSTEM

TECHNOLOGY. DESIGN THINKING. PROTOTYPING.

JMU X-Labs held their fourth annual Fab Lab— with a twist. Partnering with the University Innovation Fellows (UIF) at JMU, Fab Lab was taken to new heights. In the midst of a pandemic, the intern led event introduced students to design thinking, collaboration and prototyping.

BY JAMIE ZEIGLER

As the semester crept towards its close, the University Innovation Fellowship (UIF) students were still winding up, planning an event for JMU students to innovate. UIF students create opportunities helping their peers build the creative confidence, agency, and entrepreneurial mindset needed to address global challenges and to build a better future. In the Fall of 2020 Cameryn Norris, Emily Marsch, and Robin Lagodka went through a 6-week intensive training learning collaboration, problem solving, and the design process, becoming JMUs fellows.

Being in a pandemic, this trio shifted their focus to virtual learning, discovering the best practices to assist professors through the semester. With summer quickly approaching, the team pivoted and implemented their knowledge into a hybrid innovation event partnering with the JMU X-Labs.

The annual event Fab Lab needed a revamp in order to meet the need of the current social distancing climate. Thanks to the partnership with UIF, Fab Lab was on. Workshops were spread throughout the building with a capacity for each. The opportunity to tune into the event virtually was held in the telepresence room (CAD software tutorial) and The Tank (design thinking).

With keeping the original mission of engaging and empowering women from all majors at JMU, UIF added workshops that embody the ideals of the fellowship. Robin led a design thinking and prototyping workshop to simulate a condensed version of an X-Labs course. Students were presented with a problem and given materials/tools to prototype a solution. Emily facilitated all virtual operations of the event and led a CAD software workshop.

86 socially distanced participants

Students used Tinkercad to prototype keychains and reusable straws and were able to get them printed on our 3D printers! Instead of Fab Lab being run by the administrative team, Cameryn took the initiative to lead the event. During her UIF training she learned about communication, time management, delegating tasks and leadership, providing her the confidence and ability to take the lead on Fab Lab.

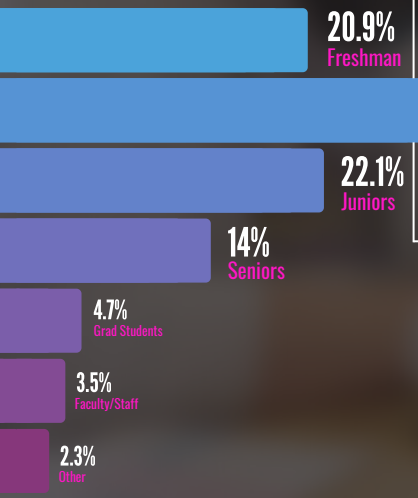
AR FILTERS

CAD

DESIGN THINKING

PROTOTYPING

Above Left to Right | 1. **Jenna Jasen** teaching a SparkAR workshop on how to make Instagram filters. | 2. **Emily Marsch** on a virtual call teaching students how to build 3D models in Tinkercad. | 3. Three friends working together on prototyping their idea in the design thinking workshop. | 4. A student showing off his final prototype of tech glasses.

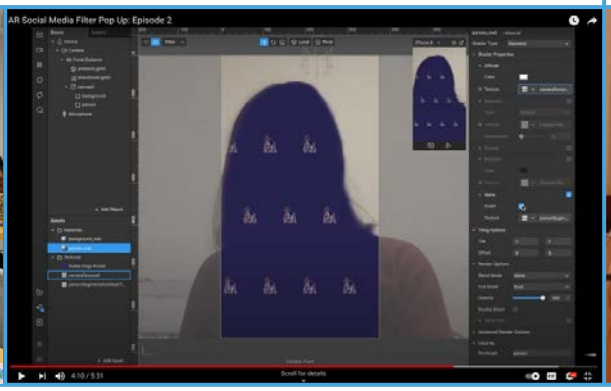


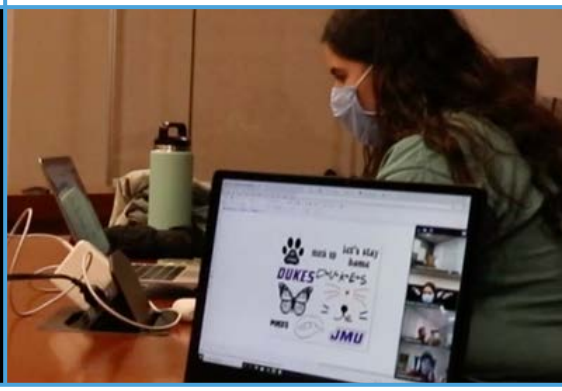
TECHNOLOGY USED

Button Press. Laser Cutter. Vinyl Cutter
Vector graphics editor. CAD software. Augmented Reality

Pop-Ups GOING VIRTUAL

Below | Intern **Brooke Harmison** is working with participants via Zoom to design a custom creation. The hybrid pop-up model started with virtual designs and had participants pick up their project from the lab.
Below center | Intern **Carley Belknap** recorded a 5 episode series on how to make AR social media filters. They can be found on the JMU X-Labs YouTube channel.
Below left | Students assembled DIY wooden record crates that were later laser engraved.





Pop-Ups are free, non-credit workshops for JMU students and faculty. Taught by JMU X-Labs interns, Pop-Ups during the 2020-2021 year looked a little different but still provided a valuable opportunity to experience new equipment and make a fun project. These workshops offer students a low-barrier opportunity to design thinking and new ways of approaching creativity and innovation.

Interns worked and experimented throughout the year to provide Pop-Ups with virtual, hybrid, and in-person experiences to adapt to changes related to the COVID-19 pandemic.

Some variations included Lab-in-a-Bag — a virtual creation with in-person pick up—hybrid creation with virtual design and in-person assembly, and in-person events with masks and social distancing in place.

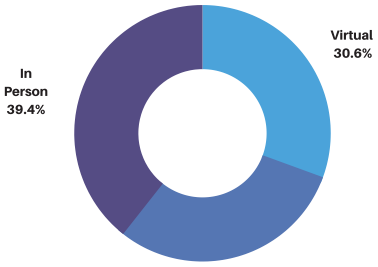
A variety activities and make-and-take projects ranged from glass-etched mason jars to making macrame plant hangers. Other projects created were vinyl customize pencil pouches, acrylic album covers (below left), cloth face masks, laser engraved beanies (below) and laser engraved journals!

GET THE FACTS

51 Pop-ups

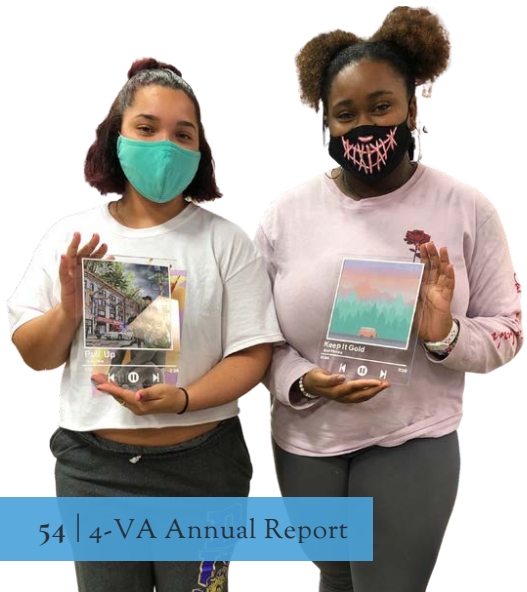
388 Registrations

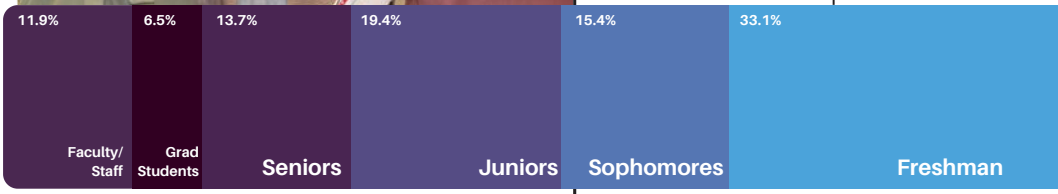
Fall 2020 Pop-Ups



1 in 3 first time participants

50 Majors represented





604 Check ins

Open Lab

ADAPTING TO THE *New Normal*

BY JAMIE ZEIGLER

Carley Belknap started as an intern at JMU X-Labs during unconventional times due to the university being immediately shut down. Primarily working during open lab hours, Carley saw a deserted lab for the first month as students were required to move off campus and classes went virtual.

Designing solutions to keep students engaged, Carley and the X-Labs team came up with creative tactics to keep the lab running. Their processes were modified to accommodate a limited capacity by adding appointment bookings, frequent cleaning procedures, and moving workspace tables and chairs to be socially distant. Virtual events became the new norm with reduced capacity and zoom calls for virtual Pop-Ups. Participants were able to meet with interns virtually to design their projects and then come to a scheduled open lab appointment to physically create them.

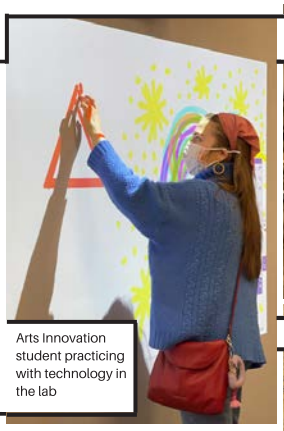
As people became more comfortable with mask procedures and vaccines were eventually introduced, the lab slowly increased the capacity using online appointments. Some of our operational changes were so successful that we are planning on adopting them for building a greater collaborative and innovative program.

Despite the unusual circumstances, the enthusiasm and creativity of JMU students has never wavered throughout this year. Open Lab provides unique opportunities for design, creative problem solving, and prototyping ideas for all students and faculty at JMU. Moving forward into the next school year, JMU X-Labs will continue to persevere and adapt, meeting the needs of the new "normal".

TOP TECHNOLOGIES USED

PROJECTS

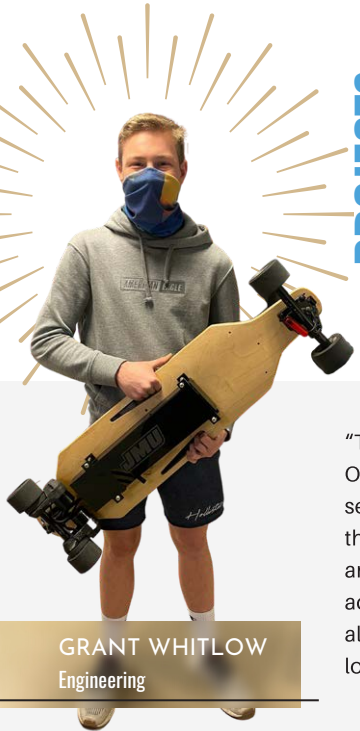
- **340** Vinyl Cutter Projects
- **152** Laser Cutter Projects
- **47** Computer Software Projects (design, AR/VR, performance art)
- **44** Multi-Tech Projects



Arts Innovation student practicing with technology in the lab

Laser engraved quad brick and wood base

Vinyl cut sign



GRANT WHITLOW
Engineering

"The electric skateboard was a fun, interesting, and useful project that I'm glad I decided to take on. Over winter break, I purchased all the components needed for the electric skateboard but I lacked a secure way to enclose these components to the elements. With a little brainstorming from Nick and the Interns, we decided that an acrylic box might be our best option. We took many measurements and after a few wooden prototypes, we used a laser cutter to cut out the pieces for the box, as well as add in a raster engraved JMU logo. We assembled the box and placed all the components inside, and all of the components fit. This was my first project with JMU X-Labs and laser cutting and I learned a lot from this experience. I look forward to many more projects at JMU X-Labs in the future. Go Dukes!"

47 Majors represented

A Celebration of inclusive STORY

Speakers



Black Innovation

innovation SERIES

BY JAMIE ZEIGLER

CONTENT CONTRIBUTORS

KATIE OVERFIELD-ZOOK

EMILY WINTER

In March of 2021, JMU X-Labs and the Gilliam Center for Entrepreneurship (GCFE) partnered with JMU College of Business Diversity Council to host a live premiere of the inaugural Inclusive Innovation Story Series (I2S2) celebrating Black Innovation. JMU's Black/Africana population—students, faculty, staff and alumni—were invited to share their story of innovation - however creativity relates to their lives, careers and journeys. Six alumni—three being double dukes—two faculty members and one current JMU student, participated and shared stories through pre-recorded Tedx style talks.

The Inclusive Innovation Story Series is an annual event that seeks to celebrate barrier breaking, cutting edge, and visionary stories from under-represented groups of JMU students, faculty, staff and alumni through these Tedx Style presentations and events. Each year will highlight a different part of the JMU community that makes our campus a thriving and vibrant place to learn and work, while also allowing a space for honest conversations and common ground.

It is the goal for I2S2 participants and viewers to reflect on what "innovation" means to them—considering a broader meaning of the word while also learning from people whose lives and perspectives may vary from their own. The I2S2 hopes to highlight unique voices that embody a forward-thinking celebration of the creative spirit that can be found in all disciplines.

You can watch the 2021 Story Series: A Celebration of Black Innovation on the JMU X-Labs YouTube channel.

Speakers



Speaker headshots: left to right | **1.** Nahshon Ford –"Surrender Forward" **2.** Dr. Ashla Hill Roseboro – "Visionary Black University Women: A Tale of the Black Press Elevating Unsung Heroes" **3.** Malique Middleton – "Liques Skin Care" **4.** Michael Hickman – "A Raw and Honest Look at the Past: Contextualizing 21st Century Systemic Racism through W.E.B. Du Bois's The Souls of Black Folk" **5.** Raiquan Thomas – "Put in the Work" **6.** Adrena May – "JMU Ole School Alumni Group: Creating Scholarships, Memories, Traditions and Relationships"

Special Guest Headshots: left to right | Mike Battle, Dr. Brent Lewis, Dr. Tolu Odumosu

Special Guests



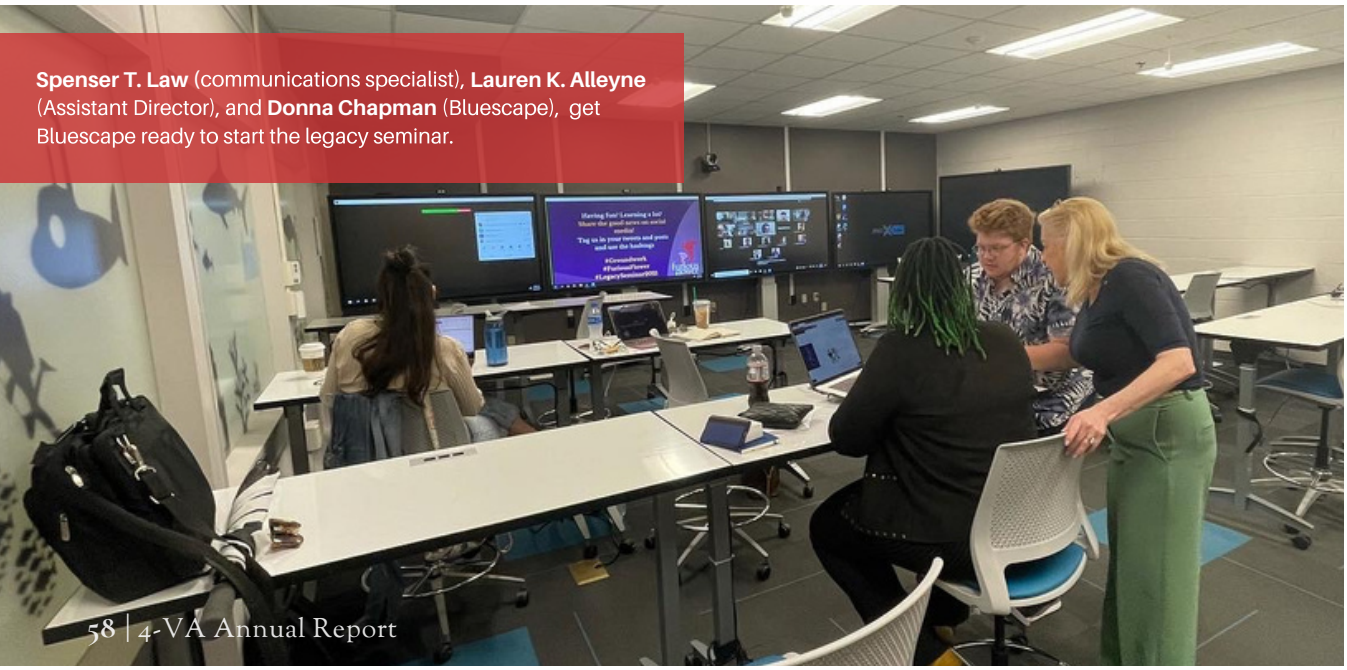
Legacy Seminar GOES VIRTUAL

CELEBRATING BLACK POETS AND WRITERS

BY JAMIE ZEIGLER

Building a big collaboration toolbox normally takes a lot of time. When COVID-19 hit, the tools for collaboration shifted. Luckily, JMU X-Labs already had a culture of collaboration–virtual and in-person–to creatively develop new ideas with existing tools. Bluescape was instrumental in several projects–we're excited to have them partnering this year for the Furious Flower Legacy Seminar. The Center has done an amazing job bringing Black Poets together, curating their work, and making it available and accessible to a larger audience. Pushing the envelope of what's expected and what's possible helps keep JMU X-Labs outside their comfort zone and to continuously innovate and grow.

The JMU Furious Flower Poetry Center (FFPC) is known as America's preeminent Black poetry center with the mission to ensure the visibility, inclusion, and critical consideration of Black poets in American letters, as well as in the whole range of educational curricula. They support and promote Black poets at all stages of their careers and preserve the history of Black poets for future generations. Groundwork: The Legacy of Poet and Editor Haki Madhubuti—the 5th legacy seminar—celebrated living Black writers whose careers have been marked by creative distinction and critical acclaim. Visit their website for more information.



Spenser T. Law (communications specialist), **Lauren K. Alleyne** (Assistant Director), and **Donna Chapman** (Bluescape), get Bluescape ready to start the legacy seminar.

With COVID-19 on the rise and the biennial seminar quickly approaching, the center needed the tools to collaborate virtually with scholars, poets, and college/high school educators, all over the world. Joanne Gabbin and Lauren K. Alleyne reached out to JMU X-Labs for help delivering an engaging hybrid seminar. X-Labs turned to their friends at Bluescape who jumped at the chance to support the program. They helped Spencer T. Law–Communications Specialist at FFPC– set up the conference environment. Donna Chapman and Isabelle Azadmanesh from Bluescape showed up to provide in-person support. Through June 21–25, 2021, The Center set up camp in The Tank providing unique collaborative discussions, workshops, panels, and lectures. With an overwhelming degree of collaboration, the overall attendance doubled for the FFPC Legacy Seminar.

The Tanks grand opening was in the Spring of 2020 and was set up with five Dell mobile interactive monitors all equipped with Bluescape software. With the Tank already providing a huge return on investment when COVID-19 hit back in March of 2020, the space is continuously proving its worth. Bluescape creates an environment where every idea, comment, and change can be captured in one infinite canvas. The legacy seminar participants were able to experience this in person and virtually, ensuring a collaborative hybrid event to anyone who wished to attend. Consistent collaboration and growth are the foundations of the JMU X-Labs where innovation happens intentionally.

Featured OUTCOMES

Autonomous Vehicles *Drive On*

See page 62.

Left | Students mounted a laser-cut fin with the JMU X-Labs logo in the early stages of the Autonomous Vehicles class.

Autonomous Vehicles *Drive On*

BY KIM FISHER

JMU X-Labs accelerates innovation intentionally by developing new, emerging technology courses for undergraduates and then spinning them out to innovative departments across campus. After 4 semesters at JMU X-Labs, the Autonomous Vehicle program is undergoing further development in the College of Integrated Science and Engineering.

Local Impact

Above | Mridul Pareek (left), a junior in computer science who worked on the user interface, and Associate Professor of Computer Science Nathan Sprague (right) point out features of the self-driving vehicle while Daily News-Record Reporter Megan Williams (center) takes it for a test drive.

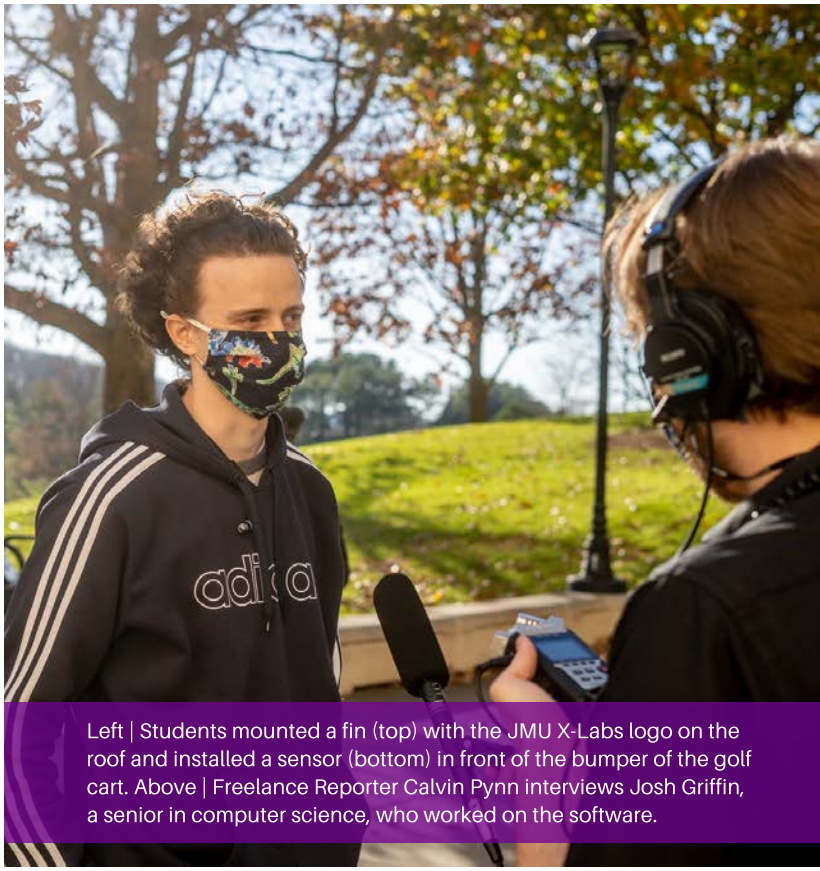
In the spring of 2018, 21 students from five different majors —communication studies, computer science, engineering, independent scholars, and integrated science and technology—participated in the debut Autonomous Vehicles class at JMU X-Labs. By engaging in the program's unique innovation ecosystem, they transformed a traditional golf cart into a self-driving vehicle with pre-mapped locations on the student-designed website and app. For 4 semesters in a row, students expanded on the project at JMU X-Labs, and in September 2018 the class won the Governor's Technology Award for innovative use of technology in education.

After a local TV news report covered the successful culmination of the class, a resident at a local retirement community asked JMU X-Labs if it was possible to design a self-driving kit to make their fleet of golf carts autonomous. This simple question led, in turn, to an award from The Jeffress Memorial Trust in the amount of $120,000 to Associate Professor Samy El-Tawab (integrated science and technology), Associate Professor Nathan Sprague (computer science), and Assistant Professor Michael Stewart (computer science) from the faculty team.

The idea behind the Autonomous Vehicles class was originally proposed by Richard Xu (engineering '18) and the class itself was developed by Nick Swayne, the founding director of JMU X-Labs. Swayne said that he

designed the course to meet a growing niche in the autonomous vehicle industry. “More and more universities are attempting to improve the sensors and processors necessary for autonomous vehicles, but the work is primarily being done by PhD professors and candidates,” said Swayne. “For the industry to mature, we will need to have a lot of undergraduates that know how to integrate systems, test, write code, etc., and I wanted JMU to be one of the first institutions to offer that opportunity to undergrads.”

In the summer of 2020, the team was awarded another grant, “Cyber Security of Transportation Networks” for $74,318, funded by the Commonwealth Cyber Initiative, which will help make it accessible to even more undergraduates at JMU. The autonomous golf cart is now housed at the College of Integrated Science and Engineering where the team continues to work on it.



Left | Students mounted a fin (top) with the JMU X-Labs logo on the roof and installed a sensor (bottom) in front of the bumper of the golf cart. Above | Freelance Reporter Calvin Pynn interviews Josh Griffin, a senior in computer science, who worked on the software.

In the News

In the fall of 2020, several local reporters took the autonomous golf cart for a test drive and published articles about the project.

wmra

JMU Engineering Students Test Self-Driving Cart

BY CALVIN PYNN

Daily News-Record

JMU Studying Autonomous Vehicles To Benefit The Elderly

BY MEGAN WILLIAMS

WHSV 3 abc

JMU tests out autonomous vehicle aimed to help retirement communities

BY JOHN HOOD

Virtual MAKEUP *becomes a* REALITY

Local Impact

BY KIM FISHER

Over the summer of 2020, Jenna Jansen and Jamie Zeigler, two students from the JMU X-Labs Augmented and Virtual Reality (AR/VR) class, jumped at the opportunity to work with Mary McMahan from withSimplicity—a local organic beauty products company. We interviewed them to hear about their experience with creating a virtual cosmetics sampling application on Instagram in response to limitations around COVID-19.

JMU X-Labs: What were the challenges that withSimplicity was trying to overcome?

Mary: When the COVID pandemic started, we were required under state law to close all our testers in our store. Because our customers are unable to try our products, we've seen a noticeable decrease in our makeup sales.

The purpose of the Instagram AR filters is to give our customers, both local and national, the opportunity to try on our makeup products from the comfort of their home, contact-free. In turn, we hope to see our makeup sales increase.

JMU X-Labs: What motivated you to reach out to JMU X-Labs about this idea?

Mary: JMU X-Labs has worked with other downtown businesses in the past, delivering great results.

As a JMU alumna myself of the JMU media arts and design program, I was very excited to work with students that were exploring a similar career path to me. When I was a student, "outside of school" projects were what really grew my skills as both a designer and media student. I saw our AR project as a way for me to give back to the JMU community and to give Jamie and Jenna a real world experience that they could use as a portfolio piece when applying for jobs next year.

"Not only are the students able to get real world experience, but local businesses are connected with young professionals who are learning about the newest, most up-to-date technologies that will help find solutions to the new problems we're facing."

MARY MCMAHAN
Director of Marketing, withSimplicity

Also, the JMU X-Labs students are very talented. I knew they would have the resources, skills, and support necessary to complete this project according to my high expectations.

JMU X-Labs: What was your impression of this option as a local resource, i.e., students from JMU X-Labs helping a local business solve a problem?

Mary: I think it's great! Not only are the students able to get real world experience, but local businesses are connected with young professionals who are learning about the newest, most up-to-date technologies that will help find solutions to the new problems we're facing.

JMU X-Labs: What does it mean to you and your company to have an app like this?

Mary: It's wonderful! Since we only have one brick-and-mortar location, our customers across the nation didn't have the option to test our makeup products. Not only did this app help find a solution to our "COVID-related" issue (with testers required to be closed), but it created a new way for our customers to experience our brand that's free, accessible, and fun!

W/S

WITHSIMPLICITY

Check out the app on the **withsimplicity_beauty** Instagram page.

JMU X-Labs: Which JMU X-Labs classes have you been a part of?

Jamie: AR/VR & 360 Media and Community Innovations

Jenna: Community Innovations, Creativity and Innovation, and AR/VR.

JMU X-Labs: How has being part of this project changed you, your life, your way of thinking, your outlook on life, your education, or your career, if at all?

Jamie: This project helped me be more adaptable and resourceful in my professional and personal life. I am looking forward to seeing what new, creative, and innovative projects will be in my future.

Left to right | **Jamie Zeigler** (media arts and design alum) and **Jenna Jansen** (computer information systems/ marketing alum) test the app's features to try on different product colors. The logo displayed in the image is withSimplicity's old logo before the rebrand in June 2021.

Jenna: I had a lot of fun with this project and it made me realize that I would love to work with augmented reality in my career. It was also so nice to be able to work with a local business. I love supporting local, so being able to use skills I learned in classes for a real business was great!

JMU X-Labs: How did your JMU X-Labs experience inform how you approached this project, if at all?

Jamie: JMU X-Labs teaches you how to be flexible and adaptable. We work with students from different disciplines and are encouraged to look at issues from multiple perspectives. Also, before the spring semester I had never worked with augmented reality. The skills I learned through using Unity and Vuforia opened up new opportunities for me. I was able to apply my existing UX/UI and design skills into the class helping me deliver a usable product for withSimplicity.

Jenna: JMU X-Labs classes taught me to 1) think big and focus on innovation and 2) realize that sometimes your innovative ideas don't work, and that's okay! We modified this project a few times over the summer to balance our skills, the client's needs, and what the current technology available to us can do.

JMU X-Labs: What was your favorite thing about working on the project?

Jamie: I really enjoyed working with Jenna and Mary on this project. We had great communication throughout and worked well together as a team. Although Jenna and I fell into certain roles, we continued to support each other to provide the best product for Mary and withSimplicity.

Jenna: I loved being able to work with a local business during the COVID-19 pandemic to come up with an innovative solution for a timely issue. withSimplicity is also such a great company and I had a lot of fun working with Mary and Jamie.

GUEST LECTURING "in" Milwaukee

National Impact

BY KIM FISHER

"I think JMU X-Labs is doing an amazing job connecting faculty together (experimentation), listening to student voices (empathy), and finding solutions around institutional red tape (resourcefulness) and exemplary dissemination efforts."

ILYA AVDEEV
Associate Professor of Mechanical Engineering
University of Wisconsin-Milwaukee

UNIVERSITY of WISCONSIN UWMILWAUKEE

Stanford's University Innovation Fellows (UIF) program doesn't just create opportunities for students. Occasionally, it even offers benefits for faculty from across the country.

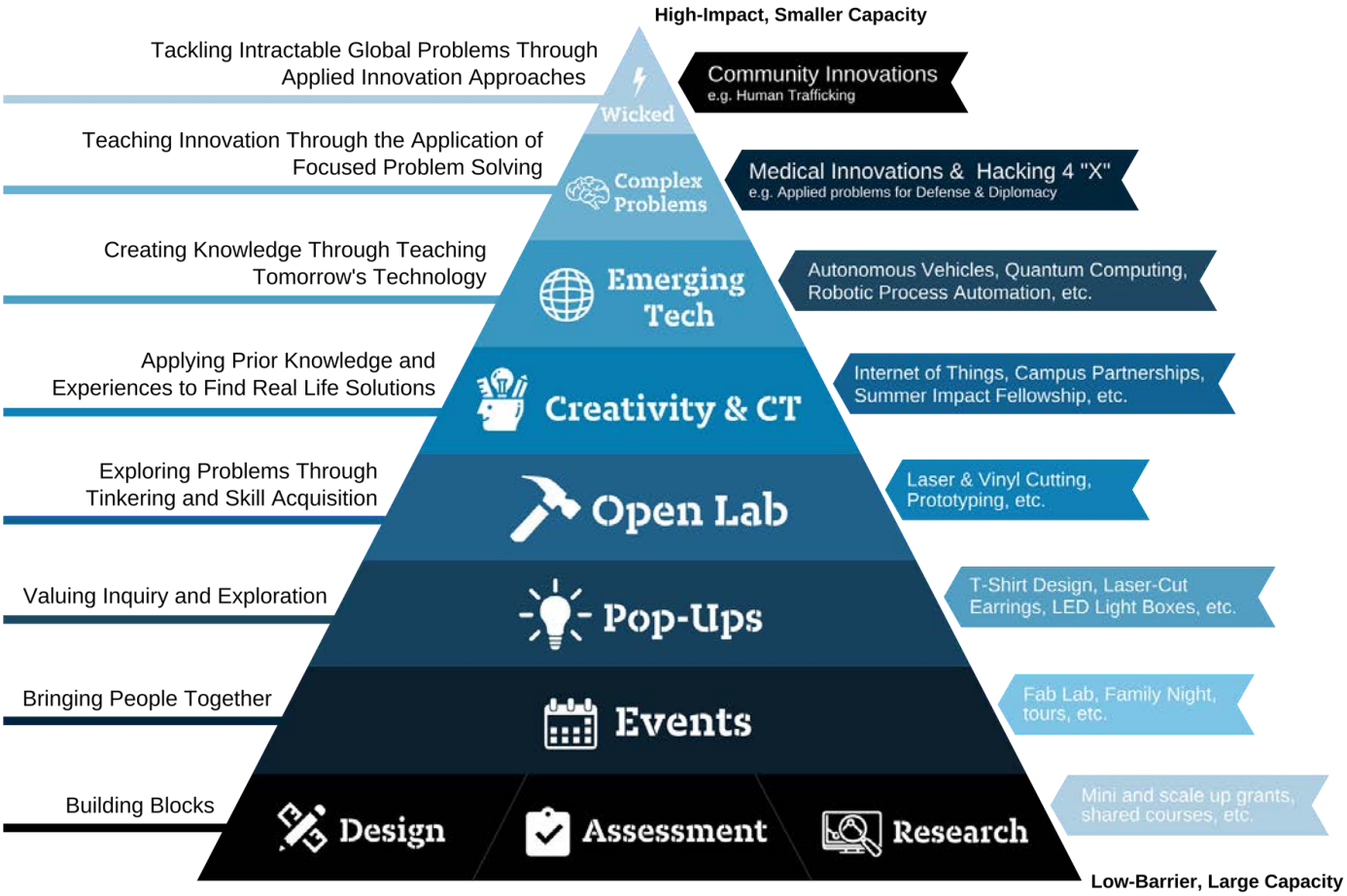
Ilya Avdeev serves as a faculty advisor for the University of Wisconsin-Milwaukee's UIF program, which empowers students to impact higher education. Through UIF, he's known JMU X-Labs Founding Director Nick Swayne for over 7 years, so he's well acquainted the the JMU X-Labs ecosystem. "The model is very inspirational," Ilya said.

Ilya also serves as the director of innovation at the Lubar Entrepreneurship Center, and part of his role there is to recruit speakers for their monthly speaker series. Familiar with the success of JMU X-Labs, he invited Nick to speak about its programs.

Only 15 people were expected to attend the February presentation on JMU X-Labs' ecosystem, but 41 people participated, including the dean of the UWM business school.

"Today," Ilya began on the Zoom call, "we have one of the most amazing people I know in terms of disrupting higher ed. and doing things differently." Throughout the presentation people asked a lot of questions and it went overtime to accommodate the interest.

To watch the presentation, visit our Scholarly Activity page: jmuxlabs.org/scholarly-activity/



Summer Impact FELLOWSHIP

BY JAMIE ZEIGLER

Masked vendors and volunteers collected and packed up items for each order and delivered them to customers, who stayed in their cars at the Turner Pavilion, thus limiting contact between people and goods.

Local Impact

As a result of the COVID-19 pandemic, organizations and businesses in Harrisonburg were forced to close or innovate to meet the needs of their community. Associate Professor Seán McCarthy from the School of Writing, Rhetoric & Technical Communication (WRTC) and the previous X-Labs Lab Manager Aaron Kishbaugh, took charge of implementing best practices to safely and efficiently run the farmers market during the pandemic. After working directly with vendors to get hundreds of their products online, the market went online after two weeks! The Farmers Market and JMU X-Labs worked with the vendors, nonprofits, local web designers and the Gilliam Center for Entrepreneurship (GCFE) to keep up the momentum.

What happens when the farmers market is allowed to go back in person? The JMU X-Labs and GCFE wanted to support the Farmers Market to create effective and innovative solutions to current issues being faced, thus creating The Summer Impact Fellowship (SIF). JMU students would get the opportunity to work with project managers from GCFE and JMU X-Labs for six weeks on real life issues organizations face.

JMU Gilliam Center for Entrepreneurship

JMU X Labs

The goal of the fellowship is to assist local organizations by providing research, design and prototypes that can be implemented to solve complex problems. While fostering relationships between JMU and the greater Harrisonburg community the fellows build collaborative problem-solving skills and learn more about entrepreneurship.

During the summer of 2020, students worked with the Farmers Market giving them the support they needed for their transitional period— In person–online–hybrid. Focusing on structural organizational solutions, the students wanted to provide the Farmers Market a strong foundation so they can be sustainable moving forward. They created vendor surveys, social media campaigns, and provided information on how to become a 501-c3.

With the work on the farmers market being so successful, GCFE and X-Labs brought back the SIF for the 2021 summer. This time 12 students were given the opportunity to work with two organizations on four different projects. With the students working hybrid for six weeks they were able to discover potential solutions through their research and interview process. Due to the importance of the issues presented, three students are continuing the work on two projects for their internships—REACH and childcare for working parents.

SUMMER 2021

On the first day of the 2021 Summer Impact Fellowship, JMU X-Labs assistant director, Karris Atkins, hosted the fellows—virtually and in person—in the Tank. Below, Karris is illustrating the first step in the design thinking process; observing, empathizing, and defining the problem. In this phase, students use their diverse prior knowledge and experiences to identify the stakeholders, barriers, processes, and other variables that affect their topic.

REACH

The Rural Engagement and Capacity-building Hub (REACH) serves agencies, students, institutions and community members to build capacity in reaching community goals for health and wellbeing in rural areas within the JMU service area.

The REACH team worked on providing prototypes for greater administrative structure and a website. Two main deliverables were created: Microsoft Teams prototype and a website prototype. The Microsoft Teams prototype included research on community resources, nonprofits, grants and marketing materials. Additional deliverables included a branding guide and multi-channel marketing research.

Institute for Innovation in Health and Human Services (IIHHS) highlighted problems centered around childcare for working parents in the Harrisonburg area. Harrisonburg is designated as a Childcare Desert—an area with an insufficient supply of childcare in relation to the amount of children in the area. While this issue may not sound pressing, it is a driving factor as to why some parents may not participate in the labor force and it has lasting impacts on the child's life and future.

This team compiled research and statistics helping identify two possible ideas for businesses to implement.—First is childminding, temporary, short-term childcare for working parents, second is partnering with a local child care facility.

Harrisonburg Downtown Renaissance (HDR) identified two problem areas—outdoor enthusiasts and student engagement. The outdoors team was tasked to find a way to make Harrisonburg a hub for outdoor enthusiasts. They decided to create three separate itineraries for their target audiences: hikers, bikers, and families. and gave multiple recommendations for implementation.

- Use the separate itineraries' information on HDR's website and include details/events from their research.
- Contact hotel managers and Airbnb hosts in downtown Harrisonburg offering placement in the itineraries.
- Make use of dining dollars to provide hotels/Airbnbs and attract visitors to restaurants downtown.

The student engagement team was tasked with getting students to engage with downtown businesses. Through their preliminary research they found four main barriers for students: transportation, expenses, exposure, and safety. The team listed three suggestions to these problem areas.

- Increase lighting and add emergency safe stations in identified areas
- Partner with JMU SafeRides for events downtown
- Partner with JMU school of music to host weekly summer concerts at the Farmer's Market pavilion

Inspections take Flight with FACILITIES MANAGEMENT

Drone Applications was one of the inaugural classes at JMU X-Labs. Over the years X-Labs has experimented with different applications for drones to improve the safety, efficacy, and efficiency of "normal" things - like fire inspections. We were asked if we could use a drone to inspect the fire sprinkler heads in the James Madison University Recreation Center (UREC). These sprinklers are all over the building - 3 stories up.

Without scissor lifts being installed how does facilities management do routine checks, especially inspections on the sprinkler heads over the pool area? It took some practice, but Bobby Baratta worked it out! Utilizing drones with versatile cameras can improve the efficiency of these important safety checks. Now designing a system to make it easy becomes a new class problem.

Above | **Bobby Baratta** and **Bob Schwartz** using a drone to inspect the sprinkler heads over the pool area in UREC.

ASU+GSV Summit

What do you need to solve some of the most challenging, wicked problems facing humanity? Problems are networked. Majors are siloed. We're changing that. At JMU X-Labs, we think it's wicked students - students equipped to work on teams, ask great questions, collaborate, and innovate intentionally. Our vision is to lead a global movement that makes passionate problem-solving a way of life. We leverage the power of disciplines to attack complex, 'wicked' problems. Students, faculty, and off-campus stakeholders work as partners to fully understand real problems, to develop real skills, and to make real impact.

In October 2020, we shared our perspective virtually with about 150 global educators and leaders at the ASU+GSV Summit. Nick Swayne (Moderator) and panelists – Benjamin Selznick, Bernie Kaussler, Erica Lewis, Patrice Ludwig, and Seán McCarthy– led the talk *No Textbooks, No Lectures, No Right Answers -- Is this What Higher Ed Needs? Hacking the Curriculum to Develop Wicked Students!*

Seeding a post-pandemic culture of "wicked education"

Nick Swayne | Erica Lewis | Seán McCarthy | Patrice Ludwig

In August 2021, we were invited back to the Summit for an in-person talk in San Diego, CA. As the pandemic begins to recede, the big winners in the higher ed sector appear to be the emerging class of "mega universities" equipped with the tools to serve huge populations of students with cheaper, more flexible online education offerings than more traditional brick and mortar institutions can provide. But when the dust settles, what emerges is very likely to be a far more complex hybrid model. Learning exclusively online will not serve all needs, no matter how sophisticated the delivery.

If online education cannot adequately serve all the demands placed on higher ed as a sector, the question is: How can brick and mortar institutions adapt to thrive in the changed global landscape?

The answer this panel proposes is to embrace the idea of "wicked education": a model that grows by embracing rather than taming the highly complex challenges faced by higher ed. The speakers, all founding team members at an innovation space at a regional, undergraduate-focused institution, explore experiments, hacks, and research agendas that embrace complexity--the key to building future-ready institutions.

Arne Duncan, **Sal Kahn** (Kahn Academy), **John King** and panelists on stage at the 2021 ASU+GSV Summit.

Photo by Nick Swayne

Student INTERNS

BY KIM FISHER

JMU X-Labs student interns learn invaluable leadership skills and pass them on to the JMU community through our programming, which increases our capacity and amplifies the impact of the lab's innovation ecosystem. This year we hired 5 fabulous new interns, bringing our amazing team to a total of 9!

The interns are often the first people new students see when they come to the lab or hop on Zoom during our free Pop-Up workshops. Their friendly faces introduce students to our culture of creativity and invite them to join our ecosystem of innovation regardless of which department across campus they're from. From different majors themselves, the interns bring their diverse perspectives together to strengthen JMU X-Labs' sense of community and provide accessibility to resources.

Our interns lead a variety of different projects that focus on developing and producing podcasts, Pop-Ups, Pop-Ups 2.0, videos, social media, 4-VA events, and JMU X-Labs events. They bring enormous creative capacity and energy to our team and we couldn't have the reach and impact that we do without them!

"Our mix of interns gives JMU X-Labs a wealth of creative ideas that drives all of our programming. Their passion and enthusiasm make JMU X-Labs a welcoming environment for all of our patrons and they are key in keeping our programs relevant and fun for a wide audience."

EMILY WINTER
Director of Programming

Here's what the new interns had to say about their experience:

"What surprised me most about working at JMU X-Labs is how welcoming and supportive the environment is. I quickly realized that as long as you have a willingness to learn, the people at JMU X-Labs are always willing to help you every step of the way."

CARLEY BELKNAP
Junior in Computer Science

"What I love the most about JMU X-Labs is the friendly and welcoming environment. The staff is always helpful and supportive, which makes me feel welcome and encourages me in coming up with new and exciting ideas, too!"

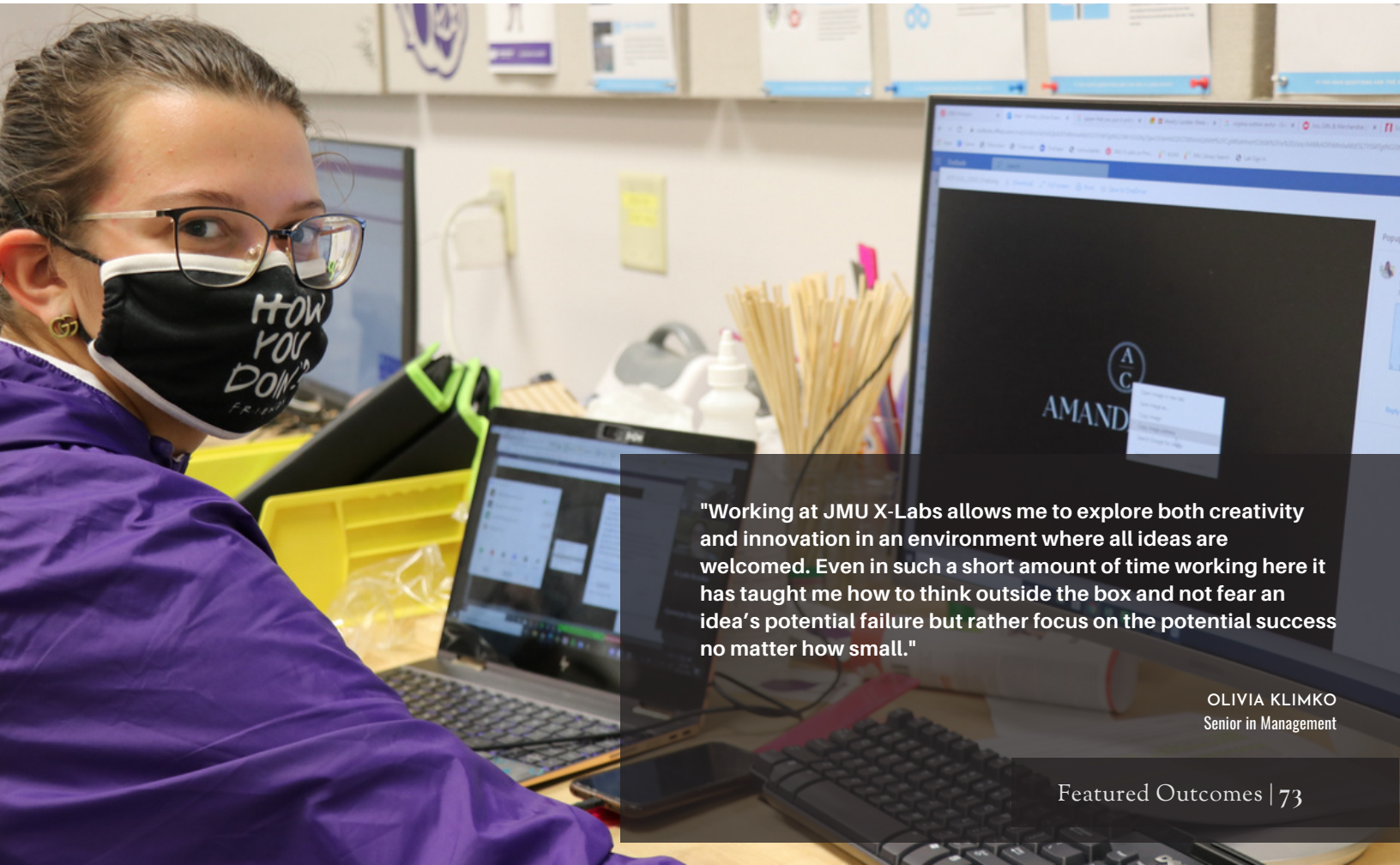
HELEN NGUYEN
Junior in Communication Studies

"Last year as a freshman coming into JMU I was so happy that I discovered JMU X-Labs. Being able to visit the lab and take a break from the stress of classes and be creative was a highlight of my freshman year experience, and now working here allows me to be a part of that for others."

BROOKE HARMISON
Sophomore in Intelligence Analysis

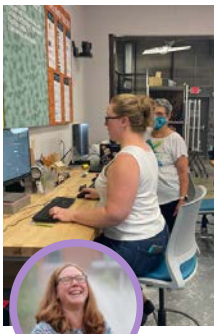
"Working here at JMU X-Labs means I can channel my creativity into helping more people see the power of design in different areas of life. The privilege of working here also means I get to be a part of something truly extraordinary alongside some wonderful people."

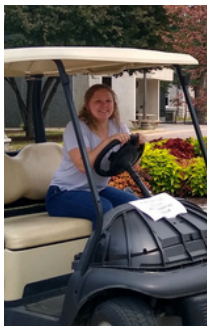
CAITLIN FERNANDEZ
Sophomore in Graphic Design

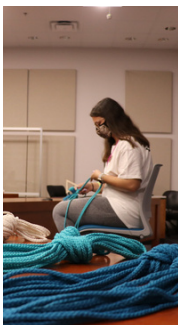


"Working at JMU X-Labs allows me to explore both creativity and innovation in an environment where all ideas are welcomed. Even in such a short amount of time working here it has taught me how to think outside the box and not fear an idea's potential failure but rather focus on the potential success no matter how small."

OLIVIA KLIMKO
Senior in Management

Karris Atkins

Joined the Team

January 2021 - Assistant Director 4-VA, JMU X-Labs

What I've Done

Prior to coming to JMU I have worked in medical offices serving pediatric to geriatric populations and everything in between. I have owned two businesses; one in event planning, and one comic book store. I came to JMU in 2014 to work in Residence Life and have enjoyed my career journey around campus ever since. I have worked in the College of Business, The Graduate School, and now 4-VA; the most rewarding yet!

Favorite Part of the Job

I love coming in each day and working through a new problem or project, and ensuring that faculty get the support they need to make their research projects come to fruition. Working with other 4-VA institutions and our community partners is fun and fast paced. It's refreshing to see everyone come together to create positive change through collaboration and innovation.

Fun Facts

I was born in Maryland and transplanted to the Valley for college too many years ago to count! I never left the valley after settling down with my husband in Weyers Cave. I have one son, Clark, two cats, Olaf and Gizmo, and a dog name Kittle (Go 49ers!). I graduated from Bridgewater College with a Bachelors in Communication Studies, and Masters from James Madison University in Adult Education and Human Resource Development.

Jamie Zeigler

Joined the Team

February 2021 - JMU X-Labs Lab Manager

What I've Done

Before starting my position as the X-Labs manager at JMU, I worked as a bartender and server to put myself through school. I had the pleasure of working at United Way and the Boys & Girls Clubs in Harrisonburg as a marketing intern. I took multiple X-Labs classes and worked on projects that immersed me into the culture of innovation. In 2020, I started freelancing as a web & digital designer and continue to provide services today! December of 2020 I received by Bachelors degree in Media Arts and Design with a concentration in Interactive Design.

Favorite Part of the Job

I love being creative, designing, and working through problems with the Harrisonburg and JMU community. The lab is a very special place that allows you to be creative, fail, and try again. It is a place with no judgement to push yourself beyond what you could possibly conceive. Here we prototype our ideas, design and make them into a reality. It's a magical place— almost as magical as my alma mater, Hogwarts.

Fun Facts

I moved to the valley in 2012 from Maryland to attend JMU as a legacy student—after graduating from Hogwarts and wining the house cup (go Hufflepuff). Unsure of my career goals, I took a step back from college and moved to New Zealand for just shy of a year. Why NZ? Well, why not go to the most beautiful place in the world! I recently married my best friend (a Slytherin) June 2021—who came lovingly with three cats and a dog. I love to paint, refurbish furniture, and board games!

Olivia Klimko

Joined the Team

August 2020 - Student Intern
May 2021 - Building Coordinator and Director of Programming

Favorite Project

I love making stickers with the vinyl cutter. Our cutter only allows for cutting one color of vinyl at a time, so I experiment with that to create multi-color stickers. I use our illustration technology to break my images into layers and cut each layer on a different color vinyl. Then I'll use transfer tape to put my layers together and create a more detailed, dimensional sticker!

Favorite Part of the Job

The JMU X-Labs team is small and mighty. We work well together often, and support each other strongly when we work independently. The administrative staff works cohesively with the student intern team to facilitate long term growth and innovation. It is because of the incredible team of students and administrative staff that I was able to further my professional career with a full time, post-undergraduate position on the JMU X-Labs team. I am so grateful for the opportunities I have been given, all which would not have been possible without the team atmosphere.

Fun Facts

I am a born and raised Jersey girl with a love for going down the shore or going into New York City for day trips. I'm also the classic Disney adult: loving all things from visiting the parks and wearing my ears to curling up in an oversized Disney t-shirt and watching hours of Disney movies!

ALUMNI

Interviews

From The Beginning

BY KIM FISHER

An interview with Claire Fulk ('17) Integrated Science And Technology

JMU X-Labs: Tell us how you were involved with JMU X-Labs.

Claire: One of the exciting things for me is that I was "employee number one" and joined the team when there was just a single 3D printer in Memorial Hall. We then moved to the ICE House where I assisted with evening classes, learned the new technologies that were added in like the laser cutter, VR, and more 3D printers, and assisted students and faculty with using them. During that time the team grew and we were able to expand more of what we did, involving hackathons and innovative events. Then the day came when we officially became JMU X-Labs and had an entire space for creativity and innovation. With that, we started hosting Pop-Up Classes—some that I ran and the rest I helped coordinate—and I assisted with the interdisciplinary classes that were created because this space existed. I think my official title was Student Director of Creativity and Innovation, but my role was constantly evolving over the years.

JMU X-Labs: Which classes and/or projects meant the most to you and why?

Claire: The Pop-Ups were great because they brought students from every year and major, they would meet new people they otherwise wouldn't have met and work together towards an objective like programming an LED light or using the laser cutter to create a design they thought up. It gave them the opportunity to work with new technology and the ideas that would come out of those classes were always refreshing. I also liked the Autonomous Vehicle class, which I was a part of, because once again it was a collaborative effort between multiple majors towards this common, challenging goal. We were successful with it, and I'm still friends with people I made on that project. The bonds built with having to meet up at 8am on a Saturday can't be broken.

CLAIRE FULK
Security Specialist at CISCO Systems, Inc.

"JMU X-Lab was a huge catalyst in the direction my life went. It is the reason I got into technology, perused a technical degree, and now have a career in Cybersecurity."

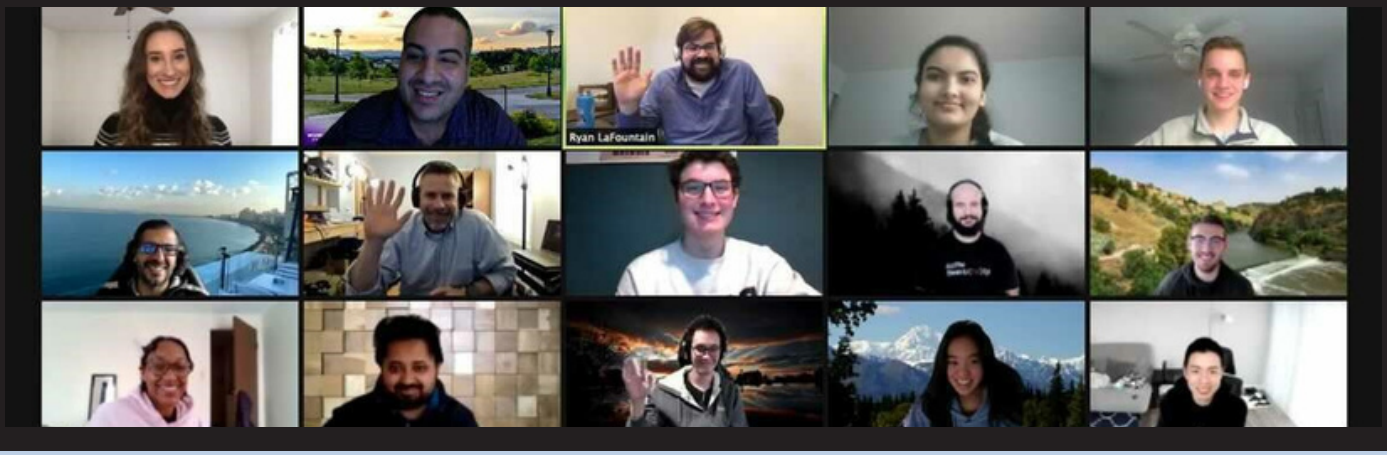
JMU X-Labs: How did your experience in the JMU X-Labs ecosystem change you, your life, or your way of thinking, if at all?

Claire: It is the reason I attended JMU, and because of that it's the reason I ended up working at Cisco. JMU X-Labs was a huge catalyst in the direction my life went. It is the reason I got into technology, pursued a technical degree, and now have a career in Cybersecurity. The people that I met helped mold the way I view projects and challenges from multiple perspectives. I learned how to perform technical troubleshooting, which is a

"Being a part of JMU X-Labs, being able to evolve and grow with it and be a part of it from the ground up gave me so many amazing opportunities that I still think of and appreciate today. I've been at Cisco for almost three years now, and I still talk about those experiences during interviews. It is truly a unique thing to be a part of that is and was ahead of its time."

CLAIRE FULK
Security Specialist, Cisco Systems, Inc.

Left | Representing Cisco as a judge for an innovation competition, trying on 3-D printed sunglasses. Right | Working as a Technical Consulting Engineer at the Cisco office on the Next Generation Firewalls team. Below | Speaking to a JMU X-Labs class of JMU and GMU students with a Principle Engineer during the pandemic about their careers, Cisco, and the future of networking/security.



huge aspect to any technical career. I became comfortable with the unknown and exploring new ideas, challenging the "norm", and embracing "failure" as a learning opportunity.

JMU X-Labs: How did your experiences influence your job interviews, career path, or performance at work?

Claire: There was a direct influence in my job interviews and career trajectory. My first role at Cisco, which I interviewed for during my Senior year at JMU, required the ability to think critically and perform technical troubleshooting. While I had experience in class doing that, I first started working and testing with technology at JMU X-Labs. I learned that I enjoy managing, teaching and coordinating during my time here, which has since helped me get promoted to new roles. I have been asked to represent Cisco as a judge for innovative competitions because of my experience at the X-Labs – I was the only one on the team who had worked with 3D printers, so I was able to have conversations about why they chose one filament over another. I am also heavily involved in student outreach, recruitment, and interviews because I know the sort of talent that is out there after meeting so many incredible students at JMU X-Labs.

Crushing Expectations

BY KIM FISHER

An interview with Nick Sipes ('17), Physics with Robotics minor

JMU X-Labs: Tell us the story about your 2017 UAV project for the ancient wall in Cartagena and what you learned.

Nick: For the entire class we prepared to fly the drone around the wall and get high quality images so we could make a great 3D scan of the wall. When we got to Colombia, we realized we couldn't even fly the drone because of the aggressive winds (the wall was right next to the ocean) and the proximity of people (the wall is a major tourist destination). This really taught me to look at problems holistically to determine the most elegant and simple solution—don't pick a solution and try to apply it to the problem.

JMU X-Labs: How did your experience in the JMU X-Labs ecosystem change you, your life, or your way of thinking, if at all?

Nick: It changed my life 100%! It taught me how to work in a multidisciplinary team, how to build team chemistry that helps you achieve goals faster, and new paradigms of thinking that make me a better engineer.

"JMU X-Labs changed my life 100%! It taught me how to work in a multidisciplinary team, how to build team chemistry that helps you achieve goals faster, and new paradigms of thinking that make me a better engineer."

FIELD APPLICATION ENGINEER AT BOSTON DYNAMICS

NICK SIPES
Field Application Engineer at Boston Dynamics

JMU X-Labs: What did you do after graduating from JMU?

I went to Worcester Polytechnic Institute for my masters in robotics. I always loved robotics, driven by my childhood love (which still persists today) for Transformers and Iron Man. After graduating JMU, I wasn't sure what to do next so I bounced around for a while. I did some contracting work building circuit boards and custom hardware + software for drones. I also worked on my startup, Canvex, which was certainly fueled by X-Labs. One day, I just decided that I'd go get a masters in robotics, but X-Labs put me in the position to get accepted and make my dream a reality.

JMU X-Labs: How did your time at X-Labs influence your job interviews?

Nick: JMU X-Labs indirectly influenced my interviews. My time there taught me how to listen, identify the elements that matter, and ask relevant questions to buy myself time to think on the problem or get more information that makes the question easier to answer. So I'd say X-Labs taught me how to be a fast critical thinker, which made me really good at interviews and general conversation.

Left | Nick Sipes and his team present at the Innovation Summit at the end of the semester. Right | Nick works with Colombian Doctoral student Manuel Saba in Cartagena. Below | Nick assembles and flies the drone for the first time in Colombia at the Technological Institute of Bolivar.

JMU X-Labs: So now you're an engineer at Boston Dynamics. How did that job come about?

Nick: One day I clicked a button on their LinkedIn that I was interested but didn't see a position that fit my skill set. About a week later I got an email from BD asking if I'd be interested in my current role, Field Application Engineer. I had a phone call screening with my current manager. He said "pick an application for Spot and tell me how you'd execute it". I told him Spot could be a guest waiter at a restaurant and started to address the requirements of the application. After a great phone screen, I had an onsite interview. The interview featured a presentation and a series of one-on-one interviews.

I presented on how Spot could be used for the battery storage industry, since I had experience in both fields. I crushed the interview and they gave me an offer that night.

JMU X-Labs: How has your X-Labs experience impacted your performance there?

Nick: JMU X-Labs shaped me into the engineer I am today. My time there exposed me to all these new technologies (drones, robotics, 3D printing, VR) that expanded my solution toolkit. I crushed expectations and was up for promotion within my first year, which is highly unusual. In our mid-term evals, I was one of only 10 people who got 5 out of 5 on my performance review in the entire 300+ person company. I wouldn't be here without JMU X-labs. I'm looking forward to coming back one day. We at Boston Dynamics use the same thinking and tools to solve problems that I learned at X-Labs. The work environment at Boston Dynamics is like if X-Labs existed in industry.

Human-Centered Focus

BY KIM FISHER

An interview with Teresa Cummings ('19), Writing, Rhetoric and Technical Communications and Modern Spanish Language

JMU X-Labs: Tell us how you were involved with JMU X-Labs.

Teresa: Dr. Sean McCarthy (WRTC) introduced me to JMU X-Labs and I took the first Hacking 4 Defense class at JMU in 2017. As one of the few humanities students in the class, I was on the Digital Overlay team and we designed an augmented solution for U.S. Army service members. I was also on the Ireland Waterways Sustainability Project: From Water to STEAM in the summer of 2017, and served as a teaching assistant for both the fall 2018 Hacking 4 Diplomacy class, and the spring 2019 Hacking 4 Defense class.

JMU X-Labs: Which project meant the most to you and why?

Teresa: I think the X-Labs project that meant the most to me is the WaterWays Ireland Project. While there, we interacted with the local communities. We learned about them and their histories by physically being there. It was an invaluable experience that introduced me to different perspectives and human-centered concepts. This project was also a cool blend of the biology and humanities disciplines. Not only did we research the local flora and fauna, but we also investigated how they were represented in local art and literature. Our deliverables incorporated story and practical designs.

JMU X-Labs: How did your experience in the JMU X-Labs ecosystem change you, your life, or your way of thinking, if at all?

Teresa: "How Might We" is the beginning of a sentence that changes lives, thought processes, and communities around the world. My career path changed when I practiced writing a "How Might We" at JMU X-Labs because it taught me to think not only about the world as it is, but also how the world could be. Additionally, while at JMU X-Labs I saw opportunities for the humanities and the sciences to collaborate and achieve great things. My experiences led me to my current path and I am grateful for that.

Teresa Cummings (second from right) and her team collaborated with local communities on the Ireland Waterways Sustainability Project: From Water to STEAM in the summer of 2017.

JMU X-Labs: How did your experiences influence grad school/job interviews, your education/career path, or your performance at school/work?

Teresa: The first Hacking 4 Defense class at JMU X-Labs changed my life and my career trajectory. Because of that class, I hungered for work that was impactful and projects designed for people, not profit. I'm finishing a master's degree at the University of Washington in Human-Centered Design and Engineering. I'm preparing to work full-time for a technology company in Seattle. This all started with my experiences at JMU.

Since my time at X-Labs I've interned for large and small companies, conducted directed research on specialized areas —like voice user interface design, and volunteered with organizations on solving complex problems—like providing healthcare to homeless communities. JMU's motto is "Be the change." I apply that motto to the opportunities and projects I take on.

JMU X-Labs: Is there anything else you'd like to share?

Teresa: When I was a student at JMU, I wasn't sure about going so far outside my comfort zone. X-Labs can seem intimidating. I wasn't sure how I, a young woman in WRTC, could fit in an arena focused on science, engineering, business, and tech. I almost didn't try at all. But I'm glad I did because it put me on a path I hadn't considered. I have immense gratitude to the people (family, professors, friends) who encouraged and helped me grow on my journey with its highs and lows. Now I live across the country and I have the opportunity to work on technology and projects that can affect the everyday world. There is so much opportunity to make a change and so much hunger for ideas that truly look at the state of the world and the people who live within it. How might you change the situation and the story of a person, place, or thing? It might start with a small step outside your comfort zone—doing something you hadn't considered before.
Don't let preconceptions, insecurities, stereotypes, or what others say hold you back. Just ask yourself: How might I?
You never know what might happen.

Anything is Possible

BY KIM FISHER

An interview with Christian Caruso ('19), Computer Information Systems

CHRISTIAN CARUSO
Senior Full Stack Software Engineer at Capital One

"Communicating with real stakeholders to conduct need-finding, prototyping solutions, and presenting our findings gave me an inside look into how business is conducted in the post undergrad "real" world...In job interviews I almost exclusively discuss my JMU X-Labs experience and the skills I gained from it."

JMU X-Labs: Tell us how you were involved with JMU X-Labs.

Christian: I joined JMU X-Labs the second semester of my sophomore year when I enrolled in the Augmented/Virtual Reality course. I enrolled almost by chance, as I needed one more class and got a blast email. From there I was hooked! After the AR/VR course I enrolled in three more classes, was nominated for and joined the University Innovation Fellows, TA'd, and participated in many outreach programs.

JMU X-Labs: Which classes and/or projects meant the most to you and why?

The two projects that come to mind are the Hacking 4 Defense semester project, as well as the Board of Visitors JMU X-Labs presentation. The former was a result of enrolling in the Hacking 4 Defense course. At the time, JMU X-Labs was the only undergraduate program to offer H4D. The course included a semester-long project for real clients and customers in the DoD. Our team specifically worked with USAF pilots to discuss pain points of the flight documentation procedure. Communicating with real stakeholders to conduct need-finding, prototyping solutions, and presenting our findings gave me an inside look into how business is conducted in the post undergrad "real" world.

The second project was a presentation given by myself and three other "X-Lab-ers" to the Board of Visitors, the governing board at JMU. Presenting on the purpose and impact of JMU X-Labs to the president, the provost, and other university leaders gave me experience in high level professional communication and presentations. It was by far the most nerve wracking presentation I've ever given, and I'd do it all again in a heartbeat.

JMU X-Labs: How did your experience in the JMU X-Labs ecosystem change you, your life, or your way of thinking, if at all?

I would say that the JMU X-Labs ecosystem absolutely impacted me, my life, and my way of thinking. JMU X-Labs gave me the best opportunities a college student could ask for. Through JMU X-Labs, I was able to explore and use cutting edge technologies like AR/VR, Blockchain, Robotic Process Automation and more. In addition, JMU X-Labs and University Innovation Fellows allowed me to travel across the country to Stanford, as well as across the world to the Netherlands.

On top of the incredible opportunities found at JMU X-Labs, it enabled me to grow as an individual, a team member, and as a leader. I felt like part of a team, not just a student turning in coursework. I was able to freely ask questions, fail fast and often, and flex my problem solving using solutions that would have been laughed out of a traditional classroom. Even after graduating from JMU and JMU X-Labs, I still probe, question, design, and prototype at my work and throughout different aspects of my life.

JMU X-Labs: How did your experiences influence your job interviews, career path, or performance at work?

The JMU X-Labs experience absolutely impacted my job interviews and career path. JMU X-Labs has a strong focus on interdisciplinary teaming and collaboration. From engineering students and nurses, to design majors and business analysts, they strive to collaborate.

Working in this environment taught me the most important skill of my undergraduate years—communication. In job interviews I almost exclusively discuss my JMU X-Labs experience and the skills I gained from it. In the workplace, being able to translate engineering requirements to business goals helps me, my team, and our entire company. I believe that without the experiences I gained at JMU X-Labs, I would not have achieved what I have today. Whether that be in school, at work, or personally, I have JMU X-Labs to thank for the person I have grown to be.

JMU X-Labs: Is there anything else you'd like to share?

At JMU X-Labs, the word "no" doesn't exist. When you walk into the building, you can feel a buzzing of energy. You can see students working on projects they are passionate about. JMU X-Labs is a space free of constraints, where anything is possible, and the only limitation is your imagination.

Bridging the Gap

BY KIM FISHER

An interview with Sally Todd ('18), Industrial Design
Senior User Experience Designer at IBM Garage

JMU X-Labs: Tell us how you were involved with JMU X-Labs.

Sally: I got involved with the X-Labs community by attending pop-up classes led by some of my industrial design friends. From designing flat-packing furniture to laser cutting to brewing your own beer (the fermentation happened off campus—don't worry!) I loved that I could walk out of the space feeling the satisfaction of having tried something new. Regardless of how my beer tasted, heck, at least I made it with my own hands and learned from the process.

As an upperclassman, I joined the University Innovation Fellowship program, which is a unique partnership between the Stanford d.school and JMU, where we created entrepreneurial and innovative programming for students, with zero barriers to entry. We implemented semester-long classes focused on emerging technologies, hosted events such as hack-a-thons, women-in-tech nights, and led Design Thinking workshops. It was a life-changing experience, not to mention an amazing trip out to California where we were formally trained by the world's leading innovators at Stanford, Google, Pinterest, Pandora etc. Through the UIF program I was able to meet students from every grade and major, and put my energy into giving back to the JMU community that I got so much out of.

"It's no secret that there is a big jump between higher education and industry. I'm lucky in that JMU X-labs bridged that gap for me."

JMU X-Labs: Which classes and/or projects meant the most to you and why?

During my senior year, I took my first X-Labs course on Drones for Conservation, where my team and I partnered with the Smithsonian Conversation Biology Institute to prove out an MVP for tracking threatened bird species. It was the most impactful project for me for a few reasons. Primarily, it was real-world. Creating a solution meant saving specialized researchers at SCBI time, money, and helping to divert the collapse of vital ecosystems in the Northeast. It was also one of the first times I worked directly with students from outside my major. The team itself, comprised of computer science, biology, and writing, rhetoric and technical communication (WRTC) students, had to discover one another's strengths, and fill in the gaps to problem solve. We had WRTC students writing Arduino code, computer science folks writing elevator pitches, and designers researching grassland bird habitats. We pivoted, we laughed, and we were challenged. Thankfully, our dedicated faculty gave us tremendous guidance, especially as they pushed us outside our comfort zones; improv dance parties and all.

JMU X-Labs: How did your experience in the JMU X-Labs ecosystem change you, your life, or your way of thinking, if at all?

"Be scrappy. Work smart, not hard. (Ok, maybe pretty hard too....) When in doubt, ask 5 people around you. Be RESOURCEFUL above all else. Group knowledge > Individual knowledge. Show, don't tell. Prototype to validate. Know your user and think 10x. Don't re-invent the wheel. Nothing is a mistake. There's no win, and no fail. There's only MAKE." And of course, my personal favorite tagline: the 'Don't be an a**hole' :)

These are just a few of the bumper stickers I've captured and collected from my time at JMU X-Labs. They pop up in my personal and career lives, kindly reminding me to think a bit more critically about what I'm doing.
It could be an average Saturday, and I'll be performing some mundane task, like trying to troubleshoot a car problem or pitching a tent, and I'll find myself stopping mid-task to listen to that voice in my head ask me, "Is this the smartest way this can be done?"
Hint: The answer is *probably not*.

JMU X-Labs: How did your experiences influence your job interviews, career path, or performance at work?

It's no secret that there is a big jump between higher education and industry. I'm lucky in that JMU X-Labs bridged that gap for me.

I overcame my imposter syndrome (the majority of it anyway!) by working with industry partners, driving cross-functional teams, and utilizing Design Thinking, Agile scrum, and Lean Start Up methodologies to cut through ambiguity and build meaningful solutions. It accelerated my portfolio, connected me to industry leaders, and helped me find confidence in myself. I learned to think and connect people.

All that for an undergrad who had never stepped foot into an office space before? Not too bad.

JMU X-Labs: Is there anything else you'd like to share?

In the end, it's not the space or the high-tech equipment (although, we could always use more, @donors thank you!) but in reality, it's the PEOPLE at JMU who make the experience real. I'm especially thankful for all the faculty, mentors, and classmates-turned-best-friends that went out of their way to help me succeed. It's self-evident that they absolutely changed my life.

Go Dukes!

Social MEDIA

Social Media helps reach virtual students to keep them engaged and participating in an ecosystem of innovation. View our impact!

1,111 Followers

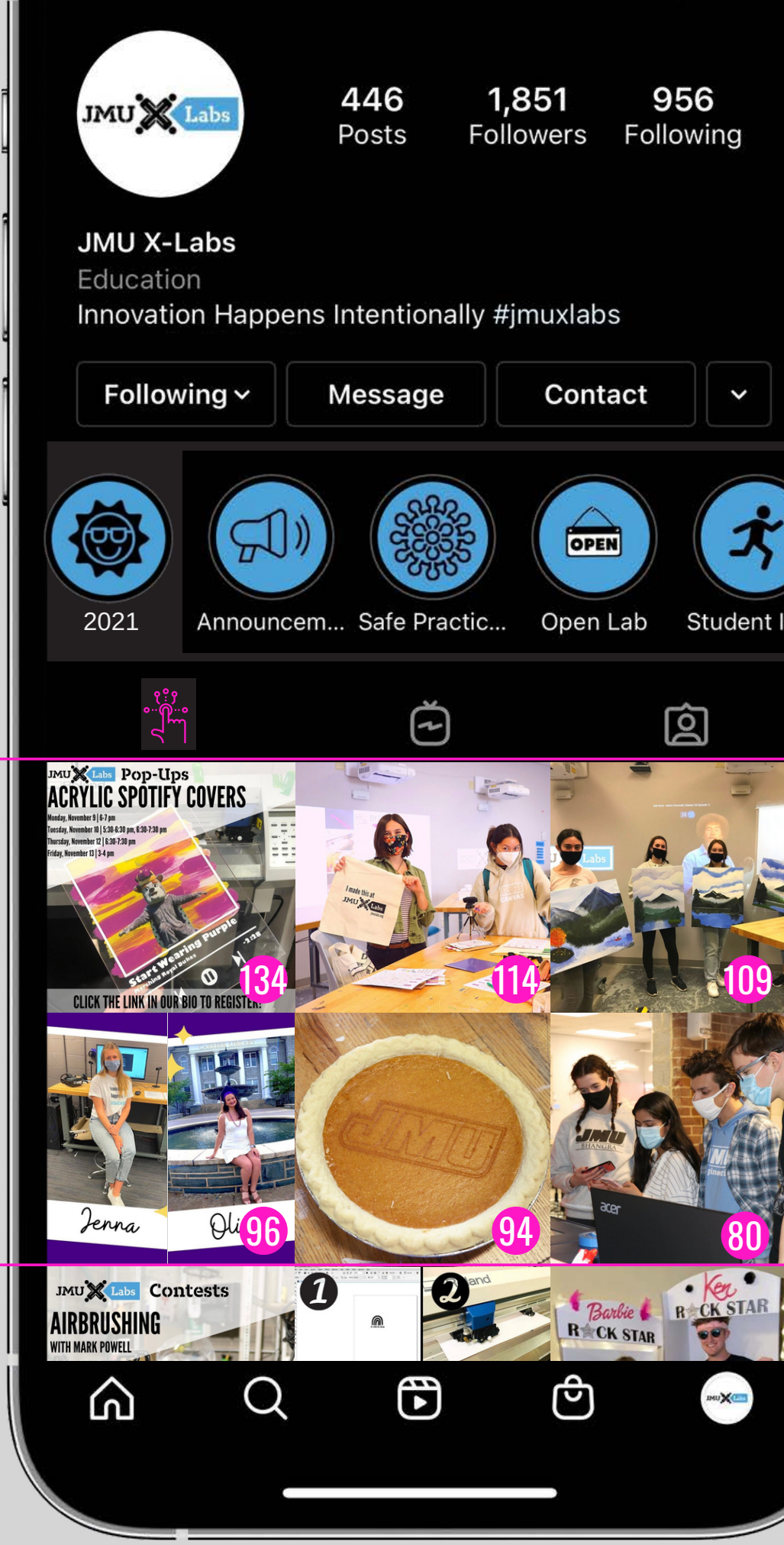
429 Connections

342 Followers

Interactions

Any actions taken directly from your post from profile visits, hyperlinks, button clicks, likes or comments.

Top Left | Acrylic Spotify Cover pop-up Top Middle | Fab Lab highlight Top Right | Bob Ross Paint Night pop-up Bottom Left | X-Labs Graduates Bottom Middle | Laser-engraved pumpkin pie Bottom Right | laser engraving leather on beanies



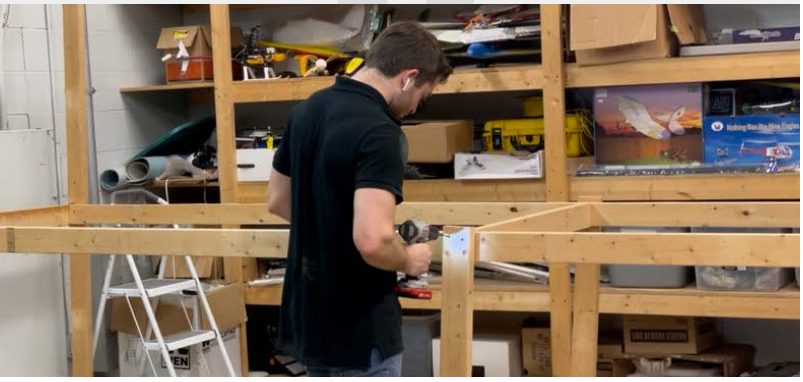
NextSteps

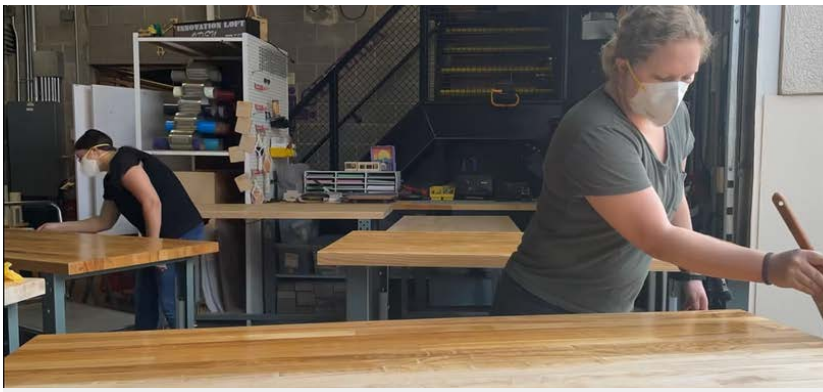
Over the summer the X-Labs team has been hard at work getting ready for Fall 2021. With constant innovation and growth among our ideas and goals, we wanted to reflect our intentions in our physical space. As you may know by now, innovation happens intentionally—so we got to work. The lab is a prototyping space to be creative and try new innovative ideas. Not only is it available to students taking X-Labs classes but to all JMU faculty, staff and student.

With a change of decor we highlighted the steps to design and showed sample projects to introduce students to the machines we use.

The projectors got an upgrade—well more like a collaborator! With ThinkHub just being installed, X-Labs Instructors and staff have been working on providing a training program and tools to make a seamless transition to the new technology.

Upstairs, the loft space was collecting old technologies, projects, and well anything with some sort of sentimental value–you know the drill. Bobby Baratta was hired for the summer and took it upon himself to make the space usable again.





With years of wear and tear, the tables were in need of some care. Olivia Klimko, Director of Programming, and Jamie Zeigler, Lab Manager, took it upon themselves to give the tables some love. After sanding them down, they put a new polyurethane finish and...voilà!

What would you like to see in the lab?
Scan the QR code and let us know!

Thank You!

JMU X-Labs would like to offer a special thank you to our supporters:

- Thank you to JMU **President Jonathan Alger**, **Provost Heather Coltman**, and the entire senior leadership team for supporting our campus community and our students.
- Thank you to **Charlie King** for his continued support of our growing program and spaces.
- Thank you to **Dale Hulvey** for his support, expertise, and guidance since the inception of 4-VA and JMU X-Labs.
- Thank you to **Anthony Tongen** for his support and understanding for 4-VA and X-Labs as we transitioned to research and scholarship.
- Thank you to **Robin Bryan** for her continued support of 4-VA and JMU X-Labs.
- Thank you to the **4-VA working group**, comprised of Campus Coordinators and Deputy Campus Coordinators who work to collaborate amongst our eight Virginia institutions
- Thank you to the **JMU deans** and **department heads** for their incredible support of 4-VA and JMU X-Labs faculty research, scholarship, and teaching.
- Thank you to all of the **fiscal technicians**, **administrative assistants**, and **campus partners** who make transdisciplinary work across campus possible.
- Thank you to **Diana Sharpe** for her amazing attention to detail, prompt responses, and all she does to help us every day.
- Thank you to our partners at **Dell**, **Bluescape**, and **Epson** for their partnership in bringing cutting edge technology to higher education.
- Thank you to **David Lamm and Hunter Pietrie** for answering our many questions, providing the best network support, and for keeping all of our systems upgraded.
- Thank you to our 4-VA Steering Committee for their valuable input, time, and commitment to faculty and undergraduate research on campus.
- Thank you to **Andy Perrine**, **Khalil Garriott**, **Eric Gorton**, **Elise Trissel**, **Justin Roth**, **Nanfei Liu** and the entire team at **University Communications & Marketing** for their invaluable partnership in helping us promote JMU students and faculty.
- Thank you to our phenomenal team of student interns for the 2020-2021 year: **Miranda Landmann**, **Cameryn Norris**, **Emily Marsch**, **Robin Lagodka**, **Olivia Klimko**, **Helen Nguyen**, **Caitlin Fernandez**, **Brooke Harmison**, **and Carley Belknap**. They inspire us daily and we can't wait to see the positive impact they continue to make on the world.
- Thank you to **Kaitlin Ilnitzki** for being such a wonderful partner and for sharing her vision for bringing innovation to students of all ages through her leadership with FIRST LEGO League Virginia + Washington, D.C.
- **Kelsey Hartman (2016-2020)**, **Emily Winter (2016-2021)**, and **Aaron Kishbaugh (2016-2021)** for making the JMU X-Labs vision a reality. Without your leadership, organization, grit, and gumption, hundreds of student projects wouldn't have become success stories.

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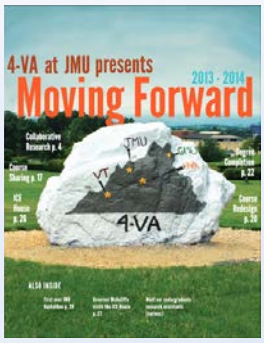
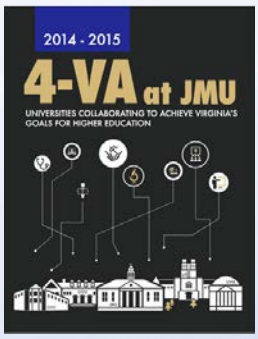
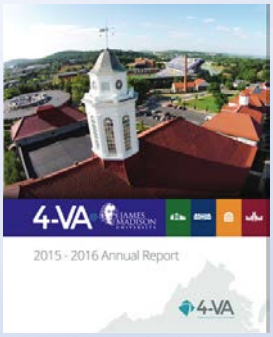
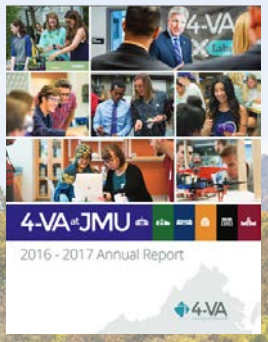
Previous PUBLICATIONS

Previous publications can be found at **jmuxlabs.org/reports/**









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