



University of  
Dayton

*The Department of*

# ELECTRICAL AND COMPUTER ENGINEERING

*Summer 2021*



## **Chair's Corner** Eric Balster

A lot has changed since our last newsletter two years ago! Of course, almost all operations in the department and across the University were up-ended due to the pandemic. We abruptly moved to an all-online semester toward the end of the spring 2020 semester, and continued online operations in the summer. In fall of 2020, we moved to a hybrid approach where classrooms were filled at half capacity for social distancing and the remainder of the students logged in remotely. We continued our hybrid approach in spring of 2021 and again this summer.

This fall, we hope to return to normal activities with the removal of social distancing requirements, and I'm sure I'm not the only one who is extremely excited to get back to business as usual!

Despite the challenges of the pandemic, we have had many accomplishments within the department. Most notably, Dr. Tarek Taha was able to license several of his patents based on memristor technology to a large electronics corporation resulting in the largest licensing deal in University of Dayton history! Also, Dr. Brad Ratliff was awarded a \$550K DURIP award for optical equipment used in his laboratory. As he is ramping up his acquisition of new optical cameras and sensors, we are looking for additional laboratory space for him to renovate. Within the year, I believe the Applied Sensing Laboratory (ASL) will become a showcase lab. This will add to our already impressive array of student spaces dedicated to state-of-the-art research. Congratulations to Drs. Taha and Ratliff for their great accomplishments!

The past 2 years have not been without loss. In 2020-2021, we lost three of our faculty. In October, we lost Dr. Ramani Asari, a long-time adjunct for ECE and integral part of our department. In November, we lost Dr. Mike Wicks, Ohio Research Scholar Endowed Chair in Sensor Exploitation and Fusion. Dr. Wicks was a world-renowned scholar and teacher. In January of 2021, we lost Mr. Herbert Hirsch, a dedicated teacher in the School of Engineering Innovation Center. Additionally, in January, we learned of the passing of Dr. Stan Rogers, the long-serving chair of our industrial advisory committee (IAC). Stan served the IAC for more than a decade, volunteering countless hours leading our department on many strategic initiatives. We mourn the loss of our beloved colleagues and continue the important work of the department in their honor.



The challenges of COVID-19 really exposed the resolve, hard work and innovative spirit of the faculty, staff and students in ECE. There were many abrupt shifts in instruction, working guidelines, and remote/campus work that are too numerous to mention. Our faculty, staff and students met these challenges at every turn, even coming up with some new remote laboratory instruction methods that we may look to incorporate into our regular curricular offerings in the years to come. I have never been more proud to be a part of ECE, and I look forward to the year ahead.

If you are reading this, then you are an important part of our department. I thank you for all that you do, and I will continue to work hard for you and to make the Department of Electrical and Computer Engineering the best it can be.

## In Memoriam



**Ramani Asari** – Adjunct professor since 2010. Ramani passed away on October 22, 2020. For many years she taught the Electrical & Electronic Circuits course. She was the wife of Dr. Vijay Asari, professor and Ohio Research Scholars Chair in Wide Area Surveillance.



**Dr. Michael Wicks** – Professor, Ohio Research Scholar Chair for Sensor Exploitation, Distinguished Research Scientist at UD Research Institute, and director of the Mumma Radar Lab. Mike passed away on December 9, 2020.



**Herb Hirsch** – Adjunct professor. He taught the senior capstone course, ECE 432L Multidisciplinary Design Lab II since 2019. Herb passed away on January 9, 2021.



**Stan Rogers** – Chair, ECE Industrial Advisory Committee. He earned his MS in 1992 and PhD in 2002 in Electrical Engineering at UD. Retired Colonel as an AF Reservist in 2013 and a Command Systems Engineer in the Air Force Materials Command Headquarters. As the chair of the ECE Industrial Advisory Committee he was a strong supporter of our students, our department, and the future of electrical and computer engineering education. He passed away on January 15, 2021.

# University of Dayton Graduate Student to Participate in Additive Manufacturing Symposium

By Cara Stevens, marketing and communications intern, 10-1-2019

Two University of Dayton engineering students were selected to present their research during the first Student Presentation Competition held in conjunction with the American Society for Testing and Materials (ASTM) International Symposium on Structural Integrity of Additive Manufactured Materials and Parts being held in Washington, D.C., in October.



Dr. Amy Doll with students Monica Yeager and Dimitri Papazoglou

Dimitri Papazoglou, a doctoral student studying electrical and computer engineering, and Brad Hripko, a senior mechanical engineering major, were selected to present their research at this prestigious competition.

Hripko, whose research involves 3D printing of polymers for finger prosthetics, was unable to attend the competition. However, Papazoglou, who has worked extensively on preliminary research for 3D metal printing custom orthopedic hip implants, will be one of 25 international student presenters.

“I’m excited to be going to the ASTM symposium; it’s an honor that they invited me,” Papazoglou said. “My research monitors the printing of 3D metallic lattice structures that will be used for orthopedic implants using machine learning. Training an algorithm to detect when a part is defective is valuable in ensuring these implants we’re putting into human bodies are defect free.”

Amy Doll, associate professor of electrical and computer engineering, is also excited for UD to be represented in the inaugural engineering student competition.

“We’re at the forefront of over 30 new ASTM standards being developed for in position monitoring and process control,” says Doll. “These new standards – developed concurrently with regulations from the FDA – will influence how orthopedic implants will be additively manufactured going forward.”

Doll continued, “This research creates tremendous opportunities for electrical and computer engineering students to engage in interdisciplinary research in an innovative biomedical space, which has significant promise for commercialization.” Doll has been working with several divisions at the University of Dayton Research Institute to advance this research.

Like the engineering field as a whole, Papazoglou is taking an interdisciplinary approach to his studies.

“I’m interdisciplinary. My master’s and doctoral degrees will be in electrical engineering, but my bachelor’s degree is in mechatronic engineering,” Papazoglou said. “My thesis work and current research is interdisciplinary in nature – employing mechanical, materials, computer and electrical engineering skills for a biomedical application. I consider myself a mechatronics engineer at the end of the day.”

Additive manufacturing is on the cutting edge. It is constantly expanding and developing new regulations and the University of Dayton is at the frontline of this research.



## Artificial Intelligence Technologies Revolutionize the Education Sector Globally

Dr. Vijayan K Asari published an article in the Education Technology Insights. Dr. Asari highlights the many ways AI technologies can revolutionize education. AI powered educational support systems can:

- customize learning strategies for each student
- enable a machine to read the expressions student's face that indicates the level of understanding in a subject
- create a facility for adaptive learning through autonomously generated personal conversations employing voice assistants
- be an effective substitute for real-world teaching, anywhere and any time
- create new methods of interacting with students having learning disabilities

These are just a few. Read the full article

here: <https://artificial-intelligence.educationtechnologyinsights.com/cxoinsights/artificial-intelligence-technologies-revolutionize-the-education-sector-globally-nid-1398.html>

## Search and Rescue

By University of Dayton Marketing and Communications

When disasters happen – whether a natural disaster like a flood or earthquake, or a human-caused one like a bombing – it can be extremely dangerous to send first responders in, even though there are people who badly need help.

Drones can be useful in such situations but most require individual pilots to fly the unmanned aircraft by remote control. That limits how quickly rescuers can view an entire affected area and can delay actual aid from reaching victims.

“Autonomous drones could cover more ground more quickly but would only be more effective if they were able to independently help rescuers identify people in need,” said Vijayan Asari, professor of electrical and computer engineering. “At the University of Dayton Vision Lab, we are working on developing systems that can help spot people or animals – especially ones who might be trapped by fallen debris. Our technology mimics the behavior of a human rescuer, looking briefly at wide areas and quickly choosing specific regions to focus in on, to examine more closely.”

Disaster areas are often cluttered with downed trees, collapsed buildings, torn-up roads and other disarray that can make spotting victims in need of rescue very difficult. Asari's team has developed an artificial neural network system that can run in a computer onboard a drone and can emulate some of the ways human vision works. It analyzes images captured by the drone's camera and communicates notable findings to human supervisors.

“First, our system processes the images to improve their clarity,” Asari explained. “Just as humans squint their eyes to adjust their focus, our technologies take detailed estimates of darker regions in a scene and computationally lighten the images. When images are too hazy or foggy, the system recognizes they're too bright and reduces the whiteness of the image to see the actual scene more clearly.”

The system can also make other adjustments that mimic strategies used by the human brain. In a rainy environment, for example, humans take note of the parts of a scene that don't change and the ones that do, such as raindrops. Asari's technology uses the same strategy, continuously investigating the contents of each location in a sequence of images to get clear information about the objects in that location.

In addition, the system is intelligent enough to extrapolate what it sees. For example, it can identify people in various positions, such as lying prone or curled in the fetal position, even from different viewing angles and in varying lighting conditions. It can also detect and locate parts of an object: a leg sticking out from under rubble, a hand waving at a distance or a head popping up above a pile of wooden blocks.

"During its initial scan of the landscape, our system examines the ground to find possible objects of interest or regions worth further examination. Then our system investigates each selected region to obtain information about the shape, structure and texture of objects there. When it detects a set of features that matches a human being or part of a human, it flags that as a location of a victim," said Asari.

The drone also collects GPS data about its location, and senses how far it is from other objects it's photographing. That information lets the system calculate exactly the location of each person needing assistance and alert rescuers.

The entire process – capturing an image, processing it for maximum visibility and analyzing it to identify people who might be trapped or concealed – takes about one-fifth of a second on a standard laptop computer carried by the drone.

***This article is adapted from a piece that originally appeared in [the Conversation](#).***





## Afternoon of Service Helps Tornado Victims

Faculty and staff volunteers from the School of Engineering gave their time to the Dayton Foodbank on July 12, 2019, providing groceries to 221 local families devastated by the tornadoes in late May. Our volunteers loaded groceries such as eggs, milk, peanut butter and rice into the vehicles of families in need through the Foodbank's drive-thru pantry.

Sandy Furterer and Kellie Schneider from the Department of Engineering Management, Systems and Technology were also volunteering by process mapping to observe the volunteering processes in attempts to streamline and improve efficiencies.

"I find the afternoon of service to not only be a good thing to do for our community, but I also think it helps the reputation of the School and provides a great teaming experience that strengthens the working relationships of those who volunteer," said faculty member Eric Balster. "I am very interested in finding creative ways to encourage ECE faculty to volunteer as well."

Thank you to everyone who dedicated their time to help the tornado victims. We encourage all faculty and staff to give back to our community!



### **Guru Subramanyam leads DARPA Wideband Adaptive RF Receiver Protection (WARP) Program**

Guru Subramanyam will be leading the subcontract work on the DARPA Wideband Adaptive RF Receiver Protection (WARP) program at UD. The DARPA WARP program officially kicked-off in February 2021. The other team members include Indiana Microelectronics, Lockheed Martin, and 3D Glass Solutions. UD will supply the thin film varactors used in this project for wideband adaptive filters designed for 2-18 GHz.

## Carroll High School Student Expands Research with Help from Vision

Ashley Martin, a Carroll High School student, set ambitious goals for her science fair project and reached out to the University of Dayton's Dr. Vijay Asari and his Vision Lab team to help achieve them.

Inspired by her work in a center for people with disabilities, Martin became interested in how brain machine interface (BMI) systems could help people with mobility issues to express themselves creatively. Using electroencephalography, a technique for recording and interpreting the electrical activity of the brain, and robotic arms, her project would allow people to paint by using mental commands.



For the full article, follow this link: <https://udayton.edu/blogs/engineering/2020/20-03-02-martin-ashley-vision-lab.php>



Barath Narayanan

Srikanth Kodeboyina

MONDAY APRIL 6, 2020

### When Ingenuity Meets the Human Spirit

By Eric F. Spina

This is a testament to the human spirit during a time when that spirit is being tested. It's about how a young, gifted University of Dayton researcher handed off the baton to a fellow UD graduate and a global team of experts in a fast, furious sprint to find a reliable technology that can quickly diagnose COVID-19. It's a story that starts and ends with inventive minds and nimble organizations — working together for the common good.

Just two weeks ago, UDRI research scientist Barath Narayanan turned his passion for helping doctors diagnose and treat patients more quickly into a quest. On his own time, he significantly improved an artificial intelligence algorithm that can discern from lung X-rays, COVID-19 positive patients from those without the virus.

That, in itself, is an amazing accomplishment. But what happens next is nothing short of remarkable. In less than 72 hours, Matt Willenbrink, an attorney who directs technology partnerships in UD's Office for Research, executed a licensing agreement with Blue Eye Soft, a Greenville, South Carolina, software development company headed by alumnus Srikanth Kodeboyina.

In the last several days, Blue Eye Soft's staff reached out virtually to more than 100 experts in Singapore, India, and across the U.S., who are contributing their expertise in fields ranging from artificial intelligence to cybersecurity to help expedite the software's development. The company has filed a provisional patent and will seek FDA approval.

By day, Dr. Narayanan, who received both a master's and doctoral degree in electrical engineering from UD, works on sponsored research in artificial intelligence for manufacturing and commercial applications.

By night and weekends, he pursues a passion – using artificial intelligence to give doctors the tools they need to rapidly diagnose patients with life-threatening diseases. He had already developed software codes that can successfully detect (with 92 to 99 percent accuracy) diseases from lung and breast cancer to brain tumors and tuberculosis before adapting that work for this vitally important use. He credits his graduate adviser, Dr. Russell Hardie, a professor in the School of Engineering, for supporting his off-the-clock research and providing feedback that led to improvements in the code

“At a time when so many are faced with personal and professional worries, I am immensely proud of how this team came together to make what we hope will be a significant contribution to fighting this awful disease,” wrote Vice President for Research John Leland in an email to me.

Amen. This is a testament to the human spirit.

## Barath Narayanan - Participation in VAIBHAV Summit

Barath Narayanan was selected to participate in the virtual VAIBHAV Summit in October 2020. Researchers were selected based on their research papers, accomplishments and topics that are essential to Indian government. As quoted from their website, “Vaishwik Bharatiya Vaigyanik (VAIBHAV) Summit is a collaborative initiative by S&T and Academic Organizations of India to enable deliberations on thought process, practices and R&D culture with a problem-solving approach for well-defined objectives. The VAIBHAV initiative aims to bring out the comprehensive roadmap to leverage the expertise and knowledge of global Indian researchers for solving emerging challenges. By bringing the Indian Overseas and Resident academicians/scientists together a structure of association will be evolved. The aim of the summit is to reflect in-depth on the collaboration and cooperation instruments with academia and scientists in India. The goal is to create an ecosystem of knowledge and innovation in the country through global outreach.”

Narayanan presented in three sessions within the Vision of Data Sciences and Data Science Applications horizontals.

Read more about the summit here: <https://vaibhav.gov.in/v6.php>



### **New compact power sources can enable extended flight time (12 hours) and increased payload for drones**

Dong Cao joined with a group of researchers from Kent State Univ. Case Western Reserve University, Wright State University and Event38 Unmanned Systems Inc. to develop a hybrid fuel cell- battery/capacitor power source for future unmanned aerial vehicles (UAV). This power source will enable vertical takeoff and landing type aircraft to have a potentially extended flight time (12 hours) and increased payload.

For more information:

<https://www.ohiofrn.org/projects/hybrid-fuel-cell-battery-capacitor-power-source-uass>



# Faculty Awards



## Julie Motz 2021 Vision Award Winner!

Congratulations to Julie Motz for receiving the 2021 Vision Award. [She was] selected for this award due to the numerous contributions [she has] made to the experiential learning of our students since coming to UD. Among these contributions is the way in which [she] helps identify laboratory skill gaps in our students and work to address these through innovative approaches to teaching, and [her] work to foster interdepartmental faculty collaborations to enhance the experiential learning of our students. In particular however, is [her] innovative approach to ensuring our students had access to hands-on experiences while learning remotely during COVID, by ideating and assembling kits for eight different lab courses. The remote, hands-on labs are still being used for international students who were not able to enter the US due to COVID.

## MDPI Electronics Best Paper Award

Congratulations to the winners of the Best Paper Award for **A State-of-the-Art Survey on Deep Learning Theory and Architectures** By Md Zahangir Alom, Tarek M. Taha, Chris Yakopcic, Stefan Westberg, Paheding Sidike, Mst Shamima Nasrin, Mahmudul Hasan, Brian C. Van Essen, Abdul A. S. Awwal and Vijayan K. Asari Electronics 2019, 8(3), 292.

(<https://www.mdpi.com/journal/electronics/awards/620>)

## Congratulations to Wes Baldwin and Ruixu Liu

Two research papers led by the University of Dayton Vision Lab researchers were been accepted for presentation at CVPR 2020 (IEEE International Conference on Computer Vision and Pattern Recognition, Seattle, Washington, United States, 14 - 19 June 2020).

R. Wes Baldwin, Mohammed M. Almatrafi, Keigo Hirakawa, and Vijayan K. Asari, “Event probability mask (EPM) and event denoising convolutional neural network (EDnCNN) for neuromorphic cameras”.

Ruixu Liu, Ju Shen, He Wang, Chen Chen, Sen-ching Cheung, Vijayan K. Asari, “Attention mechanism exploits temporal contexts: Real-time 3D human pose reconstruction”.

## Multi-talented Keigo Hirakawa Announces New Jazz Album



Not only is Keigo Hirakawa a talented professor and researcher, he is an amazing jazz pianist. Click on this link to hear **Keigo Hirakawa’s new album** with the Joseph Howell Quartet through Summit Records: <https://www.summitrecords.com/release/live-in-japan-joseph-howell-quartet/>



## Student Activity

Power Sources Manufacturers Association (PSMA) Applied Power Electronics Conference (APEC) 2021 Student Attendance Award to support Mengxuan Wei up to \$1,000 to assist her attendance at APEC 2021 present her paper for the registration, travel cost. etc.



**Alison Hardie** is a first-year electrical engineering student double majoring in geology. She received the College of Arts and Sciences Dean's Summer Research Fellowship for Summer 2021. She plans to explore remote sensing techniques for studying glaciology with respect to glacial surface processes. In particular, she plans to investigate what type of imaging techniques are most useful in mapping glacier surface processes. Her work will seek to leverage machine learning with convolutional neural networks as applied to glaciology.



**Redha Ali** is a Ph.D. student in ECE (adviser Dr. Russell Hardie) working on machine learning for medical image analysis. Redha started an exciting new internship in Spring 2021 with Cincinnati Children's Hospital Medical Center (CCHMC) in Cincinnati, OH. This represents an exciting new partnership with CCHMC. Redha is working with the [artificial intelligence for computer-aided diagnosis](#) (AI-CAD) team. Redha is working on risk prediction in premature neonates using structural and functional MRI data. His internship project aimed to create and develop a deep learning model for the early prediction of cognitive deficits in very preterm infants using brain functional connectome. Within two months, he had tailored his computer-aided diagnosis (CAD) to correctly classify the abnormal neurodevelopmental outcomes at two years of age as low or high risk of developing severe/moderate cognitive deficit in a matter of seconds and with 83.33 percent accuracy. The CAD system can improve human efficiency and serve as a valuable second opinion for medical professionals. An early diagnosis and prediction open the door to initiate appropriate intervention and treatment for any child who may have a neurodevelopmental delay. Results may help parents of young children to plan ahead on their care and support needs for early intervention services.



**Richard Van Hook** is a Ph.D. Student in ECE working on scene motion detection in the presence of atmospheric optical turbulence, as well as a variety of turbulence mitigation algorithms for long range imaging. Richard, together with his adviser, Dr. Russell Hardie, has filed a provisional patent for a new motion detection system that is robust to turbulence. The title of the provisional patent, filed in March 2021, is "Scene motion detection in imagery with anisoplanatic optical turbulence using a tilt variance based Gaussian mixed model." A journal paper with the same title has recently been submitted for publication to OSA Applied. Optics.



**Hamed Elwarfalli** is a Ph.D. student in ECE. In collaboration with his adviser, Dr. Russell Hardie, he has developed a new algorithm for multi-frame image super-resolution using a convolutional neural network (CNN). This is the first multi-frame method to perform image fusion and restoration jointly within a single CNN. The work was recently published by Elsevier in the journal Computer Vision and Image Understanding.

Hamed Elwarfalli, Russell C. Hardie, “FIFNET: A convolutional neural network for motion-based multiframe super-resolution using fusion of interpolated frames,” Computer Vision and Image Understanding, Volume 202, 2021, 103097, ISSN 1077-3142, <https://doi.org/10.1016/j.cviu.2020.103097>.



**Supun Samudika De Silva** is a Ph.D. student in ECE (adviser Dr. Russell Hardie). Supun has been working on machine learning for medical image analysis with a focus on skin lesion segmentation and classification in dermoscopy images. The goal of the work is to improve early detection of skin cancer to save lives. She presented her research, “CNN-based Machine Learning Approaches to Skin Lesion Classification for Skin Cancer Detection and Diagnosis” at the Stander Symposium at UD on April 22, 2021.

## Student Awards



< **Priyamvada Davuluru** was selected as the recipient of the IEEE Krishna Pasala Scholarship Award for 2020.

**Kaushik Annam** >

was selected as the recipient of the IEEE Krishna Pasala Scholarship Award for 2021.



**Dylan Flaute and Nathan Niehoff** received the Thomas R. Armstrong ’38 Award of Excellence for Outstanding Electrical Engineering Achievement in Memory of Brother Ulrich Rappel and W. Frank Armstrong.

**Eric Holler and Lindsay Hampo** received the Brother Louis H. Rose, S.M., ’33 Award of Excellence to the Outstanding Junior in Electrical Engineering.

**Kyle Fowler** received the Anthony Horvath ’22 and Elmer Steger ’22 Award of Excellence to the Outstanding Senior in Electrical Engineering.

**Jared Puckett and Allen Waltz** received the Mary C. Millette Endowment Award for the Outstanding Senior in Electrical or Computer Engineering in Memor of Mary C. Millette.

# List of 2020-2021 Graduates

## Spring 2020 Graduates

### Undergraduates

Kayla Chisolm  
Maria Dascola  
Sean Malek  
Antall Nguyen  
Joshua Pyron  
Patrick Reynolds  
Stephen Reynolds  
David Schaffer  
Mitchell Shimko  
Matthew Talda  
Faisal Abu Lehyeh  
Ahmad Alazemi  
Ali Albeloushi  
Ali Aldamer  
Huseen Alenezi  
Hwidy Alhubini  
Alaa Alshamaa  
Abdulrhman  
Elliott Anderson  
Ron Apuzzo  
John Callaghan  
Walter Degroft  
Elise Dermody  
Kyle Fowler  
Blaise Gassman  
Jaime Howard  
Anthony Kritis  
Nathan Mansour  
Le Vaughn Monteith  
Jacob Pogats  
Samuel Redd  
Wilbur Sharpe  
Elliot Taylor  
Jordan Wilmoth

### Master's

Bright Ablordeppey  
Naif Eid Alrehaili  
Thomas Benton  
Charles Brookshire  
Chien Kai Chen  
Nathaniel Kueterman  
Samuel Damilola Obafisoye  
Joseph Raffoul  
Chelsea Van Voorhis  
Lei Yu  
Jincheng Zhao  
Roopa Sri Garlapati  
Joshua Kaster  
Eric Stein  
Evan Lynd  
Austin Paulick  
Sreelakshmi Sreenharan  
Hongyu Wu  
Ty Wheeler

### Ph.D.

Abdunaser Mohamed Abdusamad  
Muftah Emhemad Akroush  
Ali Abobaker Mohamed  
Manoj Kumar Sharma  
Devin Smarra  
Xingsheng Xu  
Devin Spatz

## Summer 2020 Graduates

### Undergraduates

Husain Abbas  
Abdullah Alazemi  
Nawaf Alazmi  
Christopher Hartnagel  
Jerel Wilson

### Ph.D.

Ayesha Zaman

### Master's

Courtney Chapin  
Adam DeVilbiss  
Malia Harvey  
Ajay Kumar Karne  
David Kreinar  
Zackary McClamma  
Sarah Miller  
Darren Nash  
Sindhuja Palreddy  
Rachel Rajan

## Fall 2020 Graduates

### Undergraduates

Jonathan Schierl  
Matthew Slisko  
Charles Weidner  
Abdullah Alazemi  
Khaled Alazemi  
Abdullah Alazimi  
Salman Aljabaa  
Abdullah Khatlah  
Jordan Buccelli  
Ryan Clarke  
Mary Graebner  
Thomas Gray  
Michael Gross  
Jonathan Hoopes  
Kevin Meyer  
Nathan Niehoff  
Christina Owad  
Joseph Parker  
Hawrra Hussain Quli  
Patrick Rabbitt  
Abigail Sander  
Michael Wenning

### Ph.D.

Ahmed Alsafran  
Issa Elbelazi  
Liangyu Li  
Garrett Sargent

### Master's

Faisal Abu Lehyeh  
Nawaf Albaqawi  
Mohammad Alhumoud  
Austin Bergman  
Sravya Dasari  
Thierno Diallo  
Quinn Graehling  
Michael Hampo  
Anna Hecht  
Matthew Hoffmire  
Alexander Jereb  
Nachiketh Kaluvala  
Gopinath Kampati  
Salman Kassim  
Jinjing Li  
Noor Malallah  
Srinu Mandagandla  
Zeyu Mao  
Deanna Pratt  
Jiachen Qin  
Samantha Rennu  
Kyle Robinson  
Kyle Vassilo  
Benjamin Wintering  
Feng Yang  
Eric Zamora

# Spring 2021 Graduates

## Undergraduates

Mohammed Al Wahaibi  
Christian Cubacub  
Jacquelyn Cywinski  
Matthew Drake  
Robert Gemperline  
Evan Krimpenfort  
Djauan Marion  
Kenton Nash  
Raymond Nieport  
Jared Puckett  
Griffin Sventy  
Allen Waltz  
Aaron Abele  
Ahmad Alansari  
Abdullah Alazemi  
Mohammed Alazemi  
Souad Alazemi  
Abdullah Alazmi  
William Blaufuss  
Kyle Bowhay-Sanchez  
Trinity Bray  
Colin Crews  
Evan Dewine  
Ryan Duncan  
Samantha Franklin  
Joseph Fusco  
Jacob Harrison  
John Hoffman  
Adam Miesle  
Joseph Miller  
Duong Nguyen  
Carmen Reed  
Peter Rozewicz  
Matt Strunks  
Jonathan Tinch  
Alex Yacovoni  
John Zapata

## Master's

Swathi Gangadhar  
Khalil Alsulami  
Jun Jin  
Eshwar Malalakere Renukaradhya  
Mst Shamima Nasrin  
Cheng Peng  
Mario Rincon Recio  
Chitrika Tadiboina  
Kuangyi Zhang  
Hussain Alibrahim  
Ankur Bhardwaj  
Kyle Fowler  
Yicheng Geng  
Matthew Gnacek  
Cory Heatwole  
Yuzhe Lin  
Sanket Makwana  
Kyle McBrady

## Ph.D.

Alex Burwell



# Faculty Publications

## Journal Articles

Christina Karam, Kenjiro Sugimoto, **Keigo Hirakawa**, “Color-Compressive Bilateral Filter and Non-Local Means for High-Dimensional Images,” *SPIE Journal of Electronic Imaging*, vol. 30, no. 2, March 2021.

**Keigo Hirakawa**, “Introduction to Event Detection Camera,” IS&T Electronic Imaging Conference, Short Course, 2021.

Charles Brookshire, Michael Uchic, Victoria Kramb, Tyler Lesthaeghe, **Keigo Hirakawa**, “L’s Approach: Illumination Pattern Estimation Technique for Optical Microscopy,” *Wiley Journal of Microscopy*, vol. 281, no. 3, p.243-254, October 2020.

Elhusain Saad, **Keigo Hirakawa**, “Improved Photometric Acceptance Testing In Image Feature Extraction Tasks,” *SPIE Journal of Electronic Imaging*, vol. 29, no. 4, 2020, 043012.

Roseanna G. Lawandi, **Keigo Hirakawa**, **Andrew M. Sarangan**, “Spectroscopy using tunable liquid crystal Fourier filters,” *SPIE Nanoengineering: Fabrication, Properties, Optics, Thin Films, and Devices XVII*, 2020.

Mohammed Almatrafi, R. Wes Baldwin, K. Aizawa, and **Keigo Hirakawa**. “Distance Surface for Event-Based Optical Flow.” *IEEE Transactions on Pattern Analysis and Machine Intelligence* 42, no. 7, p.1547-1556, 2020.

Mohammed Almatrafi, R. Wes Baldwin, K. Aizawa, and **Keigo Hirakawa**. “Distance Surface for Event-Based Optical Flow.” *IEEE International Conference on Computational Photography (ICCP)*, 2020.

R. Wes Baldwin, M. Almatrafi, **V. Asari**, and **Keigo Hirakawa**. “Event Probability Mask (EPM) and Event Denoising Convolutional Neural Network (EDnCNN) for Neuromorphic Cameras.” *IEEE Computer Vision and Pattern Recognition (CVPR)*, 2020.

Charles Brookshire, Michael Uchic, Victoria Kramb, Tyler Lesthaeghe, and **Keigo Hirakawa**. “Estimation of the background illumination in optical reflectance microscopy.” *IS&T Electronic Imaging, Computational Imaging*, 2020.

Yeejin Lee, and **Keigo Hirakawa**. “Shift-And-Decorrelate Lifting: CAMRA For Lossless Intra Frame CFA Video Compression.” *IEEE Signal processing Letters*, 27, no. 1, p.461-465, 2020.

Ruixu Liu, Ju Shen, He Wang, Chen Chen, Sen-Ching Cheung, and **Vijayan K. Asari**, “Enhanced 3D human pose estimation from videos by using attention-based neural network with dilated convolutions,” *International Journal of Computer Vision*, pp. 1-20, February 2021. (Springer)

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