



**SIGNIFICANT**

# Bits

Newsletter Fall 2020

**Computing**  
*meets the*  
**Challenge**

UMass**Amherst**

College of Information  
& Computer Sciences

# SignificantBits

Fall 2020

Significant Bits is published by the College of Information and Computer Sciences at the University of Massachusetts Amherst.

Email your news, suggestions, comments, and contributions to [communications@cics.umass.edu](mailto:communications@cics.umass.edu).

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# Letter from the Dean

A global pandemic and the resulting economic downturn, protests against systemic racial oppression, a tumultuous U.S. election cycle, wildfires in California—these issues have consumed our attention and affected our lives in unimaginable ways since March. At CICS, the past eight months have seen the majority of our students shift to remote learning, with huge effects on how we conduct teaching and research. Yet with each development, I have seen our community respond with ingenuity, concern for one another, and a steadfast commitment to our mission.

In this issue of *Significant Bits*, you'll find a sampling of the ways our community has been able to tap its creativity, resilience, and compassion to catalyze positive change in the face of 2020's challenges. From our contributions to the fight against COVID-19 (p.4) and a call for federal regulation of face recognition technologies (p.8) to visualizing our feelings about climate change (p.6) and finding new ways to teach (p.18), our faculty have quickly applied their expertise to our current challenges—and I could not be more proud of their accomplishments. Computing, especially now, has the power to help people and do good in the world.

Over the summer, as protests started in cities and towns across the U.S. in response to police killings of Black Americans, our community came together to ensure that our vision for fair and equitable computing extends not only to our research, but also to the way we conduct ourselves in our classrooms, workplaces, residence halls, and the greater community (p.2). While inclusion and equity have long been college priorities, the Black Lives Matter movement has spurred more members of our community, including alumni, to join conversations about systemic racism and to take action. We welcome the opportunities for dialogue and the perspectives that everyone brings to this important work.

I have been heartened to hear from alumni, friends, and donors that our college's vision for fair and equitable computing—computing that is good and does good—resonates with them. All of us, and especially our students, have been buoyed by the contributions our network has made to help realize this vision by giving to our scholarship funds, volunteering to help students prepare for careers, and engaging with our college through events. Our work continues and you help us move forward. Thank you.

With gratitude and best wishes for your health and safety,



Laura Haas, Dean





# CICS Takes Action on Racism & Inequity

The killing of George Floyd in May and the subsequent worldwide protests have led many institutions to address their complicity in systemic racism. While CICS has taken strides over the past several years toward becoming an antiracist institution, the events of the summer were a catalyst for a much deeper and broader examination of racism and inequity within the college.

In 2018, the college hired Erika Dawson Head, director of diversity and inclusive community development, and Emma Anderson, director of inclusive education and teaching support, to build on the college's existing diversity programs, which included community outreach and affinity groups for women and LGBTQIA+ students. Under their guidance, the college has developed new affinity groups for people of color, exemplary faculty and student mentoring programs, the area's first hackathon for women and non-binary students, the Massenberg Summer STEM Institute for disadvantaged youth, and other programming. As protests

built this summer, and after the college was subject to a racist Zoombombing incident, the CICS community took a leap in its antiracism efforts.

At the time, Dean Laura Haas presented a plan calling for the community to work together "to ensure that our vision for fair, equitable computing is realized not only through our research, but also through the way we conduct ourselves in our classrooms, workplaces, residence halls, and the greater community."

Dean Haas convened an all-college online meeting where more than 100 faculty, students, and staff participated in frank discussions. She then asked community members to engage in developing and implementing a long-term strategic plan for diversity and inclusion in the college and for enacting systemic change. More than 60 volunteered. The dean, Anderson, and Dawson Head created the Committee Against Racism and for Equity (CARE), with Senior Teaching Faculty Michelle Trim and doctoral student Nader Akoury as co-chairs. The committee organized the large group of volunteers into subcommittees on student learning, faculty teaching, mentoring, and sustaining, as well as cross-committee working groups, and they initiated several more college-wide listening sessions.

The priorities that CARE has identified for the first year include helping faculty create more inclusive course materials and classroom experiences, developing equitable methods of assessment for courses and admission to the computer science major, investigating policies and procedures for graduate admissions, developing a suite of resource materials and events focused on cultural knowledge communication, providing mentoring to doctoral students interested in academic careers, and teaching students to recognize and combat microaggressions. In addition, CICS has called on the college community, including alumni, to sign its Pledge Against Racism, committing to take antiracist actions.

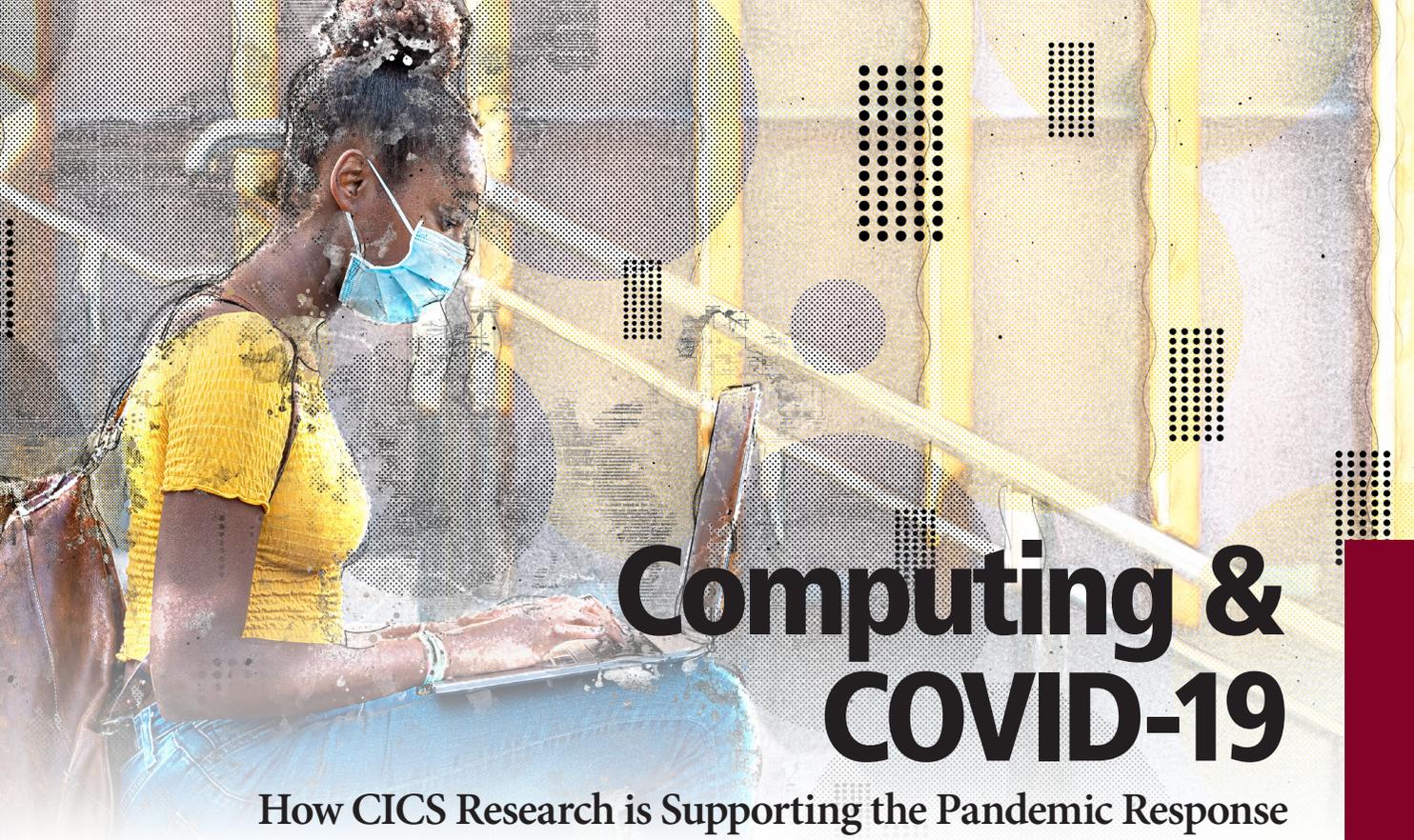
Those leading CICS's antiracism efforts are optimistic about fostering true change in the college and in the industry. "I think a lot of people are looking around at things that are happening in the world and are just over it," Trim observes. "They don't want to be part of this machine that's holding particular people back or keeping particular people down. I see that in the new faculty we hire, I see that in the grad students, and I see it in my undergrads." Dean Haas also has faith that the college will be able to maintain the momentum they've built: "One of the things I love about this college—it's a very ambitious group of people and we never do anything halfway."

# Antiracism Book Groups Facilitate Community Discussions About Race

Since February, over 230 community members have participated in multisession book discussions facilitating conversations on racism and inequity, led by Erika Dawson Head and Emma Anderson. Nearly 100 individuals participated in the first discussions of Robin DiAngelo's *White Fragility*, with 30 percent repeating the process. The groups then turned to Octavia Butler's *Parable of the Sower* (before it became a sudden bestseller) and Jane Margolis' *Stuck in the Shallow End*. They will next read Ruha Benjamin's *Race After Technology*.

"I think most of the people participating in these groups have felt more comfortable about having conversations about race," Dawson Head observes. "There were some hearts and minds that were changed and some eyes that were opened."





# Computing & COVID-19

## How CICS Research is Supporting the Pandemic Response

At the University of Massachusetts Amherst, a broad coalition of faculty, students and staff, including those from CICS, are working to address the challenges of combating COVID-19. From creating early diagnostic technology to improving contact tracing and prediction models, their research is contributing to the scientific advancements at the forefront of the effort.

### Assisting Contact Tracing Efforts on Campus

Distinguished Professor and Associate Dean **Prashant Shenoy** and doctoral student **Amee Trivedi** have released a new digital contact tracing tool, WiFiTrace, which is based on widely deployed WiFi technology and can be easily deployed without requiring students to install an app on their phones.

Trivedi recalls how this idea began in 2016 when she and Shenoy began a project for her doctoral work exploring the use of WiFi data logs for building-occupancy detection. The goal was to help physical plant managers program heating, ventilation, and air conditioning systems to save energy and provide user comfort.

“Since then we’ve had a meningitis outbreak and a couple of flu seasons, so we began learning how to use WiFi log data for contact tracing during an outbreak,” Trivedi notes. “We hope WiFiTrace will be a useful tool for health professionals to add to their contact tracing efforts to manage the early spread of COVID-19 on college campuses.”

### Interpreting Cough Sounds

Assistant Professor **Tauhidur Rahman** and doctoral student **Forsad Al Hossain**

developed FluSense, a new edge-computing platform that can detect coughing and crowd size. Using thermal imaging and neural network technology, their device accurately predicted daily illness rates when tested at UMass Amherst. Rahman and Hossain envision the extension of FluSense to hospitals, healthcare waiting rooms, and larger public spaces, expanding the arsenal of health surveillance tools used to forecast seasonal flu and viral respiratory outbreaks such as COVID-19.

Al Hossain says FluSense is an example of the power of combining artificial intelligence with edge computing, the frontier-pushing trend that enables data to be gathered and analyzed right at the data’s source. “We are trying to bring machine-learning systems to the edge,” Al Hossain says, pointing to the low-cost microphone array, Raspberry Pi, and neural computing engine inside the FluSense device. “All of the processing happens right here. These systems are becoming cheaper and more powerful.”



## Using Mobile Health Technology to Help COVID-19 Patients

Rahman is also part of a 60-member international task force along with Assistant Professor **Sunghoon Ivan Lee** that has concluded that mobile health (mHealth) technologies are a viable option to monitor COVID-19 patients at home, and predict which ones will need medical intervention. As inventors of mobile health sensors themselves, Lee and Rahman established a review of commercially available remote monitoring technologies that could be used in clinical practices to help patients and frontline healthcare workers monitor symptoms of COVID-19. The task force’s study, “Can mHealth Technology Help Mitigate the Effects of the COVID-19 Pandemic?” was published in the *IEEE Open Journal of Engineering in Medicine and Biology*.

“We carefully investigated whether the technologies could ‘monitor’ a number of obvious indicators and symptoms of COVID-19 and whether any clearance or certification from health authorities was needed,” Lee says. “We considered ease of use and integration flexibility with existing hospital electronic systems. Then we identified 12 examples of technologies that could potentially be used to monitor patients and healthcare workers.”

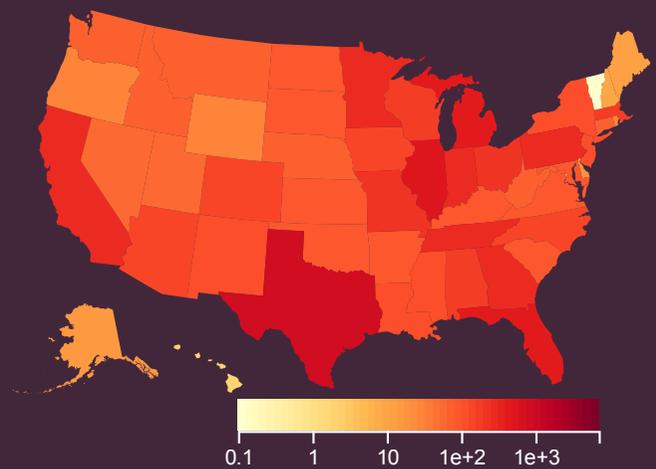
## Addressing Stress in Academia



CICS faculty and students are conducting research into broader effects associated with the pandemic on academic workers. Assistant Professors **Narges Mahyar** and **Madalina Fiterau**, Research Assistant Professor **Ali Sarvghad**, and doctoral students **Iman Deznabi** and **Tamanna Motahar** created a nationwide survey to assess the impact that the COVID-19 outbreak has had on academic communities.

Through participant responses, the team will analyze changes in health, levels of stress, levels of isolation, productivity, and financial stability. In the survey, the researchers explain that “determining the most affected aspects of people’s lives is the first step in moving towards mitigating the negative effects of the outbreak.”

COVID-19 Forecast  
2020 Week 47 - Incident Deaths (Observed)



## Improving Forecast Modeling

The UMass Influenza Forecasting Center of Excellence has developed the COVID-19 Forecasting Hub, an “ensemble” model which pulls information from various sources across the globe. The hub includes interactive visualizations of four-week forecasts for COVID-19 cumulative deaths, both by state and for the entire U.S. The center’s director, Nicholas Reich, coordinated the curation of forecasts along with **Katie House**, a recent UMass Amherst computer science master’s program graduate, and Nutcha Wattanachit, a biostatistics PhD student.

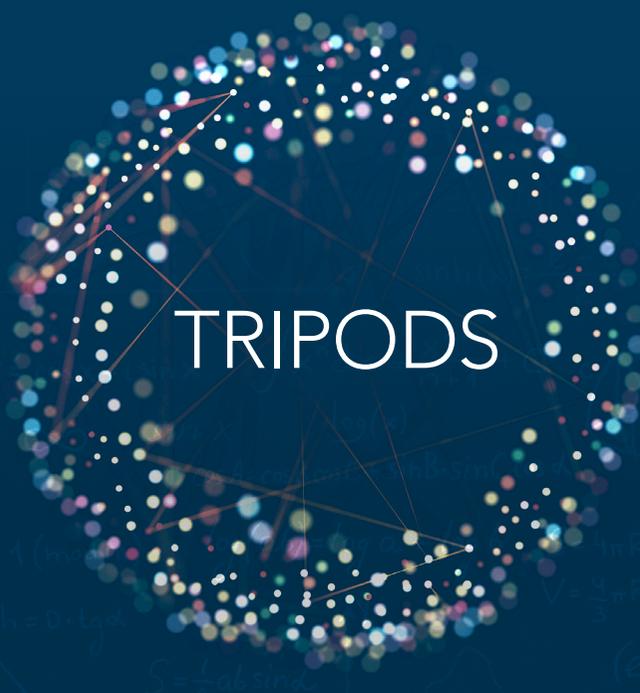
“Forecasting COVID-19 is a completely different ballgame because we can’t rely on 20 years of public health surveillance data like we have for flu,” says Reich. “Modeling has been such a central part of the COVID-19 discussion. This is really a massively important resource.”

One of the models used was developed by Associate Professor **Dan Sheldon** in collaboration with Reich and colleagues. The team has received a grant from the National Institutes of Health to develop new statistical methods for their individual mechanistic Bayesian forecasting model and explore machine learning approaches for pandemic scenarios using massive data sets.

See the forecasting models at [covid19forecasthub.org](https://covid19forecasthub.org)

# Research Briefs

Assistant Professor **Narges Mahyar** collaborated with Carolina Aragón, a public artist and assistant professor of landscape architecture and regional planning, on an art installation to give voice to a local region threatened by future flooding due to climate change. Their project, RisingEMOTIONS, is based on data collected from over 150 East Boston residents about their perspectives on projected sea level rise and its impact on their neighborhoods. The installation (shown at right) displays colored bands representing five emotions (concerned, optimistic, angry, sad, and other), with comments from survey participants written on the bands, such as "I am afraid my home will flood, and I'll lose my life's savings." Mahyar and Aragón hope that the installation will encourage residents to take part in local planning and nonprofit efforts around climate change.



A team led by Associate Professor **Andrew McGregor** was awarded a three-year, \$1.5 million grant by the National Science Foundation (NSF) to create the national TRIPODS Institute for



Theoretical Foundations of Data Science. The team includes CICS faculty members Justin Domke, Andrew McCallum, Cameron Musco, and Dan Sheldon, as well as colleagues from the departments of math and statistics, and electrical and computer engineering. The TRIPODS project will organize summer schools, speaker series, and workshops for faculty researchers in other disciplines who want to learn how big data can help them, as part of the NSF's initiative to bring together the statistics, mathematics and theoretical computer science communities to promote long-term research and training activities in data science.

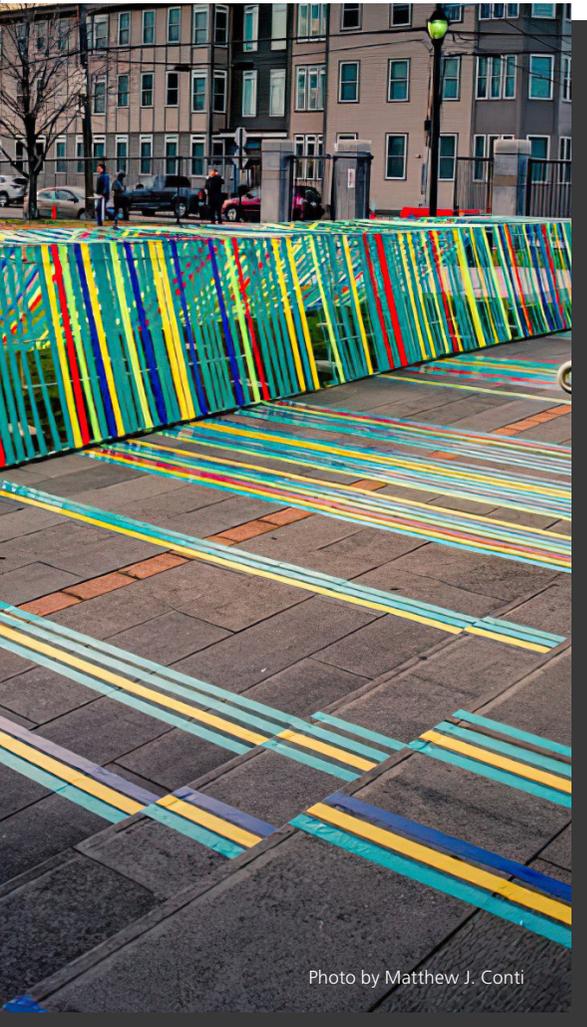


Photo by Matthew J. Conti



Professor **Deepak Ganesan** collaborated with UMass Amherst chemist Trisha Andrew of the Wearable Electronics Lab and others to introduce two types of wearable sensors. “Phyjamas” are sleep garments made of physiological-sensing textiles that can collect data from the wearer, such as heartbeat and breathing rate. The passive collection of data using sleepwear can be particularly useful for monitoring elderly patients, who may be less likely or resistant to wearable devices like smartwatches. “Chesma” is a lightweight eye mask that unobtrusively captures pulse, eye movement, and sleep signals. The researchers expect that this development will enable improved investigations of sleep quality, sleep disorders, mental health, neurodegenerative diseases, and schizophrenia.

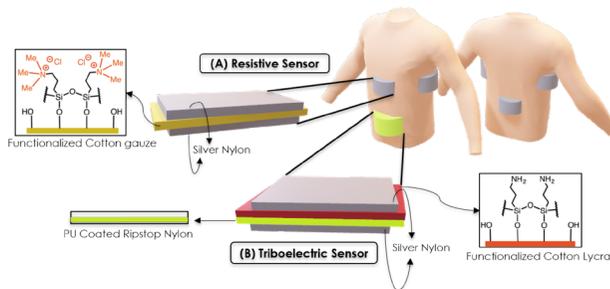


Figure above: Phyjama is comprised of a distributed set of four resistive sensors (A) and a triboelectric sensor (B). Courtesy of the authors.

Associate Professors **Daniel Sheldon** and **Subhansu Maji** led a team that created MistNet, a tool which uses machine learning to tease out images of large groups of migrating birds from weather radar data. “We hope MistNet will enable a range of science and conservation applications. For example, we see in many places that a large amount of migration is concentrated on a few nights of the season,” Sheldon says. “Knowing this, maybe we could aid birds by turning off skyscraper lights on those nights.” Already, Sheldon and other researchers using the tool have discovered that the seasonal migrations of birds in the United States are shifting earlier as the climate changes, with the greatest changes in timing occurring in the regions warming most rapidly. These findings have implications for understanding future patterns of bird migration, where even subtle shifts could cause difficulties in accessing food and other resources.



### U.S. Cumulative Migration Traffic (1999-2018)

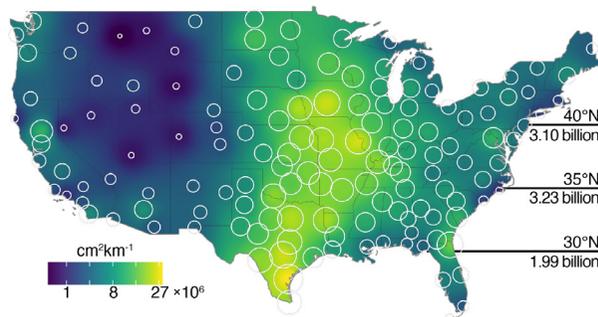


Figure above courtesy of the authors and Kyle G. Horton.



# Calling for Federal Regulation of Face Recognition

Professor Erik Learned-Miller and co-authors Joy Buolamwini of the MIT Media Lab, Vicente Ordóñez Román of the University of Virginia, and Jamie Morgenstern of the University of Washington have recently proposed a new model for managing face recognition technologies at the federal level. In a white paper titled, “Facial Recognition Technologies in the Wild: A Call for a Federal Office,” they propose an FDA-inspired model that categorizes these technologies by degrees of risk and would institute corresponding controls.

Learned-Miller explains how his work developing Labeled Faces in the Wild, one of the world’s most influential facial data sets, led him to this call for regulation. “There are a lot of problems with face recognition, like breach of privacy, surveillance, unequal performance across subgroups and profiling,” he says. “Due to the high-stakes situations in which this technology is being deployed, such as in police work, financial decision-making and analysis of job applicants, harms from inaccuracies or misuse are a real and growing problem.”

While previous issues have spurred local bans and restrictions on face recognition technology, Learned-Miller argues that this won’t fix the problem. A federal office is

We believe it’s so complicated that it cannot be left up to the industry to self-regulate, or to pass piecemeal laws in cities and states across the country.

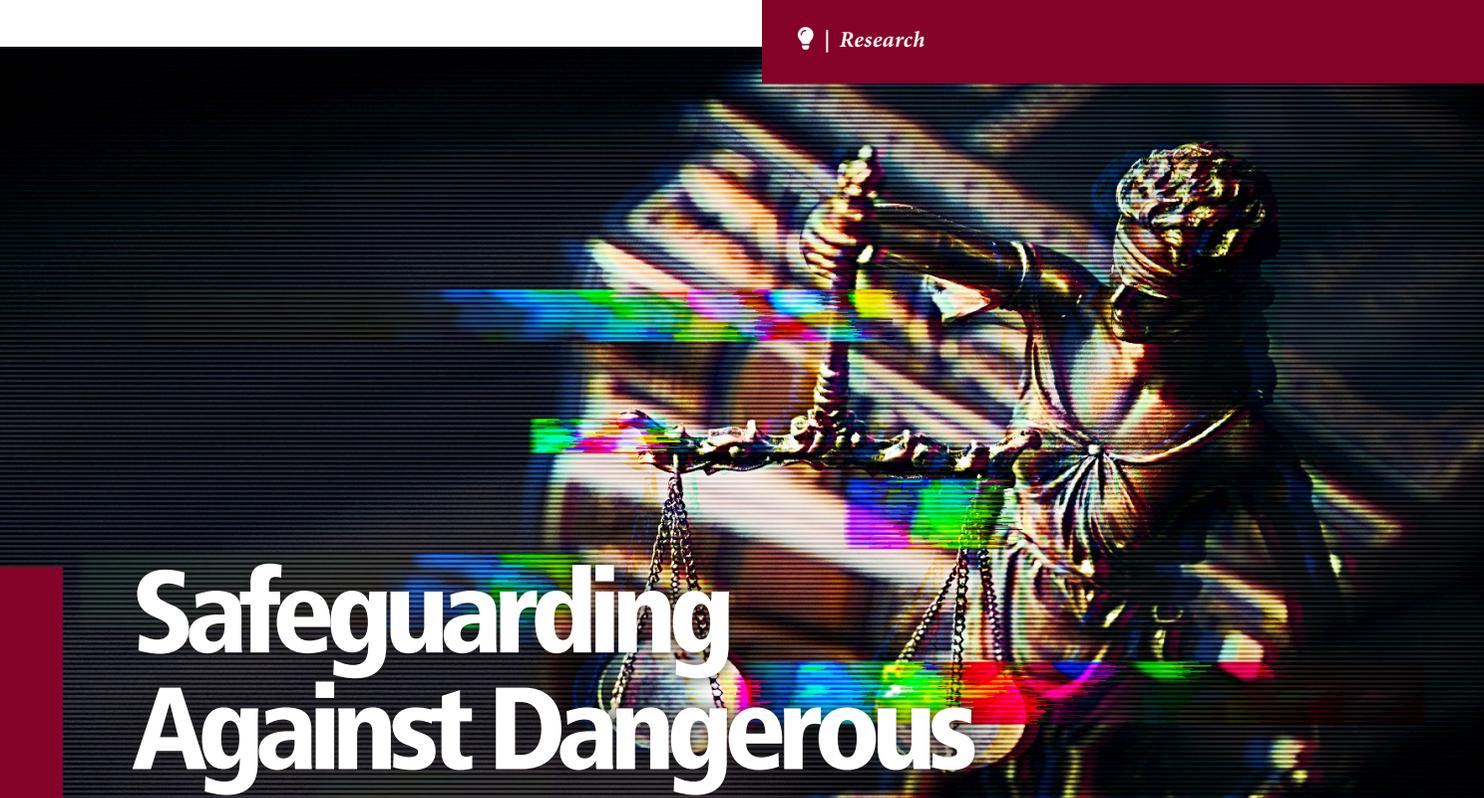
**Erik Learned-Miller**

needed, he says, one which has both the expertise and the authority to keep new products from emerging and being used until they demonstrate safety and efficacy.

“We believe it’s so complicated that it cannot be left up to the industry to self-regulate, or to pass piecemeal laws in cities and states across the country,” says Learned-Miller. “We need a coordinated effort to do this.”

 Read the white paper “Facial Recognition Technologies in the Wild: A Call for a Federal Office”: [bit.ly/CICS-FRTWild](https://bit.ly/CICS-FRTWild)

 Watch a Q&A on face recognition research and controversies with Erik Learned-Miller: [bit.ly/CICS-ELMQA](https://bit.ly/CICS-ELMQA)



# Safeguarding Against Dangerous Machine Learning Behaviors

Today, machine learning algorithms help us direct everything from self-driving vehicles to insulin pumps to criminal sentencing. The problem? “When someone applies a machine learning algorithm, it’s hard to control its behavior,” leading to potentially harmful results, says CICS Assistant Professor Philip Thomas.

To guard against bad behaviors, Thomas and co-authors including CICS Associate Professor Yuriy Brun, Professor Emeritus Andy Barto, incoming Assistant Professor Bruno Castro da Silva, and doctoral student Stephen Giguere have established a new framework to create “Seldonian” algorithms (named after a character in Isaac Asimov’s Foundation series), which allow individual users to constrain negative machine learning behaviors.

Introduced in *Science* magazine, the framework allows users to define what constitutes undesirable behavior for their specific application. “If I use a Seldonian algorithm for diabetes treatment, I can specify that undesirable behavior means dangerously low blood sugar, or hypoglycemia,” says Thomas. “I can say to the machine, ‘while you’re trying to improve the controller in the insulin pump, don’t make changes that would increase the frequency of hypoglycemia.’”

When someone applies a machine learning algorithm, it’s hard to control its behavior.

**Philip Thomas**

To test their new development framework, the team applied it to predict grade point averages in a data set of 43,000 students in Brazil, and were able to successfully avoid gender bias, which had been an issue for previous machine learning designs. They hope that machine learning researchers will go on to develop new and more sophisticated algorithms using their framework, including in applications where machine learning used to be considered too risky.



Watch the researchers talk about their work:  
[bit.ly/CICS-Seldonian](https://bit.ly/CICS-Seldonian)

# New Faculty

Thirteen new faculty bring college's cohort to seventy-five

## Bruno Castro da Silva

*Assistant Professor*

*Starting Spring 2021*

Bruno Castro da Silva was most recently an associate professor at the Institute of Informatics at the Federal University of Rio Grande do Sul (UFRGS), Brazil. His research interests lie in the intersection of machine learning, reinforcement learning, optimal control theory, and robotics. He was previously a postdoctoral associate at the Aerospace Controls Laboratory at MIT. He received his doctorate from CICS in 2014, and his master's and bachelor's degrees in computer science from UFRGS in 2007 and 2004.



## Hui Guan

*Assistant Professor*

*Starting Fall 2020*

Hui Guan recently received her doctorate from North Carolina State University. Her research lies in the intersection of machine learning and programming systems, with a focus on improving machine learning through innovations in algorithms and programming systems, as well as leveraging machine learning to improve high-performance computing. She holds a bachelor's degree in electrical engineering from Nanjing University of Posts and Telecommunications in China.



## Ravi Karkar

*Assistant Professor*

*Starting Fall 2022*

Ravi Karkar is a doctoral candidate at the University of Washington. His research focuses on designing, developing, and evaluating tools that can enable people to gather data and interpret personal aspects of their medical conditions in the context of their day-to-day lives. He received his master's degree in computer science from Georgia Institute of Technology in 2012 and his bachelor's degree in computer engineering from Gujarat University, India in 2011.



## Donghyun Kim

*Assistant Professor*

*Starting Spring 2021*

Donghyun Kim aspires to create robust, versatile legged robots capable of all-terrain mobility for service and emergency applications, with a focus on optimizing control algorithms for advanced dynamic locomotion. He was most recently a postdoctoral associate at MIT. Kim received his doctorate from the University of Texas at Austin in 2017, and his master's and bachelor's degrees in mechanical engineering from Seoul National University and Korea Advanced Institute of Science and Technology in 2012 and 2007.



## Peter Klemperer

*Senior Teaching Faculty*

*Starting Fall 2020*

Peter Klemperer was most recently an assistant professor of computer science at Mount Holyoke College. He is interested in all aspects of computer security, with an emphasis on virtualized systems and usability, including how virtualization can provide an isolated high ground position for malware detection in operating systems and processes. He received his doctorate at Carnegie Mellon University in 2014, and a master's degree from the University of Illinois at Urbana-Champaign in 2008.



## Hung Le

*Assistant Professor*

*Starting Fall 2020*

Hung Le was most recently a postdoctoral researcher at the University of Victoria, on a fellowship from the Pacific Institute for the Mathematical Sciences. He received his doctorate in computer science from Oregon State University, and his bachelor's degree from Hanoi University of Science and Technology. His research has focused on problems in low dimensional metrics, minor-free graphs, and graphs of bounded expansion.





## Ghazaleh Parvini

**Teaching Faculty**

*Starting Fall 2020*

Ghazaleh Parvini's research focuses on algorithms, optimization, computational biology and graph theory. She was most recently a doctoral candidate at Iowa State University, where she worked as a graduate instructor teaching discrete mathematics. Parvini received her master's and bachelor's degrees from the University of Tehran in 2015 and 2012. She has previously worked as a software developer, instructor, and mathematics teacher, and describes herself as "a teacher, a programmer, and a theory lover."



## Cheryl Swanier

**Senior Teaching Faculty**

*Starting Spring 2021*

Cheryl Swanier was most recently an associate professor of computer science and Henry N. and Alice Carson Tisdale Endowed Professor at Claflin University. Her research interests are in computer science education and human computer interaction, with an emphasis on visual programming. Swanier is a recipient of a 2016–17 Google igniteCS Award and a 2013 White House Champions of Change for Tech Inclusion Award. She received a PhD and an EdD from Auburn University.



## Laure Thompson

**Assistant Professor**

*Starting Fall 2020*

Laure Thompson's research bridges machine learning and natural language processing with humanistic scholarship. She develops methods for understanding and intentionally altering what models learn, as well as methods and methodologies for studying humanities collections at scale. Her work focuses on understanding how information is encoded within trained models' learned representations and how intentional data modification affects these representations. Thompson received her doctorate from Cornell University in 2020.



## Gayane Vardoyan

**Assistant Professor**

*Starting Fall 2022*

Gayane Vardoyan's recent research interests have focused on problems in quantum communication, including the development and performance of quantum entanglement switches. Vardoyan received her master's and doctorate from CICS in 2017 and 2020 and a bachelor's in electrical engineering and computer sciences from the University of California, Berkeley in 2011. Prior to rejoining CICS as faculty, she will be a postdoctoral associate at Delft University of Technology, Netherlands, supported by the Quantum Software Consortium's Ada Lovelace Fellowship.



## Cindy Xiong

**Assistant Professor**

*Starting Fall 2021*

Cindy Xiong is a doctoral candidate in the Visual Thinking Lab at Northwestern University. Her research interests include cognitive psychology, perception, education, decision making and data visualization. Xiong was a visiting scholar at Utrecht University, Netherlands in 2018, and received bachelor's degrees in applied mathematics and psychology from University of California, Los Angeles in 2016.



## Hamed Zamani

**Assistant Professor**

*Starting Fall 2020*

Hamed Zamani's research interests include various aspects of information retrieval, recommender systems, and machine learning. He was most recently a researcher at Microsoft, working on a wide range of theoretical and practical problems related to search engines. Prior to Microsoft, he spent four years at the Center for Intelligent Information Retrieval at CICS, where he received his doctorate in 2019 and won the college's Outstanding Dissertation Award.



## Ethan Zuckerman

**Associate Professor**

*Starting Spring 2021 - Joint position with the College of Social and Behavioral Sciences*

Ethan Zuckerman previously served as director of the MIT Center for Civic Media and associate professor of practice in media arts and sciences at the MIT Media Lab. The author of the books *Rewire: Digital Cosmopolitans in the Age of Connection*, and the forthcoming *Mistrust: How Losing Faith in Institutions Provides the Tools to Transform Them*, his research focuses on the use of media as a tool for social change, the role of technology in international development, and the use of new media technologies by activists.



# Giving



Dear Alumni, Parents, and Friends,

My name is Ed Welch, and I recently joined the College of Information and Computer Sciences as the executive director of development. I hope this note finds you and your families safe and healthy.

In my role, I focus on increasing philanthropic giving to the college by engaging with constituencies that support our vision for a world where computing enhances the life of its citizenry.

In the past fiscal year, we received over \$3 million in philanthropic support from individuals, corporations, and foundations. These gifts provided necessary assistance to a variety of areas in the college, including financial aid for undergraduate and graduate students, support of faculty research, and the launch of important programs for diversity and inclusion. Recently, gifts from generous alumni and friends have enabled us to provide technology necessary for remote learning to students in need. Your assistance enables us to provide a top-tier education for our students and valuable services to the community. We appreciate your generosity and your display of confidence in the value of a UMass Amherst computer science education.

Now, more than ever, we recognize there are numerous demands on people's time and resources. As you consider your philanthropic giving, we hope you will keep CICS students, faculty, and programs in mind. Should you wish, I am available to discuss the various ways individuals can support the college and where they want to direct their gifts.

Thank you for all that you do for the College of Information and Computer Sciences. Wishing you all the best.

Sincerely,

**Ed Welch**  
Executive Director of Development  
(413) 320-3749  
[ed.welch@umass.edu](mailto:ed.welch@umass.edu)



To make a year-end, tax-deductible gift to CICS, visit [bit.ly/CICS-Giving](https://bit.ly/CICS-Giving)

# Donor Report

The following alumni and friends have made gifts to the College of Information and Computer Sciences from July 1, 2019 to June 30, 2020. Philanthropy is vitally important to the college and helps maintain a world-class instructional and research program. Contributions from alumni and friends help fund scholarships and important special activities that are not supported through the state budget.

## We thank you for your philanthropic support.

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Dr. Prabuddha Biswas (93)

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Microsoft

[The scholarship] not only takes the financial burden off my shoulders, but the encouragement and morale boost that it provides are priceless, especially within the current situation of global crisis and uncertainty.

Shib Sankar Dasgupta, Doctoral Student  
Bruce Croft Graduate Scholarship Recipient

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It is the thoughtful people like you who set motivating examples for students like me to contribute towards science and society at the same time.

Maliha T Islam, Doctoral Student  
David W. Stemple Scholarship Recipient

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Your generosity has reminded me that my hard work is seen and not swept under the rug. Thank you for supporting me and my UMass journey.

Rachael Mathew, Computer Science '23  
Dean's Merit Scholarship Recipient

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I am incredibly grateful for this award and want to thank you for your generosity and commitment to elevating new and emerging voices in computer science, an effort that I see as critical to ensuring a more equitable and innovative technological future.

Celia Lewis, Computer Science & Business Administration '21  
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 Mr. Hanumantha R. Kodavalla (88)  
 Mr. Lawrence M. Pizette (86)

Without people like you, this university would not be a place for people like me. I love it here, and without people like you, I would not be here.

Christopher Gomez, Computer Science '21  
 David Mix Barrington Scholarship Recipient

# Faculty

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# Honors



The faculty of CICS are renowned contributors to the fields of computing and information science. Here are five of our cohort that were recognized this year by their peers, community, and nation for their extraordinary contributions.

## James Kurose

### National Academy of Engineering

On October 4, Distinguished Professor James Kurose was formally inducted into the National Academy of Engineering (NAE), one of the highest professional distinctions accorded to an engineer. Kurose was cited by the academy for “contributions to the design and analysis of network protocols for multimedia communication.”

Kurose says of the honor, “I’m incredibly honored to be elected to the NAE, and so pleased that it recognizes the research activities I’ve undertaken with so many fabulous students and colleagues throughout my career here at UMass Amherst.”

An award-winning teacher and co-author of the book *Computer Networking: A Top-Down Approach*, Kurose is also the author or co-author of nearly 300 refereed technical publications. In 2013, he received the Chancellor’s Medal, the highest recognition given for service to the campus. From 2015 to 2019, Kurose served as assistant director at the National Science Foundation, where he led the Directorate of Computer and Information Science and Engineering.



## Hava Siegelmann

### DARPA Meritorious Public Service Medal

Nearly 100 colleagues recently joined an online celebration to honor Professor Hava T. Siegelmann as she received the rarely awarded Meritorious Public Service Medal from the Defense Advanced Research Projects Agency (DARPA), the third-highest honor the Department of the Army can bestow on a private citizen. Her medal citation credits her with creating and managing “some of DARPA’s largest and most advanced AI programs.”

Siegelmann says, “I didn’t know that anyone was noticing what I do. It was so touching, and a complete surprise. I feel honored to be contributing.” She adds, “I think UMass should get credit for supporting me to run a very advanced AI lab such that the government wanted to invite me, and for allowing me to join what is literally the world’s most advanced and sophisticated AI initiative.”



## Prashant Shenoy Distinguished Professor & Conti Fellowship

Associate Dean Prashant Shenoy was appointed Distinguished Professor following approval by the UMass Board of Trustees at its July 20, 2020 meeting. In their letter of nomination, Chancellor Kumble Subbaswamy and Provost John McCarthy highlighted Shenoy's contributions in research, teaching, mentoring, and service to UMass Amherst. As they put it, Shenoy "has been a leader in the fields of energy-conserving computing and computing for energy management," as reflected in more than 200 conference papers and 70 journal articles, which have been cited over 20,000 times.

This award follows Shenoy's receipt of a 2020–2021 Samuel F. Conti Fellowship for research. With the fellowship, he will work on writing a textbook that demonstrates how computer science methods can be harnessed to develop smart technologies for the social good. Additionally, he will lead a large, multi-institution Army Research Lab grant that is exploring the dependability and security of Internet of Things technologies, and work to move the team's initial research results to the field.



## Ramesh Sitaraman Distinguished Teaching Award

Professor and Informatics Program Director Ramesh Sitaraman was one of four faculty recipients of the university's 2019–2020 Distinguished Teaching Award, the only student-initiated award on campus.

At CICS, Sitaraman is known for redesigning the undergraduate algorithms curriculum. He created COMPSCI 311, which took a novel approach to teaching algorithms and is now the only required 300-level course for computer science majors. He also revamped COMPSCI 611, the cornerstone of the graduate algorithms curriculum.

Over two decades of teaching these courses, his students have given him superb ratings, describing him as "brilliant and efficient," while praising his "rare ability to break complex concepts into simple, easy to understand terms."

"My goal as a teacher is to transform the student from a computer programmer who writes software by the seat of their pants to a computer scientist who can mathematically design and analyze their algorithm before implementing it in software," explained Sitaraman.



## Michelle Trim CICS Outstanding Teaching Award

Michelle Trim, senior teaching faculty and the associate director of the informatics program, was selected to receive CICS's 2020 College Outstanding Teaching Award.

Since arriving at CICS in 2013, Trim has developed and taught two undergraduate courses, COMPSCI 305: Social Issues in Computing—the college's junior year writing course—and INFO 101: Introduction to Informatics. She has also taught the graduate-level course COMPSCI 590E: Ethical Considerations in Computing. In addition to her work in the classroom, she helps direct the college's new informatics major, with duties including advising prospective and current informatics majors.

As a nominating member of the faculty put it, "Michelle is consistently creative in how she constructs her courses and lessons in ways that are engaging and effective ... her courses and presented material are crafted carefully and deliberately to reach each and every student."



# Software Engineering *Remotely*



CICS undergrads are combining practical professional skill-building with software development in COMPSCI 320: Introduction to Software Engineering. This textbook-free course takes students through the hands-on process of designing, creating, and testing a software system for a customer. Working together as a development team using agile practices, they learn to develop high-quality software under time and resource constraints.

A recent team of students, led by lecturer David Fisher, responded to the chaos of the pandemic by learning to complete their class project in a virtual environment. In collaboration with staff from CICS Careers and CICS Advising, they designed ReachOUT, a scheduling app that matches mentors or staff advisors with students who need appointments for help.

“After creating an account on the system, mentors can choose to provide support to students in any kind of area—interviewing, networking, C++—as well as indicate the majors and minors they are interested in helping,” explains Preetham Syamala, a senior computer science major who was a front-end development lead on the project. “From there, it’s a simple process using our web interface to create available appointment blocks for students to choose from.”

To build ReachOUT under these circumstances, the students needed to pick up not only technical skills like working with GitHub and Amazon Web Services, but professional skills such as team communication and prioritizing an agile product backlog. Sean Powell, a senior majoring in computer science and mathematics, helped develop the front end in React.JS, and used the experience to gain an internship as an iOS developer. Victoria Caruso, a senior computer science and mathematics major who worked as a back-end development lead on ReachOUT, used the experience to obtain an internship as a QA engineer.

“Everyone on the team worked on at least one major feature,” says Chinmay Patil, a recent graduate who now serves as one of two alumni advisors on the project. “Keeping our spirits up during remote learning was a challenge, but the tangible progress we kept making on ReachOUT provided the motivation we needed. People really stepped up beyond their class requirements to get this project completed to specification.”



Victoria Caruso



Dhruvil Gala



Chinmay Patil



Sean Powell



Preetham Syamala

# Faculty Notes

Four CICS faculty members were promoted or granted tenure in 2020: **Marc Liberatore** to Senior Lecturer II, **Subhansu Maji** to Associate Professor with tenure, **Brendan O'Connor** to Associate Professor with tenure, and **Charles Weems** to Professor.

Associate Professor **Yuriy Brun** received the Most Influential Paper Award at the 15th International Symposium on Software Engineering for Adaptive and Self-Managing Systems for his 2007 paper, "An Architectural Style for Solving Computationally Intensive Problems on Large Networks," co-authored with Nenad Medvidovic of the University of Southern California. This and further collaborations between Brun and Medvidovic had a meaningful impact on researchers developing numerous systems, including distributed authentication protocols, permissioned blockchains, and runtime self-adaptive systems.

Professor **Gerome Miklau**, Associate Professor **Andrew McGregor**, and collaborators received the Alberto O. Mendelzon Test-of-Time Award at the 2020 Association for Computing Machinery Symposium on the Principles of Database Systems conference (ACM PODS) for their 2010 paper, "Optimizing Linear Counting Queries under Differential Privacy." The award committee cited the paper's significant impact, numerous citations in database theory and data systems papers, and the adoption of its novel data-privacy mechanism by the United States 2020 Census.

Professor and Chair of the Faculty **James Allan** was chosen to receive an Amazon Research Award for his proposal, "Explanation of Product Facets for Conversational Search." Motivated by the recent success of voice-based intelligent personal assistants, Allan and postdoctoral researcher Razieh (Negin) Rahimi aim to develop search models that can provide users with personalized and session-based answers, and play an active role in eliciting users' needs.

Assistant Professor **Mohit Iyer** received the 2020 IBM Faculty Award for his project, "Exploring Modeling and Evaluation for Long-form QA." This project will use

Facebook's ELI5 dataset, created from the "Explain it Like I'm Five" community on Reddit, to explore new approaches to long-form question answering (QA), a natural language generation task in which answers are free-form paragraphs. Iyer aims to solve existing challenges in long-form QA, including maintaining logical structure and avoiding the production of false facts.

Assistant Professor **Marco Serafini** and Associate Professor **Arjun Guha** received Facebook's Systems for Machine Learning research award for their proposal, "Massively Parallel Graph Sampling on GPUs." Serafini and Guha, along with ten other teams, were selected from 167 proposals submitted from more than 100 universities.

Professor Emeritus **Rick Adrion** and collaborators released the book, *Computing and the National Science Foundation, 1950-2016: Building a Foundation for Modern Computing*, about the influential role played by the Directorate for Computer and Information Science and Engineering (CISE) at the National Science Foundation (NSF). Adrion has served several times as a senior manager at the NSF, most recently as a division director and senior advisor in CISE from 1999 to 2003.

Distinguished Professor **James Kurose** and co-author Keith Ross have released the eighth edition of their widely used textbook, *Computer Networking: A Top-Down Approach* (Pearson 2020). The new edition has been updated to reflect recent advances in networking, including software-defined networking, and the rapid adoption of 4G/5G networks and the mobile applications they enable.

An article from a team led by Assistant Professor **Sunghoon Ivan Lee** was featured in the March 2020 issue of *IEEE Transactions on Neural Systems & Rehabilitation Engineering*. In the paper, "Estimating Upper-Limb Impairment Level in Stroke Survivors using Wearable Inertial Sensors and a Minimally-Burdensome Motor Task," the researchers describe a new tool to assess upper-limb impairment in stroke survivors that promises to be easier to use than current methods for both patients and caregivers.

# Graduate Student Notes

Doctoral student **Anna Fariha** was awarded a 2020 Microsoft Research Dissertation Grant for her proposal, “Enhancing Usability and Explainability of Data Systems.” Fariha’s work focuses on reducing the usability gap between non-expert users and complex data systems. Her thesis aims to enable data-driven systems to become more democratized and transparent, by providing programming tools for non-technical users, better explanations of algorithmic results and inferences, and tools to assess the trustworthiness of their predictions.

The 2020 CICS Outstanding Graduate Awards were given to graduate students **Chen Qu, Zezhou Cheng, Zachary While, and Cole Reilly**. Qu and Cheng each won an Outstanding Synthesis Project award—Qu for “Conversation History Understanding in Conversational Question Answering,” and Cheng for “Detecting and Tracking Communal Bird Roosts in Weather Radar Data.”

While and Reilly won the Outstanding Teaching Assistant awards for their exemplary efforts in assisting with course instruction.

The 2020 CICS Outstanding Dissertation Awards were given to **Stephen Lee** and **Hamed Zamani** (now an assistant professor at CICS). Lee’s dissertation, “Software-Defined Infrastructure for IoT-based Energy Systems,” presents four techniques that use systems and machine learning principles to design, analyze, and deploy the next generation of smart Internet of Things energy systems, specifically focusing on “smart solar” for renewable energy deployments. Zamani’s dissertation, “Neural Models for Information Retrieval Without Labeled Data,” demonstrates how weak supervision can be used to train neural ranking models in a variety of scenarios.

## Honoring the Legacy of Five Longtime Staff Members

Readers may remember the five longtime staff members who retired in 2020, some of whom performed roles helping students navigate their academic and research careers at the college.

- **Robbie Calliham**, assistant to the associate dean of student affairs, after 18 years of service
- **Laurie Downey**, grant administrator, after 41 years of service
- **Darlene Fahey**, undergraduate programs manager, after 25 years of service
- **Michele Roberts**, grant administrator, after 38 years of service
- **Barbara Sutherland**, administrative assistant, after 36 years of service

“Our five retirees, many of whom have been with us since we were the ‘computer science department,’ are leaving an impressive legacy. Through their combined 158 years of service to UMass, they have made lasting contributions to our research, education, and community endeavors. I am very grateful for their dedication to our college and wish them well in the next stage of their lives,” says Dean Laura Haas.



Send congratulations and well-wishes to [alumni@cics.umass.edu](mailto:alumni@cics.umass.edu)

# Undergraduate Student Notes

Four undergraduates received 2020 UMass Amherst Alumni Association Awards. **Chung Hin Lee '20** received a Senior Leadership Award, presented to graduating seniors demonstrating exceptional leadership skills. **John Bachman '21, Lucy Cousins '21, and Cody Richter '21** received William F. Field Alumni Scholar Awards, recognizing academic success in third-year students.

The 2020 Outstanding Undergraduate Achievement Awards were given to seniors **Jacob Bashista, Emily Earl, Lillian Grassin-Drake, Arianna Kazemi, Matthew Pearce,** and **Adam Viola**. "These students have distinguished themselves in academic excellence, research, leadership, and commitment to helping others," says Benjamin Marlin, associate professor and computer science undergraduate program co-director.

**Jack Merullo '20** was named a UMass Rising Researcher for his work using natural language processing to help solve research questions pertaining to social issues, information retrieval, and deep learning. For his honors thesis, he studied the presence and degree of racial bias in sports commentary, gaining coverage on ESPN's website The Undeclared.

Eight undergraduates were paired with four supervising doctoral students for **UGRAD Research Volunteers**, a new program from CICS Careers designed in response to the reduced availability of internships during the pandemic. The students engaged in a wide range of activities, including coding, data analysis, and exploring machine learning.

The second annual Hack(H)er413—an all-woman (cis and trans) and non-binary student hackathon which aims to increase diversity and inclusion in the technology industry—was held in February with over 300 students attending. The event was run by an all-student team that heavily featured CICS students, including director **Disha Srivastava '21** and team members **Nila Abhirami Sadeeshkumar '20, Vindhya Rachur '22, Corinne Greene '22, Shreya Sawant '21, Victoria Okoro '22, Sarah Manlove '20, and Alicia Bochnak '20.**

## Join the Celebrations

In place of our in-person graduation festivities, we celebrated our 365 bachelor's degree recipients, 141 master's degree recipients, and 28 doctoral degree recipients virtually in May with collections of video messages and memories.

2020 Senior Celebration: [bit.ly/CICS-seniors](https://bit.ly/CICS-seniors)

2020 Master's & Doctoral Celebration: [bit.ly/CICS-MSPHD](https://bit.ly/CICS-MSPHD)

# CICS Alumni Are Broadening Access to Entrepreneurship & Venture Capital

While **Esha Sahai '02, MS '04** and **Anthony Gee '89** began their careers in technology, they both became fascinated with entrepreneurship and venture capital and their potential to spur innovation. Bringing the analytical skills and ethical considerations of their computer science education to the finance sector, they both found professional passions, as well as opportunities to support marginalized communities and break down barriers limiting access to entrepreneurship and investment.



Esha Sahai spent several years working in the technology sector before pursuing a master's in management and engineering at MIT, where she was involved in entrepreneurship and venture capital endeavors. She went on to a position at Microsoft in corporate strategy and development, but also undertook a fellowship with Castor Ventures and launched her career in venture capital. Sahai now serves as an advisor and mentor at Flamenco Ventures, where she is a founding partner with several funds and accelerator programs. For the college, she has served as a Ventures @ CICS entrepreneur-in-residence.

Throughout her career, Sahai had been troubled by how few women, especially women of color, she saw in STEM, entrepreneurship, and venture capital. In 2019, she launched Girls Who Venture, a nonprofit that cultivates female entrepreneurs and venture capitalists, especially in developing countries.

Girls Who Venture takes a twofold approach to its mission. One piece is its set of remote educational programs for high school girls, where they learn about entrepreneurship and venture capital. They started the program through the Wema

Children's Centre in Kenya, and have also offered it in the United States for girls in underrepresented communities in Chicago and New York. The U.S. program included a virtual pitch session, where the girls were able to present their ideas to a panel of investors and startup founders for cash prizes.

The second piece of Girls Who Venture's mission is to support and disseminate research on gender entrepreneurship in developing regions. As Sahai explains, "Our overall mission is to inspire policy makers in government and the venture capital industry to take notice of problems in these regions, and to introduce programs for gender equality as developing countries build ecosystems for entrepreneurship and venture capital."

In recognition of her accomplishments, the college awarded Sahai the Outstanding Achievement and Advocacy (OAA) Award for Outstanding Contributions to Society in 2018.



Anthony Gee discovered the world of venture capital in his second position out of college, researching companies for New Science Associates, where he took special interest in entrepreneurship development and early stage companies. After returning to school for an MBA at NYU, and working in investment banking for several years, he launched Carthage Venture Fund, an early stage technology fund.

As Carthage grew, Gee found himself working with increasingly large companies and transactions. Anxious to return to the world of small startups, he and three partners launched Core Venture Studio to support the burgeoning startup community in Atlanta. "I wanted to focus more on earlier stage companies and to really have more flexibility around the types of investments that I wanted to make and the companies that I wanted to get involved in," he recalls.

Core Venture Studio is built on a studio model, allowing the partners to invest in projects they're passionate about. They help companies with everything from creating a business model and growing their executive team to developing marketing strategy.



Core Venture also invests in neighborhoods through Core Development Partners, a real estate company they formed under the Core Venture umbrella. "The goal is to create economic and entrepreneurial opportunities for underinvested neighborhoods," Gee explains. They recently completed a \$28 million project in partnership with the Annie E. Casey Foundation, developing Pittsburgh Yards—a nearly 30-acre Atlanta site—into mixed-use commercial and community spaces.

Since their start in 2014, Core Venture has had an important role not only in nurturing Atlanta's entrepreneurial ecosystem, but in diversifying it. Fifty percent of the companies they've supported have been led by women and 30 percent have been led by African Americans. While Gee loves the opportunities Core Venture gives him to collaborate with a variety of talented entrepreneurs, he particularly enjoys being able to support the city's Black business community. "Black entrepreneurs don't often have the relationship base or resources necessary to really scale the business up," he observes. "To help them tap into different markets and relationships is just very rewarding."

# Alumni Notes

**Jody Daniels '93MS, '97PhD, '19H** has been promoted to lieutenant general and assigned to command the U.S. Army Reserve, becoming the first woman to lead the Reserve in its 112-year history. In a *USA Today* profile, a former colleague describes Daniels as “a terrific officer ... smart, experienced, approachable and [a] gifted leader.”



**i** Read the *USA Today* profile: [bit.ly/CICS-daniels](https://bit.ly/CICS-daniels)

**P. Anandan '87PhD**, CEO of the Wadhvani Institute for Artificial Intelligence, was named co-director of the new COVID-19 Data Science Consortium, based in India. The consortium brings together experts from academia, industry, and research to support public authorities in managing the COVID-19 pandemic, by building and deploying technology solutions.

**Claire Cardie '89MS, '94PhD**, professor of computer science and information science at Cornell University, and **Matthew Dwyer '95PhD**, John C. Knight Faculty Fellow and professor of computer science at the University of Virginia, were named 2019 Association for Computing Machinery Fellows.

**Lee Delaney '93BS** has been appointed CEO of Massachusetts-based BJ's Wholesale Club. Delaney joined BJ's in 2015 and most recently served as the warehouse store's president.

**Amy McGovern '98MS, '02PhD** has been selected to lead the AI Institute for Research on Trustworthy AI in Weather, Climate, and Coastal Oceanography at the University of Oklahoma, part of a \$100 million initiative by the National Science Foundation to establish five new AI research institutes nationwide.

In memoriam: **Tom Fawcett '93PhD** died June 4, 2020 in a cycling accident. In addition to holding senior research scientist positions in industry, Fawcett co-authored *Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking*, now used by over 140 universities worldwide.



Youngho Kim '14PhD and Joseph Daverin '00, '03MS joined Dean Laura Haas, Assistant Professor Philip Thomas, and fellow CICS alumni at the 2020 Bay Area Alumni Meetup, held at the Computer History Museum in Mountain View, CA on January 29, 2020.



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