

COMPUTATION

UCF Department of Computer Science
Orlando, Florida | Volume 3 | 2025-2026



UCF

Contents



**Department of
Computer Science**

UNIVERSITY OF CENTRAL FLORIDA

Computation is an annual publication that highlights the achievements of the students, faculty, staff and alumni from the University of Central Florida's Department of Computer Science.

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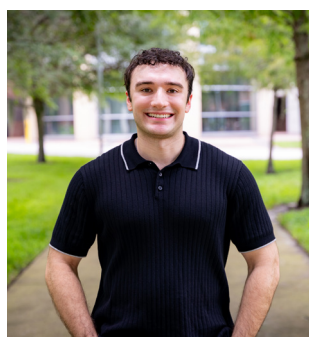
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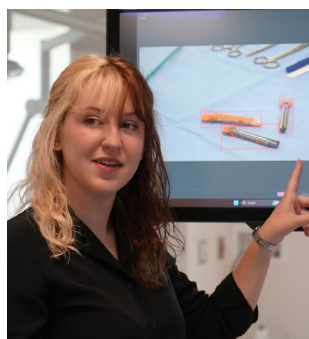
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Letter From the Department Chair



Welcome to another academic year full of new projects, new ideas, new collaborations, new students and new faculty.

As our department focuses on the academic year ahead, I'm reflecting on this past year, which was a season of transformative growth. We onboarded a record number of 19 faculty in one semester with an additional three beginning this fall. This tremendous group of people, whom you will meet in the following pages, bring with them a wide range of expertise in areas such as virtual and augmented reality, data visualization, cybersecurity, bioinformatics, machine learning and artificial intelligence, as well as an eagerness to elevate the UCF Department of Computer Science.

Many of these new faculty joined the department as members of the UCF Institute of Artificial Intelligence, which unites UCF's AI talents under one center, creating a platform for high-impact research and collaboration.

The IAI is led by computer science researcher and Pegasus Professor Mubarak Shah and is comprised of more than 20 faculty members with at least half from the computer science department. This new institute not only positions UCF as a leader in AI, but will foster stronger industry collaborations and real-world AI advancements. I look forward to seeing how our faculty and students benefit from this interdisciplinary center.

Professor Carolina Cruz-Neira recently won an Auggie Award for her immersive robotic technology that allows a human to remotely control a robot with their movements. And Assistant Professor Yu Tian is working on novel solutions that combine

computer science and medicine to help humans live longer.

We are also very proud to announce that Professor David Mohaisen has been named the new associate dean for graduate affairs. We trust that his vision and leadership will enhance our college's reputation for graduate education.

Finally, I want to acknowledge the creative efforts of our student, Luke Diederich, pictured on the front cover. With the programming skills he honed at UCF, he was able to develop the WalkUCF app, which maps the quickest routes across our vast campus. I look forward to seeing what he invents next.

I hope you enjoy this issue of *Computation* and I wish you success this academic year.

All the best,
Damla Turgut, Ph.D.

10 Things

ALUMNI & FRIENDS CAN DO FOR UCF



1 GIVE to UCF

Make a gift that will fuel student success, research and innovation. Join Go For Launch: The Campaign for UCF's Next Mission.



2 BECOME a Knightfluencer

Promote UCF news, events and initiatives on your social media. ucfalumni.com/knightfluencers

3 JOIN UCF Knights Network

A virtual career community that will help you get connected, expand your network, seek advice, promote your business and advance your career. ucfknightnetwork.com



4 ENGAGE with UCF

Attend an event, volunteer, join a board or committee.

5 HIRE a UCF Knight or give a job recommendation!



6 PURCHASE season tickets to football, basketball, soccer, volleyball, softball and baseball and attend the games to support our student-athletes.

ucfknight.com/athletics-ticketing-central

7 ADVOCATE for UCF

Advocate and amplify our message with friends, neighbors, and your state and local law makers.



8 SHARE your Expertise

Mentor a student, offer internships or give a lecture on campus.

9 SHOW Knight Pride

KNIGHT Your Ride – Purchase a new UCF license plate to display wherever you drive. knightyourride.com



KNIGHT Your Device – Download your favorite iconic wallpapers and display your pride. ucfalumni.com/knight-your-device



PURCHASE UCF apparel at the UCF bookstore or online. ucfalumni.shoptruespirit.com



10 CONNECT and FOLLOW us on social media

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SHATTERING HIRING RECORDS

UCF Strengthens Investment in Computer Science With 22 New Hires

As the technology industry grows each year, so does the need for experts who create innovations that fuel this sector and educate the workforce that powers it.

With this demand in mind, UCF's Department of Computer Science broke hiring records this past year by hiring a record of 22 faculty members, with more joining the department this

fall. These hires are part of a strategic hiring initiative that brought in a total of 140 faculty to the college over the past year three years.

"The Department of Computer Science welcomes a record-breaking number of 22 new faculty – 15 tenured and tenure-track faculty members and seven lecturers," says Damla Turgut, the department chair. "This reflects both the growing

research potential of the department as well as our commitment to support our growing student population. The research faculty bring expertise across key areas of computer science such as AI – six of the new faculty were hired as part of the UCF Institute of Artificial Intelligence – digital twin technologies, bioinformatics and software engineering."



MOHAMMED AL KINOON
Lecturer

Research Areas:

- Cybersecurity
- Network security
- Machine learning
- Healthcare security and privacy
- Cyber threat intelligence



ALI ALKINOON
Lecturer

Research Areas:

- Computer security and privacy
- Malware detection
- Machine learning
- Natural language processing



GERD BRUDER
Associate Professor

Research Areas:

- Extended reality
- Human factors and human computer interaction
- Modeling, simulation and training
- Application domains



YADI CAO
Assistant Professor

Research Areas:

- Machine learning for science and engineering
- Neural surrogate models
- Cost-aware scientific agents
- Multi-scale graph neural networks
- In-context operator learning



YU FU
Assistant Professor

Research Areas:

- Data visualization and visual analytics
- Human-computer interaction
- AI-powered data analysis and communication
- Digital twin
- Sports analytics



KARTHIK GAJULAPALLI
Assistant Professor

Research Areas:

- Complexity theory
- Algorithms
- Randomness
- Cryptography



SHAHRAM JAHANI
Lecturer

Research Areas:

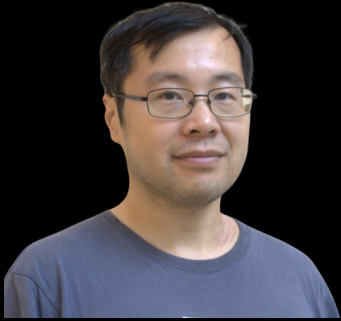
- Cryptography
- Computer security
- Public-key cryptography
- Modular arithmetic
- High-performance computing
- Computer algebra



JIE LIN
Assistant Professor

Research Areas:

- Security and robustness of large language models
- Vulnerability detection and localization in source code
- Context window optimization
- Hallucination mitigation



WU LIN
Assistant Professor

Research Areas:

- Intersection of artificial intelligence, statistics and mathematics
- Machine learning systems



KIRILL MEDVEDEV
Assistant Professor

Research Areas:

- Computational biology
- Bioinformatics
- Structural biology
- Drug discovery
- Digital pathology



KEVIN PFEIL '10 '13MS '21PHD
Lecturer

Research Areas:

- Human and virtual augmented reality
- Human-computer interaction
- Telepresence
- Computer science education



COREY PITTMAN
Lecturer

Research Areas:

- Augmented reality
- Gesture recognition
- Novel user interfaces
- Pattern recognition



MD MAHFUZUR RAHAMAN
Lecturer

Research Areas:

- Computational biology
- Bioinformatics
- RNA biology
- Algorithms



YUZHANG SHANG
Assistant Professor

Research Areas:

- Efficient and scalable artificial intelligence
- Model compression
- Deep learning
- Machine learning
- Computer vision



ALI SIAHKOHI
Assistant Professor

Research Areas:

- Generative models
- Uncertainty quantification
- Variational inference
- Inverse problems



SHASHANK SONKAR
Assistant Professor

Research Areas:

- Natural language processing
- Large language models
- Cognitive modeling
- Artificial intelligence in education
- Learning sciences



YU TIAN
Assistant Professor

Research Areas:

- Computer vision
- Machine learning
- Biomedical artificial intelligence
- Medical imaging
- Artificial intelligence for science



JAKUB TOMCZAK
Associate Professor

Research Areas:

- Generative AI systems
- Generative modeling
- Probabilistic modeling
- Deep learning
- AI4Science



ROHITH VENKATAKRISHNAN
Assistant Professor

Research Areas:

- Human-computer interaction
- UX in immersive XR technologies
- Cybersickness
- Virtual agents
- Perception and cognition
- Interaction in XR
- Self avatars



ROSHAN VENKATAKRISHNAN
Assistant Professor

Research Areas:

- Human-computer interaction
- UX in immersive XR technologies
- Virtual agents
- Cybersickness
- Perception and cognition
- Interaction in AR



SONG WANG
Assistant Professor

Research Areas:

- Machine learning algorithms
- Bioinformatics
- Neuroscience



AASHISH YADAVALLY
Assistant Professor

Research Areas:

- Software engineering
- Software security
- Machine learning
- Artificial intelligence
- Programming language processing



ADVANCING AI

UCF Launches Institute of Artificial Intelligence to Advance Research, Talent Development Across Disciplines

The University of Central Florida has launched the Institute of Artificial Intelligence (IAI), a bold initiative that will elevate UCF's leadership in this transformative technology.

The institute will unite more than two dozen world-class faculty across multiple colleges who are advancing foundational and applied artificial intelligence (AI) in areas like computer vision, robotics, machine learning, healthcare, finance and mathematics. By bringing AI-related faculty, students, research, and partners together, the institute will serve as a nucleus for collaboration, driving education and discovery with real-world impact.

"AI is massively transforming how we live, work and learn. As Florida's Premier Engineering and Technology University, UCF is uniquely positioned to lead in this critical space," says UCF President Alexander N. Cartwright.

With focus on research, applications-translation partnerships and education-workforce talent development, the IAI will:

- Unite an initial 25 faculty across four colleges — the College of Business, College of Engineering and Computer Science, College of Medicine, and College of Sciences — leveraging UCF's expertise and scale to promote a truly collaborative, multidisciplinary approach.
- Promote collaboration across industry, government and community stakeholders — enhanced by UCF's location in a metropolitan region.
- Strengthen the AI skillset of all students so they can have competitive advantages as they enter the workforce.
- Support collaboration in research and education for other UCF faculty who are doing research in AI and on its applications, opening doors learn about AI and contribute to the enhancing its applications across disciplines.

Strengthening Impact Through AI

UCF's momentum in AI is already strong. The university's computer vision research ranks No. 8 nationally,

with affiliated faculty publishing dozens of papers in premier venues and securing millions in external funding, including major awards from the Defense Advanced Research Projects Agency (DARPA), Intelligence Advanced Research Project (IARPA), U.S. National Science Foundation (NSF) and industry. In the past two years, UCF's AI Initiative has hired 11 faculty members across multiple colleges, with eight more joining this fall. Additionally, the Center for Research in Computer Vision (CRCV) will also be joining IAI.

"The Institute of Artificial Intelligence unites UCF's AI strengths under one roof, creating a platform for high-impact research and talent development," says Trustee Chair of Computer Science Mubarak Shah, who has been named inaugural director of the institute.

The institute will also support UCF's AI for All Initiative, which integrates AI into teaching and learning across disciplines. Led by Kevin Yee, special assistant to the

provost for artificial intelligence, AI for All is helping to scale AI tools and curriculum across all disciplines so that students graduate with an understanding of how to effectively use AI in their careers.

About Our AI Faculty

At the core of the institute is a growing network of faculty whose excellence and expertise reflect the depth of UCF's interdisciplinary strength in AI. Their research and teaching are defining UCF's approach to AI as collaborative and grounded in real-world impact.

At least 14 of the 22 members of the IAI hail from the College of Engineering and Computer Science, with more joining the institute this fall and coming spring.

Written by Courtney Gilmartin



UCF Alumnus Becomes Tech Pioneer, Industry Expert

At Apple, Afshin Dehghan '14MS '16PhD is on the cutting edge of the newest AI technology and developing some of the most popular and innovative products in the world.

If you've used an iPhone, iPad or Apple Vision Pro in the last decade, it's likely that you have benefitted from AI technology that UCF alumnus Afshin Dehghan '14MS '16PhD helped to create.

Dehghan leads an AI team at Apple that is at the forefront of the company's technology. He guides the research, design and development of some of the world's most innovative operating systems and products.

He joined Apple nearly 10 years ago, after completing his graduate program in UCF's College of Engineering and Computer Science — earning both his master's and Ph.D. in computer science — and working for a Central Florida technology startup.

Finding His Way to UCF

When he started at UCF in 2011, it was about a year before the rebirth of what we now consider the modern AI.

He had already completed his undergraduate studies abroad and was taking part in a student exchange program in Lisbon, Portugal, working in a computer vision lab.

That's when he came across a survey paper authored by Mubarak

Shah, founder of UCF's computer vision program and now director of the UCF Institute for Artificial Intelligence. The paper was on the topic of object tracking, which was also the subject of Dehghan's internship.

"That paper was my first introduction to UCF's computer vision program, which was considered one of the top labs in the world. I applied, was honored to be accepted and eventually completed my dissertation on that exact same topic," he says.

Pioneering New Tech at Apple

Today Dehghan heads the Multimodal Intelligence group at Apple. They focus on building AI technologies for new hardware that help devices better see, understand and make sense of the world.

When he initially joined Apple, he created the company's always-on, real-time tracking engine based on neural networks for iPhone cameras that came out in 2018. He describes it as a full-circle moment that connected his early research during his internship in Portugal and his doctoral work at UCF to creating Apple's first large-scale production object tracking system.

Since then, he has worked on building perception systems across iPhone, iPad and Vision Pro that help these devices sense, interpret and understand their environment. More recently, he worked on Apple Intelligence and building agentic systems across products, such as

To learn more about the IAI, visit bit.ly/ucfiai.



Pushing the Boundaries of What's Next

IEEE 2026 Awardee Carolina Cruz-Neira: Turning a “Plan B” Into a Global Legacy

UCF Institute for Simulation and Training Interim (IST) Director Carolina Cruz-Neira’s career in virtual reality (VR) began as a backup plan.

She spent her childhood training as a ballet dancer. When a knee injury at 21 ended her professional dance aspirations, she leaned on the engineering degree her father had encouraged her to pursue.

While earning her doctoral degree in electrical engineering and computer science at the University of Illinois Chicago, she discovered the Electronic Visualization Laboratory — and with it, a way to merge art and technology.

In 1992, she unveiled the Cave Automatic Virtual Environment (CAVE), an immersive VR system that transforms a room-sized cube into an interactive 3D digital world. Unlike early VR headsets that

isolated users, the CAVE allows multiple people to step inside the same digital environment, fostering shared exploration and real-time collaboration.

Today, CAVE systems are used worldwide, from gaming and art installations to military training and automotive design, helping industries visualize complex problems, improve safety and refine products before building them in the real world.

Powering the Future of Simulation

Over nearly four decades, Cruz-Neira has made significant contributions to the fields of VR, interactive visualization, high-performance computing and digital twins, which are dynamic virtual replicas of real-world objects used for simulation and testing across industries. Her innovations have

influenced training and research for NASA, the U.S. military and U.S. National Laboratories.

A Lasting Impact

“My philosophy as a researcher has always been to take on projects that are a little risky,” says Cruz-Neira, UCF’s Agere Chair Professor of computer science. “I tell my students that we do research with a purpose. And yes, it’s challenging. But if we have that vision of where this thing is going, our talent and creativity have a terrific playground.”

That bold spirit of exploration drew her to UCF in 2020 — a university recognized for its strength in computer science and deep partnerships and collaborators across several sectors, including space, defense, entertainment and healthcare.



Since arriving, she says she has found something even more powerful: a culture that pairs high-level excellence with a nurturing environment — where ambitious ideas are energized, challenged and brought to life through collaboration.

“There’s a whole community of researchers, faculty and students here who are passionate about this kind of work. That has allowed us to expand our ideas tremendously,” Cruz-Neira says. “We’re now collaborating with teams across the College of Engineering and Computer Science, the College of Medicine, the College of Arts and Humanities and the Rosen College of Hospitality Management, which broadens what we’re able to do. It’s nice to have a tribe around you, where everyone helps each other and works together.”

Among those collaborators is longtime colleague and IEEE VGTC Virtual Reality Service awardee, Gregory Welch. Cruz-Neira says they first met as “Ph.D. babies,” beginning a collaboration that has now spanned nearly 38 years. Since joining UCF, she has continued working closely with Welch and his team on several joint research projects and publications.

What’s Next: Blending Physical and Virtual Worlds

As IST director, Cruz-Neira is helping broaden UCF’s modeling and simulation legacy while leading several cutting-edge research projects in collaboration with talented students and faculty. One such project explores humanoid robots as extensions of the human body, allowing a person

to navigate remote or inaccessible locations in real time. Using artificial intelligence, the robot captures its surroundings and transmits a live digital replica into the CAVE, where a human operator’s movements control the robot, creating a seamless exchange between physical and virtual worlds.

“This project opens a lot of possibilities and aligns with where we want to go at IST and UCF,” Cruz-Neira says. “We do a lot of work with defense, first responders and healthcare professionals, and in many cases, we see the need for a human [presence in locations] that aren’t feasible. By combining mature technologies available in the commercial world with some of our more advanced algorithms and system designs at UCF, we’ve finally been able to come together to make this prototype and showcase it in December 2025 at [the Interservice/Industry Training Simulation and Education Conference], a major defense training environment.”

Cruz-Neira continues to push boundaries, bringing people together and asking questions like, “What can we create next?” and “How far can we take this?”

And despite a lifetime achievement award, she’s clear about one thing: “I’m not done yet.”

Written by Juzanne Martin

To learn more about Cruz-Neira, visit bit.ly/cruzneira.



UCF Researchers Receive Auggie Award for Immersive Robotic Technology

A team of UCF researchers has won an industry award for using robotics and digital twins to blend human intuition with technological innovation.

Their work, “Be There Without Being There: Humanoid Robot Immersive Telepresence,” won an Auggie Award for the Best Interaction Product at this year’s Augmented World Expo in Long Beach, California. The team is comprised of computer science student researchers Judah Rowe ’23 ’25MS, junior Liam Abramov, and seniors SeNiah McField and Megan Bailey; Assistant Professor Mohsen Rakhshan; and led by UCF Institute for Simulation and Training Director and Agere Chair Professor of Computer Science Carolina Cruz-Neira.

The group developed a system that integrates a humanoid robot and a remote immersive environment that enables a human to interact as if it were in the robot’s location, creating a powerful immersive experience that gives a person the ability to interact as the robot. The human, digitally mapped to the robot, is able to engage in distant surroundings as the robot relays a digital twin rendering, in real time, to an immersive environment.

“From a technical significance, this is the perhaps the first working product or system that actually puts a human to be physically functional in a remote location, as if they were really there,” Cruz-Neira says. “We map the body of the human to the robot. So the human walks, the robot walks. The human moves, and the robot moves. The human turns the head, the robot turns the head. So it’s almost like the concept of the movie *Avatar*.”

Improving AI



UCF Researcher Aims to Make AI Safer, More Reliable

As people have begun to rely on artificial intelligence for assistance with complex or tedious tasks, they have found the technology to be... unreliable. Simple AI queries can return inaccurate information, data filled with mistakes, or reasoning that's been manipulated by other users.

But UCF researcher Amrit Singh Bedi aims to make AI safer and more dependable through a new project supported by the Defense Advanced Research Projects Agency (DARPA). With a one-year, \$340,000 grant, Bedi and his team of researchers will study AI systems and determine how to train them to withstand failures, attacks and unexpected situations.

"The goal of this project is to study how AI systems can become more resilient by learning to recognize weaknesses in their own reasoning and improve their behavior over time," Bedi says. "At a high level, the project explores the idea of self-improving AI for safety – AI systems that can adapt

and strengthen their own decision-making processes rather than relying solely on static safety rules or external corrections."

Bedi, an assistant professor in the Department of Computer Science, says that while generative AI systems are becoming more capable, they remain vulnerable to manipulation through carefully crafted prompts, unexpected inputs, or adversarial conditions. These exploits can lead to inaccurate data, which can negatively affect the end user.

"The gap between apparent capability and true robustness is especially concerning in mission-critical settings, where even a small deviation can have serious consequences," Bedi says. "We were motivated by the need to move beyond surface-level alignment and develop AI systems that can actively recognize, withstand and recover from adversarial pressure while staying faithful to mission goals."

Bedi and his team in the SafeRR AI Lab plan to combat this issue

by exploring the concept of "self-hardening," which means that AI systems would be able to detect when they're being manipulated with misleading instructions, tricky wording, or hostile inputs. Instead of veering off course, AI systems would respond to manipulation by strengthening their own responses.

The findings could help improve the reliability of AI systems that are used in defense operations, autonomous systems, and robotics.

"If AI is used to support defense, healthcare, emergency response or cybersecurity, it needs to keep working correctly even when the situation is confusing or adversarial," Bedi says. "Our research helps build trust in AI systems for these important applications."

Written by Marisa Ramiccio

To learn more about Bedi's research, visit bit.ly/amritbedi.

A portrait of David Mohaisen, a man with a beard and mustache, wearing a dark suit, white shirt, and dark tie. He is looking slightly to the right with a serious expression.

A NEW LEADER

David Mohaisen Named Associate Dean of Graduate Affairs for UCF College of Engineering and Computer Science

The UCF College of Engineering and Computer Science (CECS) has selected a new associate dean of graduate affairs. David Mohaisen, a professor of computer science, will step into the role following the appointment of Ali Gordon, the current associate dean of graduate affairs, as dean of the College of Engineering at Wichita State University.

Mohaisen says that it is truly an honor to be selected for this role.

"I am grateful for the trust placed in me by the college leadership, faculty and colleagues," Mohaisen says. "CECS has a strong graduate enterprise with exceptional students, faculty and programs, and I look forward to contributing to its continued growth and impact."

Mohaisen was chosen based on his strong scholarly record, vision for the role, clear understanding of the key aspects of graduate education and his ability to translate complex challenges into clear, actionable plans.

"The search committee noted his balanced approach to growth, attention to both big-picture strategy and implementation, and his commitment to improving the student

and faculty experience," says Michael Georgiopoulos, the dean of CECS. "In my interactions with Dr. Mohaisen, I found him to be thorough, thoughtful, energetic, and ready to take on the challenge of leading our graduate programs, with support from faculty and staff, to new heights."

Mohaisen's vision for this position is centered on strategic and sustainable growth of the college's graduate programs while maintaining academic quality, research excellence and student success. His goals include strengthening collaboration and alignment across graduate programs, supporting faculty and student research productivity, expanding opportunities in strategic areas such as AI and cybersecurity. He says he also hopes to build clear, collaborative and transparent processes that support the college's mission.

"I see this role as highly collaborative and service-oriented," Mohaisen says. "I value openness, accessibility and strong communication, and I look forward to working closely with faculty, staff and students across the college in support of their success. CECS already has exceptional momentum, talent and many strong initiatives underway, and

I hope to contribute by supporting and building upon those efforts in ways that continue advancing the college's strengths and opportunities."

About David Mohaisen

David Mohaisen is a professor in the Department of Computer Science at the University of Central Florida, with courtesy appointments in the Department of Electrical and Computer Engineering and the School of Modeling, Simulation and Training. He joined UCF in 2017 after serving as an assistant professor at the University at Buffalo, SUNY and as a senior research scientist at Verisign Labs. He received his doctoral and master's degrees in computer science from the University of Minnesota. His research interests span systems security, trustworthy AI and online privacy.

Written by Marisa Ramiccio

**To learn more about Mohaisen,
visit bit.ly/mohaisen.**



BUILDING SECURE AI

Computer Science Professor Aims to Build Novel Framework to Make AI Infrastructure More Secure

Artificial intelligence (AI) has become a valuable tool for data analysis across the finance, healthcare and government sectors. But AI has a significant flaw – it can expose private and sensitive data during computation.

Professor Qian Lou of the UCF Department of Computer Science plans to change the way data is protected by AI with the support of a \$600,000 grant from the National Science Foundation's Faculty Early Career Development (CAREER) Program, which supports early-career faculty who have the potential to serve as role models in research and education.

Lou's objective is to enable AI to perform computations on protected

data without exposing the underlying information to the cloud provider or to unauthorized users.

"My goal is to build security into the AI infrastructure itself – from secure algorithms and GPU kernels to compilers and software libraries," Lou says. "If encrypted computation becomes fast, scalable and easy to use, organizations can benefit from AI without surrendering the privacy of their data or models."

How AI Queries Work

Medical facilities could use AI to analyze medical images or clinical records. Banks might employ AI models to detect fraud and money laundering schemes. National security agencies may use AI for defense

purposes. In each of these instances, the use of sensitive data would be required, but that data would no longer be protected.

When an AI query draws information from private data, the data is encrypted while it is sent to the server. As the data enters the AI system or the graphics processing unit (GPU) memory, it is decrypted for inference.

"During that time, raw inputs, model activations, and sometimes proprietary model parameters may be exposed to the cloud operator, a malicious insider, or an attacker who compromises the host," Lou says. "Our project seeks to keep sensitive values protected while computation is running."



The Challenge of AI Security

As Lou and his team develop their research, there are several challenges to overcome. The first is performance. While modern GPUs are optimized for basic AI computation, they can't adequately handle encrypted mathematics. This means that security compromises speed and efficiency. AI also involves many different operations include nonlinear functions, inferences and training models. Different security measures may be needed for each function, so there isn't a one-size-fits-all security method that will work well for every task.

Another obstacle is usability. Secure AI requires deep expertise in cryptography, which not every developer had. Lou's goal is for encryption to be automated so that developers can focus on writing programs while the system secures itself.

A Novel Framework for Secure AI

The idea behind Lou's AI framework is simple: embed security into the platform as it is built.

"Our framework treats security as an AI-infrastructure problem," Lou says. "It co-designs the mathematics, cryptography, GPU and accelerator

kernels, and software automation. A key idea is algebraic invariance — reorganizing encrypted computation to avoid unnecessary ciphertext transformations. The project also develops integer and modular kernels for common accelerators and uses hybrid protection when that is the better fit. The goal is a practical stack, not a single algorithm."

The end result will be open-source software that eliminates the need for specialized cryptography and connects to existing AI frameworks. Additionally, students will also gain hands-on experience in AI, cybersecurity, GPUs and applied cryptography.

"The project will lead to the creation of course and laboratory modules, research opportunities, mentoring, public tutorials and K-12 outreach," Lou says. "Students will learn not only how AI models work, but also how the underlying infrastructure can be redesigned for security."

Written by Marisa Ramiccio

To learn more about Lou's research, visit bit.ly/qianlou.



Yan Solihin Named Fellow of Prominent Computing Organization

After decades of pushing the boundaries of how computers think, Pegasus Professor Yan Solihin of the Department of Computer Science has earned the highest professional distinction in computer architecture.

The Association for Computing Machinery (ACM) has named Solihin to its 2025 class of fellows — a distinction awarded to just 71 professionals worldwide for their remarkable achievements, technical innovations and lasting contributions to the field.

Selected from ACM's 100,000 members, the new fellows were formally inducted at the ACM Awards Banquet this past June.

For Solihin, the recognition represents something deeper than a title.

"Being one out of 71 selected for this designation worldwide in 2025, I feel deeply honored," he says. "This recognition is the culmination of decades of research in computer architecture, with contributions from my former and current Ph.D. students and collaborators."

Although Solihin is a pioneer of "fair cache sharing" and "cache quality of service, he says these aren't the biggest achievements of his career.

"The achievement I am the proudest of is the positive impact I have made on students that I have advised," he says. "Some of my past students have established good careers of their own, including becoming professors at Oxford University, Northeastern University, UC Santa Cruz and Binghamton University."



Could AI Lead to The Fountain of Youth?

Computer Scientist Yu Tian Wants to Discover Novel Solutions for Longer, Healthier Lifespans

Every day, Yu Tian clocks in to his AI and Imaging in Medicine (AIM) Research Lab at UCF working to change life as we know it.

“We often hear that ‘we’re at a turning point in human history,’” Tian says, “and with AI research in a university setting like this, it’s true.”

Tian has adapted quickly — and gladly — to life at UCF since arriving last May to teach computer science. He is now living what he once imagined as the idyllic scenario: talented artificial intelligence (AI) specialists coming from around the world to collaborate with medical experts and launch new projects, pressing each other through formidable challenges and achieving the unachievable.

“The ultimate goal for my team is to extend people’s lives, significantly,” Tian says.

Assembling a Dream Team

Tian’s ambition has eluded human pursuits for millennia. Even medical AI has barely begun to approach its potential impact — especially when compared with other AI applications like chatbots and fintech.

“There are two major limitations with medical AI,” Tian says. “One is the privacy of data — AI requires a lot of data. The other issue holding back progress is collaboration. Computer scientists working on AI typically don’t know medicine. We need input from doctors and biologists. In that sense, universities are uniquely positioned.”

With all of this available to his AIM team, they’ve been building a system that can learn from each patient’s history, exams, MRIs, CTs and life information. Given the copious

amount of data, the AI model would then predict the person’s future medical trajectory.

For example, a doctor could know the probability of dementia five years before onset. An oncologist could use MRI scans to determine the gene mutation associated with a tumor within seconds rather than performing surgery and then waiting weeks for the results of a genome test.

Diseases would be preventable. Treatment plans would be more effective and less costly. People would be healthier, happier and live longer.

How close are we?

“Close,” Tian says. “It’s sometimes hard for me to believe, too.”

At the Forefront of AI

As recently as 2020, Tian didn’t give much thought to topics like longevity or the location of Orlando.

While working to complete his doctorate, Tian had immersed himself in familiar computer-science objectives at the University of Adelaide in Australia. Day and night, the lab became a replacement for the home he'd left on the Chinese peninsula of Liaodong. In just three years, he published more than 15 papers.

Yet something was missing: a greater purpose.

"I've always wanted to discover a solution to a mystery that has never been solved," he says.

He didn't know what that mystery might be until an advisor asked him, "Do you want to work on fun AI video projects, or do you want to really impact lives?"

The conversation grabbed Tian's attention. He'd been reading about groundbreaking AI research in computer vision and medical imaging. Many of the papers came from an institution in the U.S., a place called UCF.

After finishing his doctorate, Tian came to the U.S. for postdoctoral work at Harvard University and the University of Pennsylvania, digging his attention deeper into not only medical AI, but also into UCF.

"I found out about UCF's young medical school with physicians and scientists working together. And then I heard about the hospitals in the Orlando area, including AdventHealth and Orlando Health, and this freedom to explore AI applications. I wanted to be in an environment like that, where research can advance quickly."

Tian fast-tracked his postdoctoral role so he could accept a position at UCF, participate in the collaboration, and continue his pursuit of the unsolved mystery: extend life. Shortly

after he arrived, the Institute of Artificial Intelligence (IAI) opened its doors — and Tian went on to establish his lab, taking a significant step toward his long-term research goals.

Big Goals Lead to Big Impact

You can sense a profound energy inside AIM.

It's a convergence of talent and enthusiasm. In addition to Tian, the institute has recruited two dozen faculty, more than 100 doctoral students and 10 postdocs to imagine and encourage progress. The expertise transcends domains, including computer science, robotics, finance, smart cities and medicine.

"We all have big goals," Tian says.

Less than a year after heading up the AIM Lab, he says, "We aren't far off from deploying AI models in hospitals to help doctors."

Tian works at the same speed as technology (fast), until a certain topic comes up. Family. He looks up and begins to describe his hometown, his mother, and the sight of his dad walking in the door one night with the family's first computer.

"He and I were fascinated. We went from trying to install the first software to building our own computers and robots. I could never get enough of it."

Those memories motivate him to work even faster toward his ultimate goal.

"I want to help everyone have a quality life to 100 — or longer. My family. Me. All of us," he says. "I love the possibility. I love being here, at this turning point, with the opportunity to make a huge impact."

Written by Robert Stephens



Joe LaViola Recognized for Work in Human-Computer Interactions

Professor Joseph LaViola Jr. has been fascinated by human-computer interaction (HCI) since his undergraduate days in the mid-1990s. Decades later, that interest has propelled him to the forefront of the field, earning him global recognition from his peers.

LaViola is one of 11 computer science academics and professionals selected for induction into the Association for Computing Machinery's Special Interest Group on Computer-Human Interaction (ACM SIGCHI) Academy this year. He was honored during an awards ceremony at the 2026 CHI conference in Barcelona, the leading international conference on human-computer interaction.

"It means a great deal to me, both personally and professionally, to be included with so many outstanding HCI researchers and pioneers in the field," LaViola says. "This honor helps recognize the work I have done over the last 20-plus years in the field, and I am truly humbled to be part of this select group."

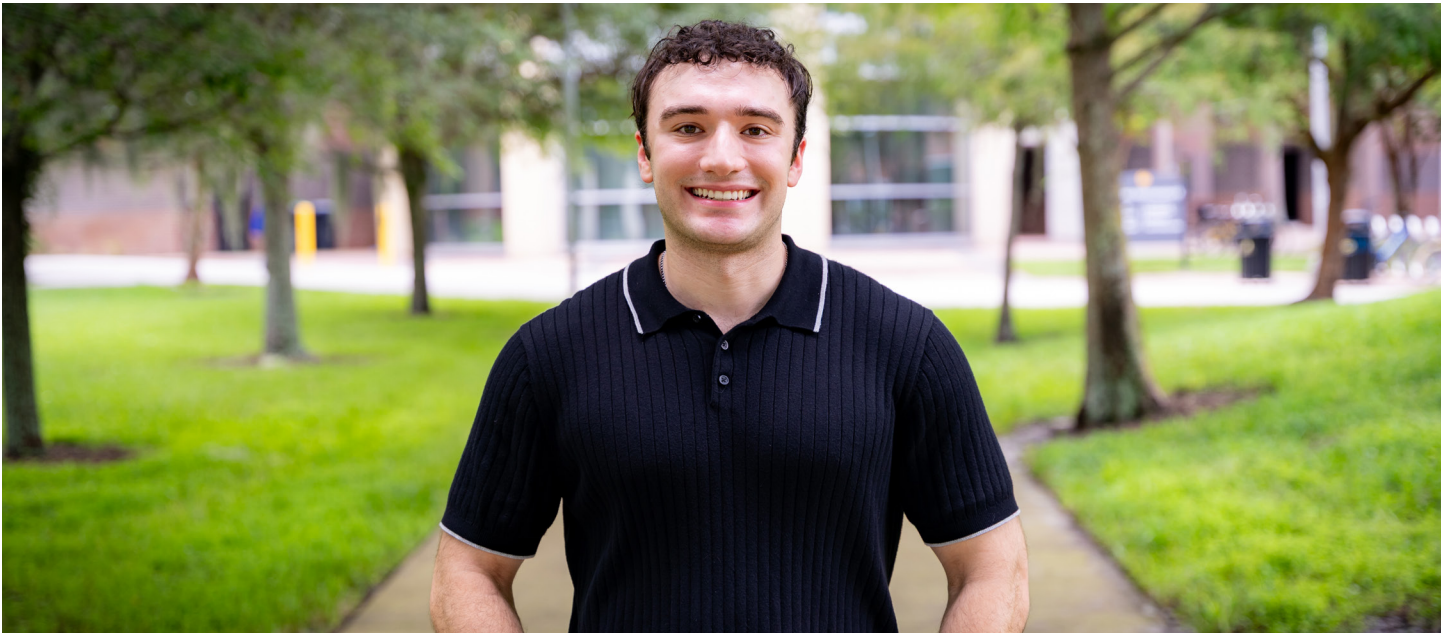
LaViola manages the Interactive Computing Experiences Research Laboratory at UCF, where his work with 3D user interfaces, 2D and 3D gesture recognition and sketch- and touch-based interfaces contributed to his induction into the ACM SIGCHI Academy. He and his team are currently developing multimodal interfaces that use visual language models to track users' movements and eye gaze and interpret their speech. The goal is seamless human-computer interaction, enabling computers to predict user needs without requiring exact commands. He's also the lead author of the first comprehensive book on the topic.



ON THE FAST TRACK



Programming Student Develops
App That Maps the Quickest Routes
Around the UCF Campus



On a campus that boasts more than 1,400 acres, finding your way from one end of campus to another in the shortest amount of time is essential. Computer science student Luke Dederich realized this as he tried to determine the fastest way to walk from his dorm to class. Would cutting through the parking lot save time or should he stick to the sidewalks?

That train of thought sparked an idea for a new app called walkUCF. Users can enter their start location and destination, and the app will map the quickest route, which could take them through buildings or across patches of grass. Dederich has tested some of the routes and says he and other students he knows personally use the app frequently to zip around campus.

"One of the reasons I enjoyed making this application so much is because I knew it was something I would actually use," Dederich says. "The first time I tested the application, I discovered the path I have been taking from my dorm to the gym for the past two years was far from optimal. Since then, I have been taking the new path and saving some time."

This isn't the first app that Dederich has created, but it is the first app that he has developed for fun. The process not only enhanced his technical knowledge of app development but also provided some professional and personal insights as well. His LinkedIn post on walkUCF garnered much attention from students and faculty alike, which broadened his perspective on the

power of networking.

"On a more personal level, managing this project independently has also honed my ability to troubleshoot and find solutions to technical challenges on my own," Dederich says. "Taking a web server from initial deployment to production proved especially instructive for my troubleshooting skills."

Troubleshooting is a skill that Dederich has honed through his experience on the UCF Programming Team, which has secured many wins at both national and international competitions. Without any preparation, he landed a spot on the Division II team and traveled to Florida State University this past fall for the International Collegiate Programming Contest North America Southeast Regional competition.

"As Team UCF Override, we performed very well," Dederich says. "It was a super fun experience, especially for someone like me who was new to competitive programming."

Dederich plans to take his passion for programming to Lockheed Martin, where he will work as a software engineer for the missiles and fire control division. He secured the job through the Lockheed Martin College Work Experience Program, a unique, year-long opportunity that allows undergraduate and graduate students to work on projects for the aerospace and defense company.

Dederich aims to become a professional software engineer after graduation, but for now, he can add amateur app developer to his resume.

His advice to other students who want to create their own web applications is to find a solution to a common problem and to consider the end user along the way.

"Identify a problem and come up with an idea to solve it," Dederich says. "The idea is by far the most challenging part. As long as the idea has a reasonable scope, all the other pieces fall into place."

Written by Marisa Ramiccio

Dederich's Tips for App Development

- Ask your audience what they think about the problem. Is it one worth solving? If the proposed application existed, would they use it?
- Don't be afraid to learn as you go. If you have the core skills needed for the project at the beginning, it is easy to learn secondary skills along the way.
- Strive for high quality in every aspect. No project will ever be perfect, but many projects are held back because small details are inadequately done. If you add a feature, ensure it is bug-free for edge conditions. If you make a website, ensure it looks presentable at all screen sizes. Putting effort into these less monumental aspects of an application vastly improves the final product's user experience.



UCF Students' AI System, Created as a Senior Design Project, Assists Orlando Health Robotic Surgeries

A student engineering project that began with using artificial intelligence (AI) to track cafeteria forks transformed into a system that will help Orlando Health surgeons perform robotic surgeries more efficiently.

Laura Brattain, a UCF biomedical engineer, mentored six College of Engineering and Computer Science seniors, who developed the AIMS (AI for Medical Surgery) system that keeps track of surgical staples, enabling surgical teams to operate more efficiently, reduce waste and improve sustainability. The new technology was developed as part of the college's Senior Design capstone course that encourages students to create a usable product before they graduate.

Students built an end-to-end application and tested it in an operating room at Orlando Health several times to improve the application. Alexis Sanchez, robotic surgery program director at Orlando Health Orlando Regional Medical Center (ORMC), participated in the project and is now using the system in his surgeries.

As Florida's Premier Engineering and Technology University, UCF is focused on leveraging technology to

strengthen the health of communities.

That is Brattain's research focus — integrating biomedical AI, medical ultrasound and surgical robotics to create healthcare innovations that improve care. An associate professor at UCF's College of Medicine and a faculty member of the UCF AI Initiative, she holds secondary positions in the College of Engineering and Computer Science.

Sanchez says the technology can be applied to many other processes in the future, such as keeping track of instrument usage during non-robotic surgeries.

"We work in a very fast-paced environment, so having this to be able to detect waste has incredible potential to improve both efficiency and sustainability," he says. "This is just the beginning. And this collaboration underscores both Orlando Health and UCF's commitment to innovation to improve healthcare for our community."

How the System Works

Many of the new medical tools developed for the operating room are disposable. Once they have been removed from their sterile containers and placed on the operating room

table, they must be discarded — even if unused — because they are no longer considered sterile. During robotic surgeries, the robot cuts and staples tissues at the same time to reduce bleeding. But no one is sure how many staples a particular surgery will take.

During a visit to the hospital, Brattain joined Sanchez in observing the entire process of performing a robotic surgery, from preparation to completion. After evaluating potential areas for improvement, they suggested that students develop an AI system to track how many staples are placed on the surgical table versus how many are actually used.

"I wanted the students to know that while they can all create a computer program, they can also make an impact in healthcare," she says. "To avoid developing technologies that end up collecting dust on the shelf, we should work with clinical experts to solve problems that can ultimately improve the care of patients."

AIMS has a camera feed linked to a computer in the operating room. During surgery, their AI software directs the camera to record each staple that comes into the operating room and track its use. That data

can then be analyzed to determine exactly how many staples are used to avoid opening unnecessary staples for surgery.

Life in the real world of surgery offered unique challenges to the young scientists. They went through multiple iterations with Sanchez and his team at Orlando Health.

Initially they didn't account for the low light conditions in operating rooms, so they had to change the camera's angles and settings to better capture photos of the staples. They had to address other issues: What happened if someone placed a tool in front of the staples during surgery? What happened if someone moved the staples or stepped in front of the camera?

"We are thankful that Dr. Sanchez and his team provided the students with the opportunities to test AIMS in real-world scenarios where a regular robotic procedure is happening in the operating room and the medical team is moving around as usual," Brattain says. "You can't imagine these things in a classroom. Students need to see their science through a medical provider's eyes."

Creating Real-World Technologies

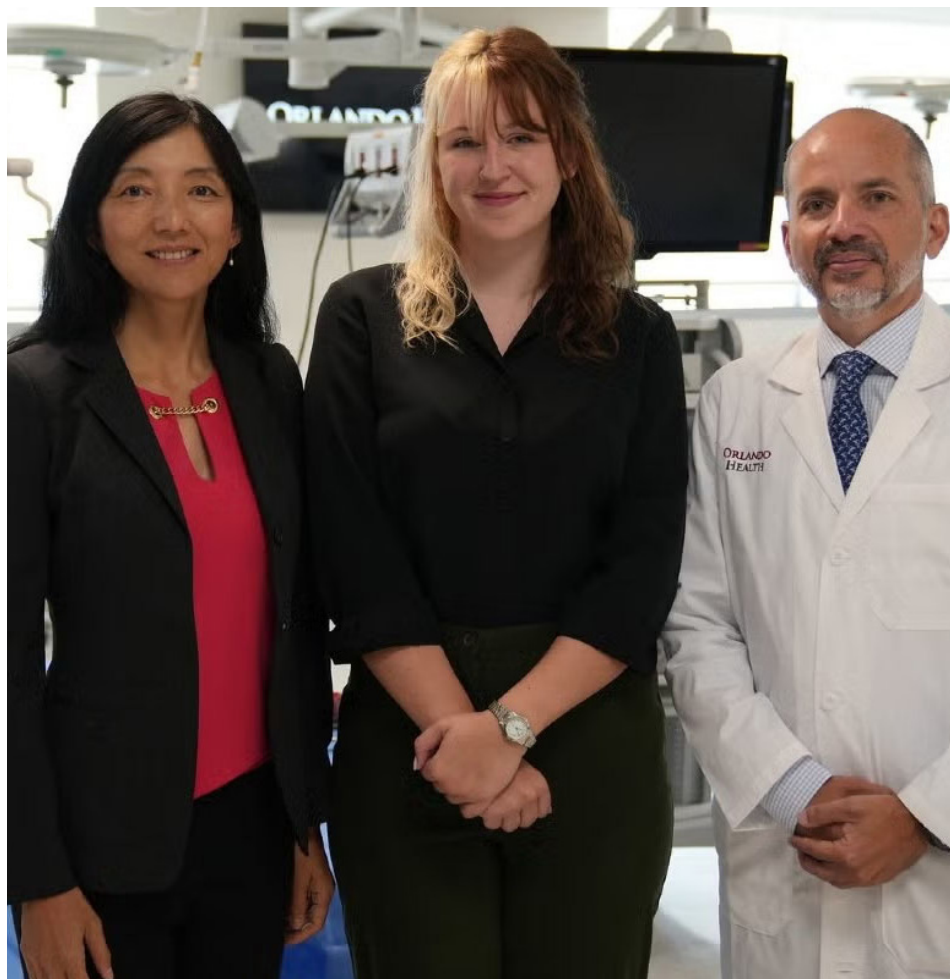
The goal of the Senior Design capstone is to "give students the opportunity to say, 'I actually made something,'" during their education, says Matthew Gerber, a faculty member who helps lead the module. "We love it when the project turns into an application that's being used in the real world. We wish it would happen more often."

To further engineering-medicine partnerships, Brattain offered an Introduction to Medical Robotics course to engineering majors this semester — the first time the course has been offered in a decade.

Students learned about how medical robots are designed and manipulated. As part of the class, they visited Sanchez's team and saw the hospital's Da Vinci robot in action.

Students had a unique chance to interact with robotic surgeons, who have been generous with sharing their knowledge and answering questions. All these visits were coordinated by Lillian Aguirre, a clinical nurse specialist on Sanchez's team and a UCF College of Nursing alum. The students and Brattain are grateful for her dedicated assistance.

Sanchez was at UCF when the students presented their Senior



Design project and says he was proud of what they had accomplished together.

"One of the students came up to me and there were tears in his eyes," Sanchez says. "He said, 'I always hoped my skills would help humanity one day, and now I have.'"

Gerber sees plenty of future opportunities to create UCF engineering-medicine systems that impact patient care.

"Doctors are faced with so much information," he says. "With AI, we can quickly and objectively analyze all that information to help give doctors better, cleaner information. AI can say to doctors, 'Don't worry about that. Focus on this.'"

Orlando Health is a UCF Pegasus Partner, a program that offers opportunities for select partners to engage across the university in ways that create meaningful value for both organizations. That engagement includes talent development and recruitment, shared research projects, joint ventures and collaborations, and strategic philanthropy.

Working together on projects like this creates synergy and provides the

potential for advances in the science of medicine in Central Florida.

Rachel Leiner '25, who graduated from UCF this spring, was the student leader for the AI project.

"Coming into a project that's for a grade and seeing that we made something that can help improve the hospital workflow makes me very proud," she says. "We started this project by developing AI to track cafeteria forks. We had nothing, and in eight months we had a working software app and a usable AI model to track surgical staples in an operating room."

Written by Wendy Sarubbi

To view the media coverage of this project, visit bit.ly/wftvAI.

VIRTUAL VICTORY

UCF-Led Virtual Reality Project Reaches Two Major Milestones

After years of research and development led by experts at UCF in collaboration with researchers from universities across the U.S. and in Europe, the Virtual Experience Research Accelerator (VERA) has reached two major milestones: powering its first full-scale study to address one of virtual reality's most persistent barriers to adoption and awarding its first use grant to enhance immersive learning and information across industries.

VERA, a platform funded by the U.S. National Science Foundation, is the first, large-scale system for extended reality human subjects research and designed to advance the speed, scale and scope of immersive research. The platform enables immersive researchers to design, deploy, and manage virtual and augmented reality (VR/AR) studies with remote participants therefore significantly improving the quality of the science, while reducing costs, lowering logistical barriers and expanding participant reach.

"No one has built anything like VERA before," says Pegasus Professor Gregory Welch, lead principal investigator on VERA. "The team was really starting from scratch to create this national platform, integrating AI technologies and establishing policies and procedures that will produce methodologically

rigorous behavioral data."

"We're excited for VERA to now start to run in an open beta mode and reach these two firsts," Welch continues.

Accelerating Understanding of Cybersickness

For its first major large-scale study leveraging remote participants, VERA is helping researchers address one of the most persistent challenges in virtual reality: cybersickness.

Cybersickness occurs when symptoms such as nausea, dizziness and discomfort are caused by a mismatch between visual motion in a headset and the user's physical motion. Associate Professor of Computer Science Gerd Bruder, who is an affiliate researcher in the Institute of Simulation and Training, is leading the research study in collaboration with other UCF researchers and external partners.

"Understanding who is susceptible to cybersickness is critical to improving VR accessibility, making VR more comfortable for all users and enabling broader adoption across research, education and industry," Bruder says.

Early data collection highlights the powerful capabilities of the VERA platform to accelerate VR research at an unprecedented scale.

In just 15 cumulative days, VERA had more than 250 participants complete the full study protocol. In comparison, the original in-lab study collected data from just 30 participants and in traditional VR research settings, studies with hundreds of participants often require several months to complete.

For the study, each participant experiences a controlled VR rollercoaster ride on their own headset and provides sickness ratings at periodic intervals, a pre- and post- exposure questionnaire, an in-VR visual acuity assessment, and continuous head-tracking data. Each session is completed in approximately 30 minutes at home.

Enrollment is ongoing with a target of 2,000 participants. Preliminary analyses already suggest meaningful individual differences in how quickly and severely participants experience cybersickness.

"VERA was built to study problems like this with a combination of speed, scale and experimental complexity not previously possible," Welch says. "The sectors where VERA can make an impact are expansive, from healthcare to workforce training to accessibility to learning."

Written by Julie Harper

To learn more about Bruder, visit bit.ly/gerdbruder.



Destined for Science

Academic Upbringing in Siberia Inspires Assistant Professor's Career

Deep in the pine forest of Siberia lies a unique scientific community that was envisioned to be the New Atlantis for science. At its peak, the town was home to more than 65,000 scientists who worked at 35 research institutes dedicated to molecular biology, chemistry, physics and cybernetics. Neighbors and friends would gather at the local cafes or courtyards, not only to exchange pleasantries, but to discuss the latest discoveries and to debate new scientific trends.

While this sounds like the setting for a sci-fi novel, it's actually the hometown of Assistant Professor Kirill Medvedev, a new faculty member in the Department of Computer Science. Medvedev grew up in Akademgorodok, which literally translates to "Academic Town," a place that sparked his interest in bioinformatics and inspired his career.

"The constant exposure to open, curiosity-driven inquiry made the language of science feel as natural as the Siberian forest around us," Medvedev says. "My passion for bioinformatics and computational biology was ignited by a fascination with three-dimensional protein structures. I realized that computational approaches are indispensable for decoding life's molecular machines, and it set me on

the path toward research in the field of computational structural biology and bioinformatics."

Medvedev earned his doctoral degree in mathematical biology and bioinformatics from the Institute of Cytology and Genetics in 2015. Since then, he's worked with Professor Nick Grishin at the University of Texas Southwestern Medical Center as a postdoctoral researcher. His work focuses on the classification and analysis of large-scale biomedical datasets that span the molecular, cellular and tissue levels.

Within the past decade Medvedev developed the DrugDomain database, which lists the domain features of human proteins that are targets for small molecules and drugs. He augmented the DrugDomain database with AI-powered protein structure prediction, creating a first-of-its-kind resource that maps thousands of post-translational modifications to their drug targets across the human proteome. He also uses computational modeling to analyze variations within cancer types and employs deep learning methods to identify cancer subtypes.

Now Medvedev's taken his scientific prowess to UCF, where he will teach the discrete mathematics course this fall. He hopes to instill both practical and technical

knowledge in his students.

"I hope to share with my students not only the course knowledge but also my experience of being a scientist," Medvedev says. "I believe that integrity is the defining characteristic of a scientist."

Any doctoral students with strong computation skills who are interested in working with Medvedev can connect with him through email. A basic understanding of molecular or structural biology or biochemistry is beneficial but not required.

The opportunity to collaborate with the next generation of scientists — as well as established colleagues — is what drew Medvedev to UCF.

"Today, truly groundbreaking science cannot be done by one person, or even one lab, but only through collaboration among multidisciplinary teams," Medvedev says. "I was interested in the University of Central Florida because it's such a dynamic and fast-growing research hub — one that actively promotes collaboration among researchers."

Written by Marisa Ramiccio

To learn more about
Medvedev's research, visit
bit.ly/kirillmedvedev.



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