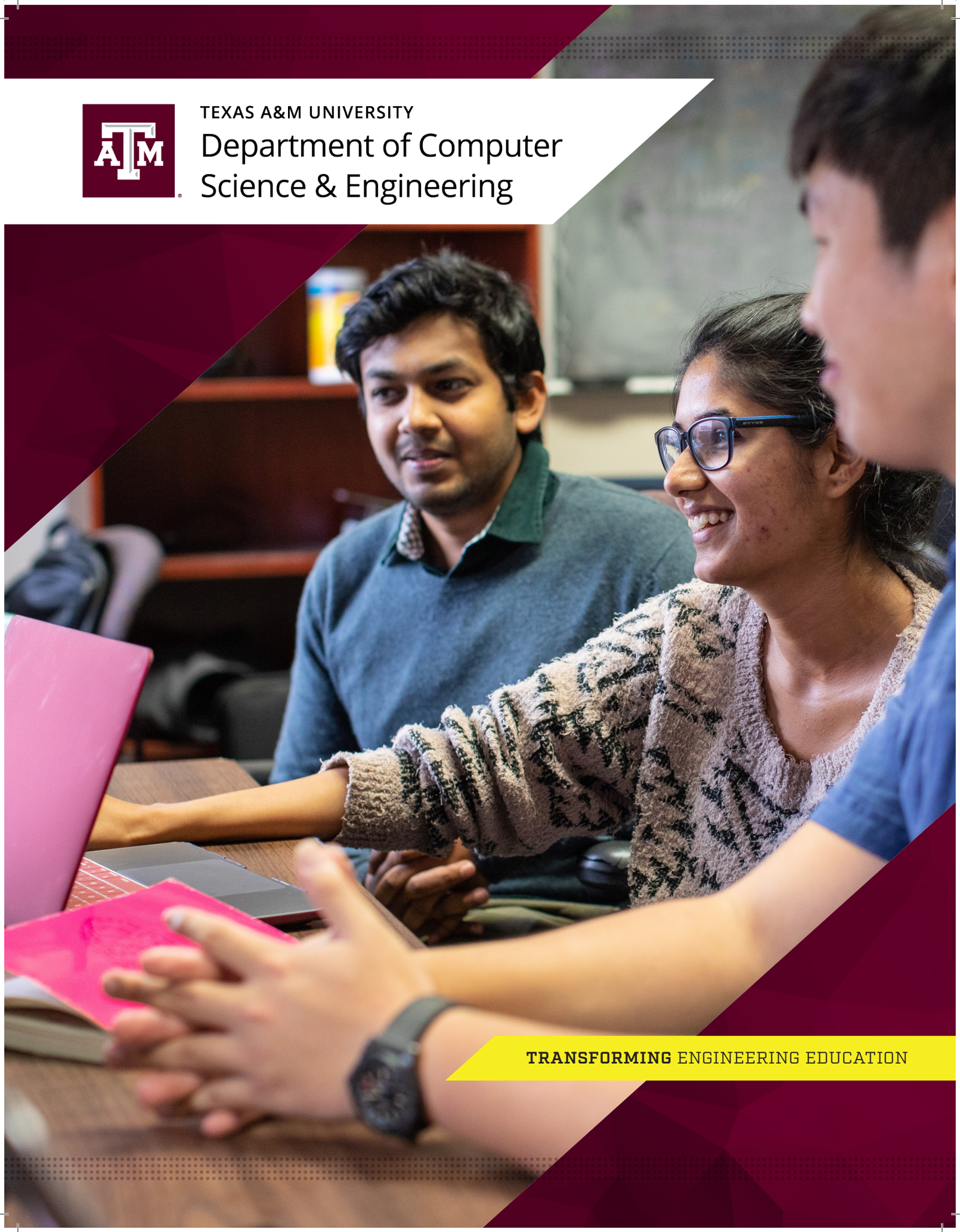
TEXAS A&M UNIVERSITY

Department of Computer Science & Engineering



TRANSFORMING ENGINEERING EDUCATION

GREETINGS FROM AGGIELAND!

The Department of Computer Science and Engineering at Texas A&M University continues to experience significant growth. In the last year, we added eight new faculty members who bring expertise in areas such as artificial intelligence, data science, cybersecurity, computer graphics and human-computer interaction. We also hired five teaching-focused faculty to join our department.

In the pages that follow, you will see a small sample of our research portfolio. Our faculty remains engaged in multidisciplinary efforts addressing important societal challenges. It is a great time to be in computing, and our research groups are advancing the state-of-the-art with ideas that matter to the world.

Our department is equally dedicated to educating the next generation of innovators. In the fall, we introduced a new undergraduate degree: Bachelor of Arts in Computing. This program offers a new pathway for students to combine an in-depth knowledge of computing with another area of interest, positioning them to excel in leveraging computing to advance other domains and industries.

Additionally, the demand for our Bachelor of Science degrees in Computer Science and Computer Engineering from the first-year engineering students continues to grow, placing our majors among the most popular in the College of Engineering. Our graduate program also attracts a large number of high-quality applicants. In the last year, we substantially increased the support to our graduate students by offering new travel grants and fellowships.

We continue to pursue our mission to develop the human and intellectual resources needed to meet the future technological challenges in the field of computing. It has been another fantastic year for our department in this endeavor, and I am proud to highlight the success and contributions of our faculty and students in this issue.

We are a department that prides itself as a home for high-quality education and research, and as always, a home for our students, former students and friends.

Dilma
Da Silva, Ph.D.

Department Head

Professor

Holder of the Ford Motor
Company Design Professorship II

IN THIS **ISSUE**

LEADERS IN ENGINEERING

The Department of Computer Science and Engineering is part of the College of Engineering at Texas A&M University, which is the largest college on the Texas A&M campus. Among public institutions in the nation, the College of Engineering was recently ranked 8th in both undergraduate and graduate programs. Our faculty are experts in a multitude of impactful areas of study such as cybersecurity, data science, digital humanities, intelligent systems, remote health and robotics.

HIGH IMPACT

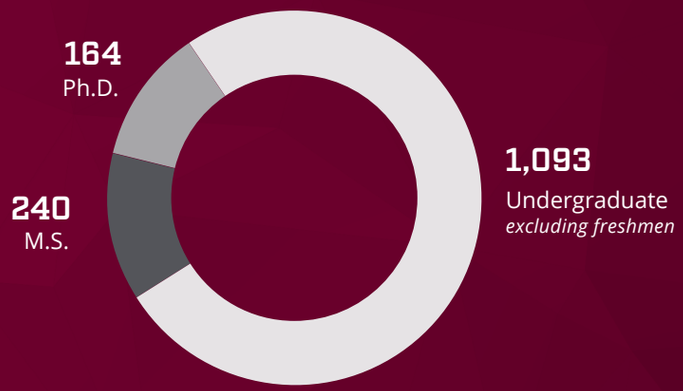
The department's areas of research encompass a vast array of topics within the computing field, all of which are highly meaningful in our world today. From studying the use of robotics in space exploration to working on enhancing the resilience of crisis communications systems, our faculty members continue to make a difference in the ever-evolving field of computing.

DEPARTMENT MISSION

The mission of the Department of Computer Science and Engineering is to develop the human and intellectual resources needed to meet the future technological challenges in the field of computing. This includes developing computer scientists and computer engineers for positions of leadership in industry, government and academia.

DEPARTMENT OVERVIEW

ENROLLMENT (FALL 2018) · 1,497



FACULTY (2018-19)

Tenured/Tenure Track	47
Academic Professional Track	9

ENDOWED POSITIONS

Chairs	2
Professorships	6
Faculty Fellowships	15

DIVERSITY · UNDERGRADUATE

15% Female

19% Hispanic

2% African American

DIVERSITY · GRADUATE

18% Female

3% Hispanic

1% African American

ENGINEERING HONORS

COMPUTER SCIENCE & ENGINEERING

221

AREAS OF RECENT FOCUS

ARTIFICIAL INTELLIGENCE

DATA SCIENCE

CYBERSECURITY

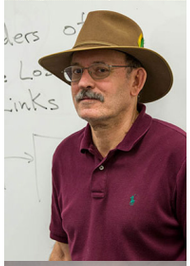
HEALTH

COMPUTER GRAPHICS

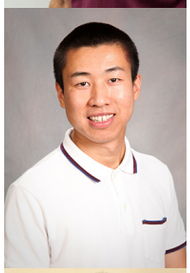
NEW FACULTY *(AY 2018-19)*

Martin Carlisle
Professor of Practice
Teaching Faculty

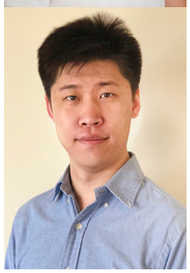
Nima Kalantari
Assistant Professor
Tenured/Tenure Track



Tim McGuire
Instructional Professor
Teaching Faculty

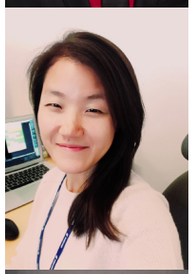


Fang Song
Assistant Professor
Tenured/Tenure Track



Yupeng Zhang
Assistant Professor
Tenured/Tenure Track

David Kebo Houngninou
Instructional Assistant Professor
Teaching Faculty



Jeeeun Kim
Assistant Professor
Tenured/Tenure Track

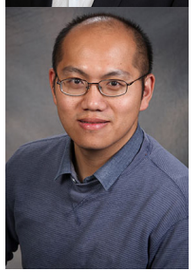
Abdullah Muzahid
Assistant Professor
Tenured/Tenure Track

Shawna Thomas
Instructional Assistant Professor
Teaching Faculty

Shuiwang Ji
Associate Professor
Tenured/Tenure Track

Robert Lightfoot
Lecturer
Teaching Faculty

Guni Sharon
Assistant Professor
Tenured/Tenure Track



Chia-Che Tsai
Assistant Professor
Tenured/Tenure Track

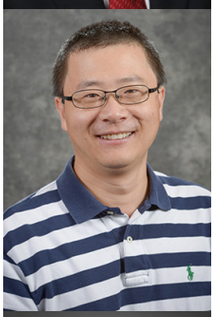
FACULTY AWARDS *(AY 2018-19)*

James Caverlee

Associate Professor

TEES Faculty Fellow

CSE Undergraduate Faculty Teaching Excellence Award



Guofei Gu

Associate Professor

TEES Research Impact Award

TEES Faculty Fellow

Dean of Engineering Excellence Award- Associate Professor

Roozbeh Jafari

Associate Professor

William O. and Montine P. Head Memorial Research Fund

Lawrence Rauchwerger

Eppright Professor

American Association for the Advancement of Science Fellow

Tim Davis

Professor

TEES Faculty Fellow

Sigma Xi Walston Chubb Award for Innovation

Theodora Chaspari

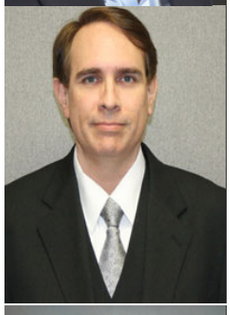
Assistant Professor

CSE Graduate Faculty Teaching Excellence Award

Ricardo Gutierrez-Osuna

Professor

TEES Faculty Fellow



Daniel Jiménez

Professor

CSE Graduate Faculty Teaching Excellence Award

Scott Schaefer

Professor and Associate Head for Academics

TEES Research Impact Award

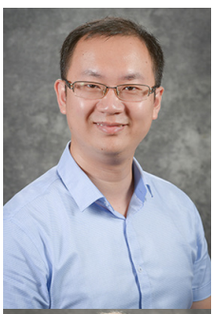
CSE Undergraduate Faculty Teaching Excellence Award

Association of Former Students University-Level Distinguished Achievement Award- Teaching

Juan Garay

Professor

International Association for Cryptologic Research Fellow



Xia “Ben” Hu

Assistant Professor

TEES Young Faculty Fellow, Dean of Engineering Excellence Award-Assistant Professor, NSF Faculty Early Career Development Award, J.P. Morgan AI Research Faculty Award

John Keyser

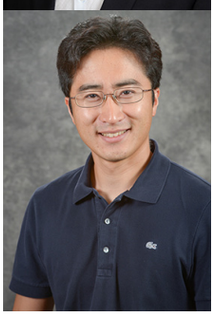
Professor

William Keeler Memorial Service Award

Guni Sharon

Assistant Professor

CSE Graduate Faculty Teaching Excellence Award



Shinjiro Sueda

Assistant Professor

NSF Faculty Early Career Development Award

Jeff Huang

Assistant Professor

Google Research Award

Mozilla Research Award

Robin Murphy

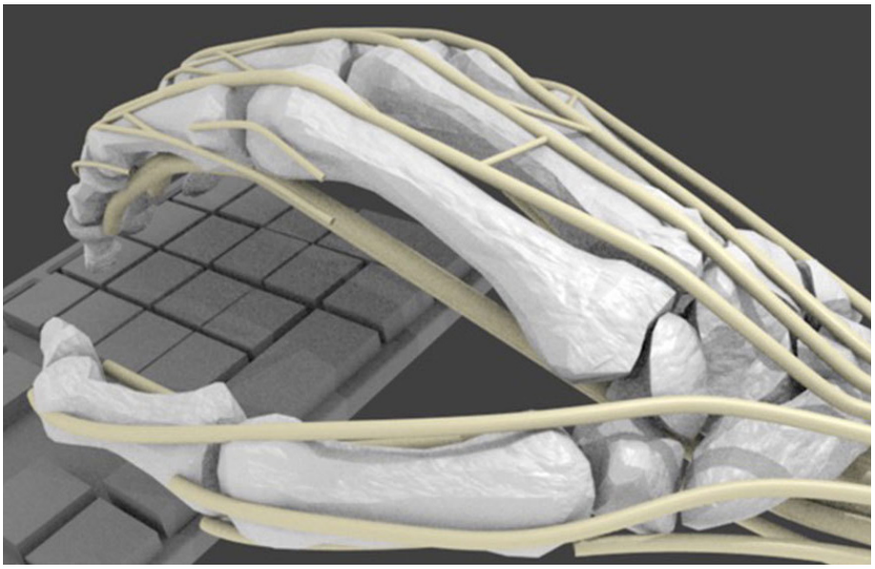
Raytheon Professor

TEES Research Impact Award

Frank Shipman

Professor and Associate Department Head

Dean of Engineering Excellence Award Full Professor



MAKING MOVES: BIOMECHANICAL SIMULATION TO ADVANCE COMPUTER ANIMATION AND MEDICINE

Dr. Shinjiro Sueda, assistant professor in the Department of Computer Science and Engineering at Texas A&M University, has been working on musculoskeletal simulation since his years pursuing his Ph.D. His interest is particularly focused on the complex interactions of muscles, tendons and the skeleton during movement.

"Muscles and tendons wrap around bones and other anatomical obstacles and apply forces to the skeleton in interesting ways, making us capable of both intricate and forceful movements," said Sueda. "For example, by delicately controlling our muscles, we are able to change a baby's diaper without hurting the baby. Using the same muscles, we are also able to throw a ball half way across a field."

To better understand this range of functions, Sueda is using new computer models to simulate the biomechanics of humans.

In recent decades, two contrasting methods for musculoskeletal simulation have been developed: line-based methods and volume-based methods. These two approaches are built on fundamentally different principles: line-based methods are built on rigid body dynamics, whereas volume-based methods are built on continuum mechanics. Currently, there is no way to utilize the best of both methods.

Sueda's research will build on these existing simulations and bridge the gap between the two approaches.

The application of his research will stretch across many areas, including: medicine, for surgical training and stroke rehabilitation; ergonomics, for better understanding of energy use; bio-paleontology, for discovering the movement of extinct animals; robotics, for bio-inspired tendon-driven actuators; and neuroscience, for reverse engineering the brain by providing a computational testbed for understanding motor control.

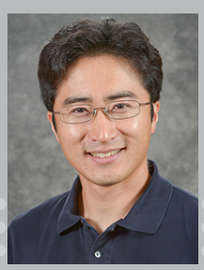
"One obvious area of impact is computer graphics and virtual/augmented reality," said Sueda. "With recent advances, computer-generated imagery of human characters often looks indistinguishable from photographs, but when these characters start moving, it becomes easy to tell that they are not real — there's something 'uncanny' about them."

Sueda's research will help to generate digital characters that move more naturally by modeling the underlying muscles, tendons and bones from first principles.

"Although the main focus is on humans, the proposed research can also be applied to other animals, including extinct animals or even imaginary characters," said Sueda.

Sueda received the Faculty Early Career Development (CAREER) award from the National Science Foundation. The award provides funding to support promising integrated research and education. Sueda will use the funds primarily for student support.

Featured Researcher



Dr. Shinjiro Sueda

Assistant Professor

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HUANG'S RESEARCH ON BROWSER ATTACKS RECEIVES SUPPORT FROM GOOGLE AND MOZILLA

Web browsers have been facing a serious threat in recent years. Attackers are gaining access to private user data by exploiting a programming flaw in browsers' memory. This vulnerability is not easily recognized, and the attacks happen too quickly for program developers to create a patch in the programming.

Dr. Jeff Huang, assistant professor in the Department of Computer Science and Engineering, has proposed a new solution to this security concern and is developing an automated tool that will detect and eliminate these memory vulnerabilities. In support of his significant research on browser-based attacks, Huang was awarded the Google Faculty Research Award and Mozilla Research Grant.

"The security issues inside the browsers are very serious," said Huang. "There are so many malicious websites and billions of users."

As Huang explained, each time a user opens a browser such as Google Chrome or Mozilla Firefox and visits a website, they are accessing a space in the browser's memory. If a user visits a malicious site, attackers can corrupt the browser's memory and share that space with the user. At that point, if a user proceeds to visit their bank's website, for example, and logs into their account, the attackers can access and manipulate the user's private bank information.

"The goal is to have a tool that is automatically setup when Firefox and Chrome release a new version," Huang said. "The tool will automatically scan the browser's code, inspect its behavior and combat any potential memory corruption vulnerabilities. It's going to be very helpful and protect billions of people a day."

His open-soured automated tool has already surpassed existing technology in its ability to find and eliminate bugs in the programming. With the funding and collaborative support received from Google and Mozilla, Huang plans to continue researching browser concerns and enhance his tools to have optimal detection and debugging capabilities.

"What excites me most about this project is its practical impact," Huang said. "Long term, I am interested to see the technical transfer of this technology to other areas, such as computer operating systems."

The Google Faculty Research Awards program supports academic research in computer science, engineering and related fields. Through the program, Google funds world-class research at top universities, facilitates interaction between Google and academia, and supports projects whose output will be made openly available to the research community. Huang's project was one of 152 considered by Google, chosen from a total of 1,033 covering 46 countries and more than 360 universities.

The Mozilla Research Grants support innovations that will make the internet safer, more empowering and more successful. A total of 115 proposals were submitted and Huang's was one of the eight selected for the Mozilla Research Grant.

Featured Researcher

Dr. Jeff Huang

Assistant Professor

jeffhuang@tamu.edu

PSYCHOLOGY OF **VOICES**

From Fitbits to mobile meditation apps, personal health has taken technology by storm.

While many programs use inputs such as heart rate or calorie intake to track the condition of a user, a person's voice can speak volumes about their well-being.

Utilizing the insightful nature of speech and vocal patterns, Dr. Theodora Chaspari is working to develop a digital program that monitors and tracks a user's emotional state while keeping their identity completely anonymous. Her research has the potential to transform everyday devices into valuable assets for psychological healthcare and future research.

Chaspari is an assistant professor in the Department of Computer Science and Engineering at Texas A&M University. Her project is funded by a 2019 PESCA grant provided by the university's Division of Research.

Similar to the way a Fitbit records activity to track a person's physical fitness, many voice-compatible accessories, such as cellphones and Amazon's Echo, are able to record speech to track and monitor emotional wellness. This is done through the use of coded acoustic markers that decipher and translate vocal patterns, allowing digital devices to draw conclusions about the mood of a speaker.

While voice-compatible and voice-activated technology is both prominent and convenient, it also runs the risk of privacy invasion.

As Chaspari explained, everyone's

voice contains unique attributes, including timber and pitch, that reveal such things as age and gender. This information can then be used to identify a speaker, which is especially concerning when personal health information is involved.

Featured Researcher

Dr. Theodora Chaspari

Assistant Professor

chaspari@tamu.edu

"What we want to do is make ordinary devices be able to understand emotion, while erasing any information related to the identity of the speaker," said Chaspari. "So we are transforming the speech signal and deriving measures that are emotion-dependent, behavior-dependent, but not identity-dependent."

By removing the link between voice and speaker to provide anonymity to users, Chaspari's emotion monitoring program will be a vital stepping stone in the development of emotional healthcare and research in a digital world.

Whether a tool to help psychiatrists track grief or a means for parents to keep an eye on the emotional development of their child, the voice has a lot to say about the future of personal well-being.

"There have been a lot of studies about how tracking the speech and vocal patterns of people with depression can help understand its progression and recognize problematic episodes," said Chaspari. "Now that we have technology that can comprehend and record data from people's lives, the possibilities are endless."

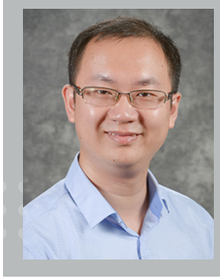
HU'S OPEN-SOURCE SYSTEM NAMED BREAKTHROUGH IN MACHINE LEARNING

Motivated to provide powerful machine-learning tools to the general public, Dr. Xia (Ben) Hu's team at Texas A&M University is enabling those with limited background knowledge in machine learning to utilize such tools more easily.

The team's solution? AutoKeras, an open-source software library for automated machine learning. An open-source software library like this is beneficial because it allows the general public to easily get access to powerful though complicated deep models. AutoKeras, and other automated machine learning tools, can be applied to a variety of industries including healthcare, autonomous driving and manufacturing.

"The most intriguing part of the work is to let the machine automatically do the difficult work that non-experts cannot do and the dirty work that experts do not want to do," said Hu, assistant professor in the Department of Computer Science and Engineering. "In the context of deep learning, neural architecture search (NAS) aims to search for the best neural network architecture for the given learning task and dataset."

Featured Researcher



Dr. Xia (Ben) Hu

Assistant Professor

hu@cse.tamu.edu

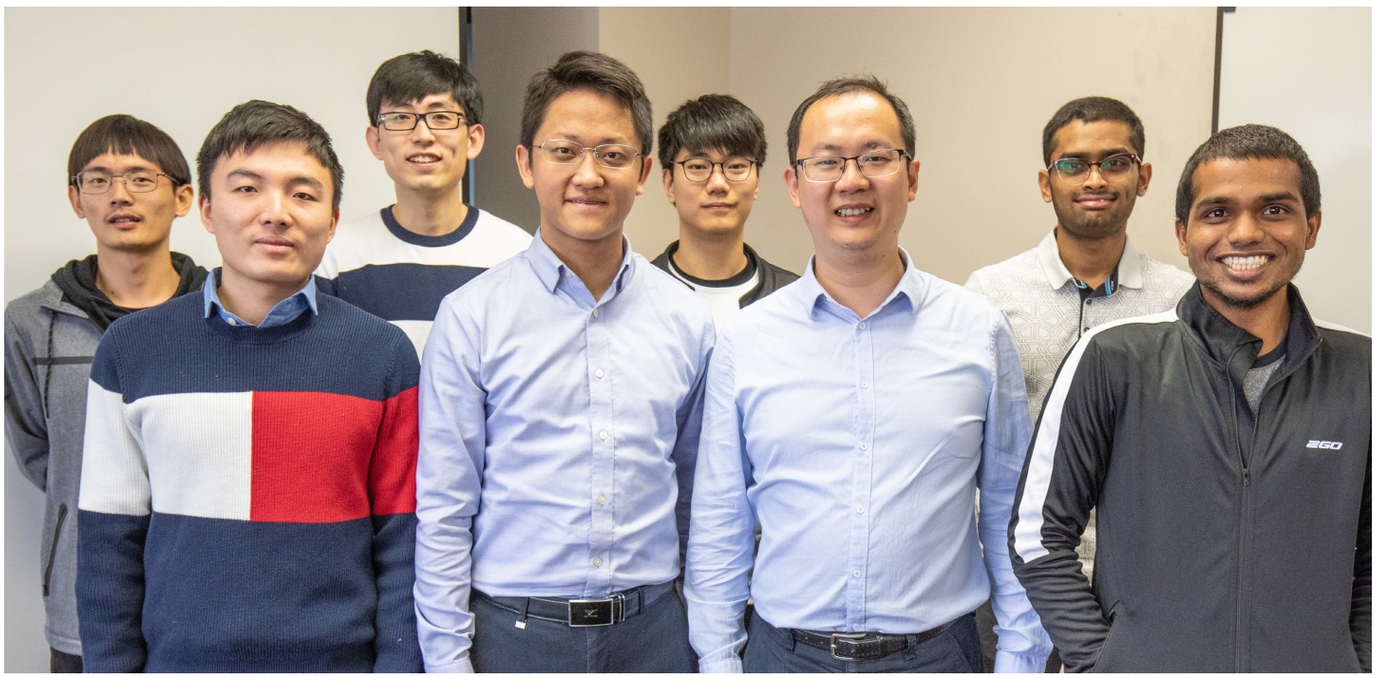
Hu and his team of graduate students pursued the project from start to finish. They began by designing the algorithm, all the way to the end by fully developing the software.

"The ultimate goal for this project is to propose advanced neural architecture search algorithms and provide an open source software library for automatically searching diverse deep neural network and hyperparameters in different applications under various learning contexts," said Hu, "which could achieve comparable or even better performance compared to human designated neural networks."

The team is comprised of Hu, principal investigator; team leaders Haifeng Jin and Qingquan Song; software developers Zonglin Yang, Boyuan Gong, Thuniki Yashwanth Reddy, Satya Kesav Gundabathula, Cheng Cheng and Praveen Kumar Venugopal. Funded by the Defense Advanced Research Projects Agency, the team has worked for more than two years on developing AutoKeras. They are now in the final stage of testing, but those interested can download a pre-released, as-is version at their website autokeras.com.

Since its pre-release, this software has received more than 4,000 stars on Github, becoming the top rated open-source automated machine learning package. Their work has been featured in numerous articles in publications around the world including Towards Data Science, Analytics India Magazine and Medium, among others. Along with other projects mainly from internet giants such as Google and Facebook, this work has been listed as one of the "key breakthroughs of AI (artificial intelligence) in 2018 and ML (machine learning) trends for 2019" by Analytics Vidhya.

"The successful outcome of this project will lead to advances in automated machine learning especially neural architecture search and enable the researchers and practitioners without a background in data science to create machine learning, especially deep learning models, for facilitating their research and applications," Hu said.



DAVIS RECEIVES SIGMA XI WALSTON CHUBB AWARD FOR INNOVATION

Dr. Timothy A. Davis, professor in the Department of Computer Science and Engineering at Texas A&M University, is the 2018 recipient of the Sigma Xi Walston Chubb Award for Innovation. This award is given to honor and promote creativity in science and engineering, and it carries an honorarium and invitation to give a lecture at Sigma Xi's annual meeting.

Davis' work focuses on solving sparse matrix problems, and he is a go-to expert in the area. Google Street View uses his software to place images in their accurate location to create a high-quality viewing experience for users. Linux also steadily relies on his software in its open-source systems, and his work is behind the programming platform MATLAB.

The use of his algorithms and software extends further than even he is often aware. For example, the Defense Advanced Research Projects Agency used Davis' solvers to scan for illegal activity on the dark web, and this analysis helped the FBI rescue six girls from sex trafficking in Colorado.

"I encounter new applications of my work in unexpected areas, often out of the blue because the codes I write are so robust and well-documented that the engineers and scientists who rely on my work rarely need to ask me how to use them," Davis said. "Google used my solvers for a year before they dropped me a note."

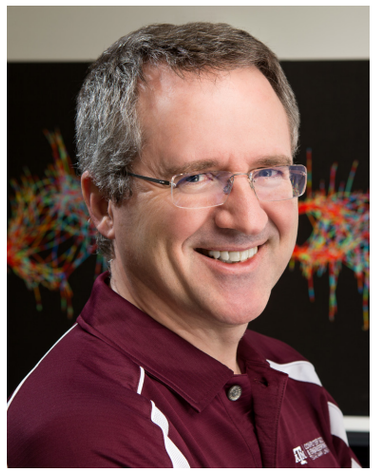
The U.S. Geological Survey previously took days to create maps of the moon, Mars and other planets, but thanks to Davis' solvers, they now create these maps in minutes.

"They thanked me for 'helping to pave the way for future human exploration,'" Davis said.

Companies, government labs and academics also work with Davis to incorporate his software into their projects. His solvers have improved drones, VLSI circuit simulators, database systems, earthquake simulators, engineering computer-aided design tools and half a billion smartphones.

As his research continues to impact the world of computing and assist others in their endeavors, an often-revisited crowd favorite of Davis' algorithms is his art.

When a coordinator for the London Electronic Arts Festival caught sight of the colorful images of his sparse matrix collection, the coordinator asked Davis if he could graph music in the same way. Although it was completely unlike any he'd done before, Davis' creative passion led him to accept the challenge. In 2013, the London



TIMOTHY DAVIS

Electronic Arts Festival used his artistic algebra as their theme for the event, and his artwork appeared on billboards all over London.

Today, Davis' research is focused on two areas: sparse linear algebra on graphics processing units (GPUs), and methods for solving graph algorithms in the language of sparse linear algebra over semirings. GPUs provide the promise of high performance and lower energy use, but they work best on very regular problems. The challenge is to map the irregular nature of sparse matrix algorithms to perform well on GPU architectures.

JIMÉNEZ RECEIVES HIGH-PERFORMANCE COMPUTER ARCHITECTURE TEST OF TIME AWARD

Dr. Daniel A. Jiménez, professor in the Department of Computer Science and Engineering at Texas A&M University, has received the High-Performance Computer Architecture (HPCA) Test of Time (ToT) Award for his 2001 paper titled "Dynamic Branch Prediction with Perceptrons."

This prestigious award is given at most to one paper from the Institute of Electrical and Electronics Engineers (IEEE) International Symposium on HPCA, whose influence is still felt 18-22 years after its initial publication. This is only the second HPCA ToT Award to be given and the first year that papers from 2001 were eligible for the award, heightening this honor.

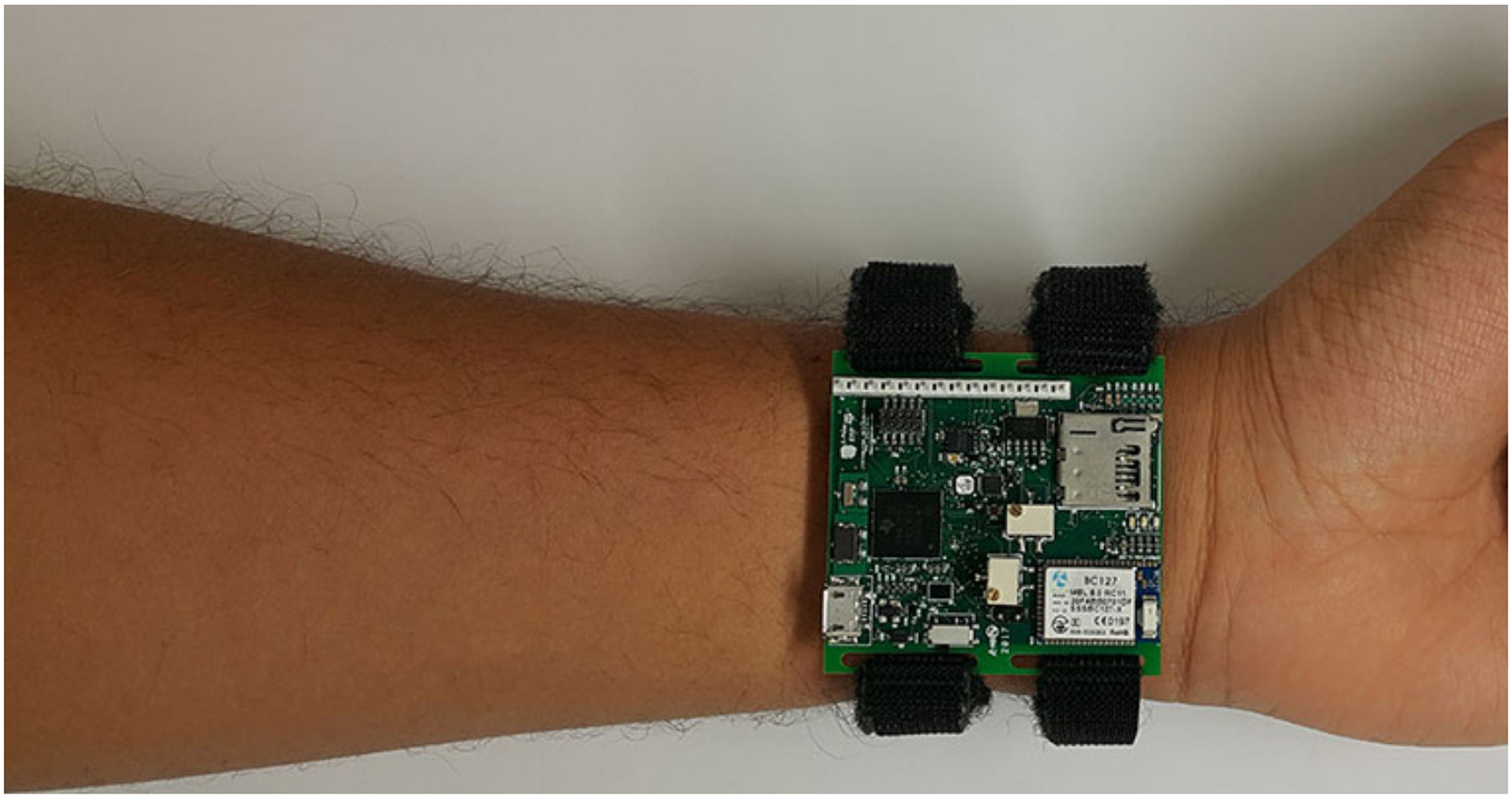
Jiménez co-authored the winning paper with his former doctoral advisor from The University of Texas at Austin, Dr. Calvin Lin. Their interdisciplinary research between computer architecture and machine learning presented a new method for how microprocessors run computer programs. Of the 225 papers considered, theirs was selected for how it fundamentally changed research into branch prediction.

Prior to their research, branch predictors used ad hoc techniques that made inefficient use of processor resources. Jiménez used his background in neural networks to apply perceptrons to branch prediction. His method of applying neural learning directly into the hardware has significantly improved performance, achieving accuracy superior to previous state-of-the-art techniques.

According to Google Scholar, the paper is the most highly cited on branch predication published in the last 25 years, and Advanced Micro Devices, Oracle and Samsung have since utilized perceptron-based branch predictors based on this research.

"It is rare for a hardware technique proposed in literature to actually be adopted in industry," said Jiménez. "We are gratified that the idea was welcomed by academia and industry and has had such a large impact."

DANIEL JIMÉNEZ



TEXAS A&M AND **YALE** TO DEVELOP WRIST-WORN, CUFFLESS BLOOD PRESSURE MONITOR

The National Institute of Biomedical Imaging and Bioengineering has announced the funding of a grant to investigators at Texas A&M University and Yale University for the development of a wrist-worn, cuffless blood pressure monitoring system. The project is sponsored for $1.2 million over four years.

With a team of engineers, computer scientists and physician-scientists led by Drs. Roozbeh Jafari and Bobak Mortazavi at Texas A&M, and Drs. Harlan Krumholz and Erica Spatz at Yale, the goal is to create a device that can unobtrusively measure blood pressure throughout the day and night and across a range of activities.

Elevated blood pressure occurs in almost half of adults and is a strong risk factor for heart disease and stroke. The blood pressure treatment guidelines recommend frequent measurement of blood pressure to define risk and treatment response, but current methods involve the periodic inflation of a blood pressure cuff, which is bothersome during the day and interrupts sleep at night. The development of a cuffless wearable device could revolutionize the approach to blood pressure management, a technology that was developed over a century ago and has undergone very few changes and enhancements over the years.

“We have developed a novel approach for measuring blood pressure that can obviate the need for the traditional blood pressure cuff,” said Jafari, principal investigator and associate professor in the Departments of Biomedical Engineering, Computer Science and Engineering, and Electrical and Computer Engineering at Texas

the future as combining novel ways of acquiring information with sophisticated approaches to analyzing the complex, streaming data, with the use of analytics, in ways that provide useful information," noted Mortazavi, assistant professor in the Department of Computer Science and Engineering at Texas A&M.

In the end, the value of the technology will depend on the clinical impact. "From the outset we are making plans to test the device in clinical populations and are oriented toward evaluating not only the validity of the information, but its usefulness in characterizing and treating hypertension," said Spatz, assistant professor of medicine at Yale.

Featured Researchers

Dr. Bobak Mortazavi

Assistant Professor

bobakm@tamu.edu

Dr. Roozbeh Jafari

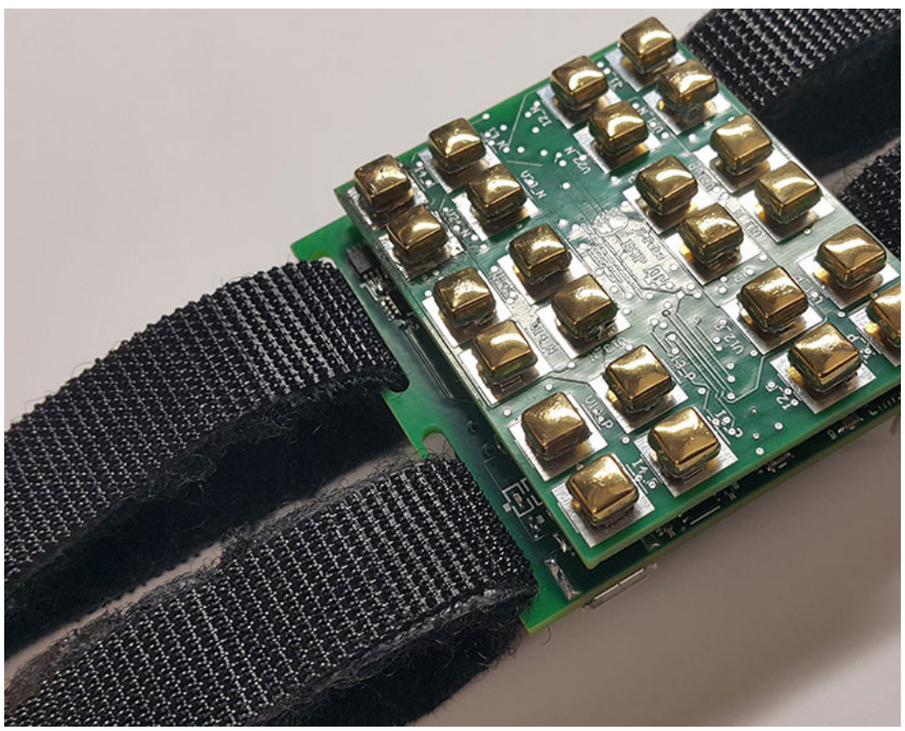
Associate Professor

rjafari@tamu.edu

A&M. "We are excited to see the translation of this technology to practice with its significant impact on how blood pressure can be used for diagnosis, prognosis and management of hypertension."

The funding represents an emerging collaboration between the two institutions. "We are so pleased to have created such a strong multidisciplinary team. My hope is that this technology will lead to a paradigm shift in the way that blood pressure is measured and will strongly improve our ability to reduce risk in the population," said Krumholz, the Harold H. Hines, Jr. Professor of Medicine and Public Health at Yale.

The work will require advanced analytics applied to the data produced by the device in order to maximize its clinical impact. "I see



TEXAS A&M AND ADOBE RESEARCH DEVELOP NEW SMART CAMERA PRIVACY FILTER

Smart devices are integrating into our workspaces and homes, providing convenient features such as security cameras, temperature control, motor games and more. Smart devices often have cameras that transmit data to the cloud. The cloud uses analytics to recognize different actions and sends data back to the device. Recently these smart cameras have come under public scrutiny for creating hacking opportunities that infiltrate the privacy of the home. A balance must therefore be reached to protect the security of the user and maintain optimal performance of the device's functionality.

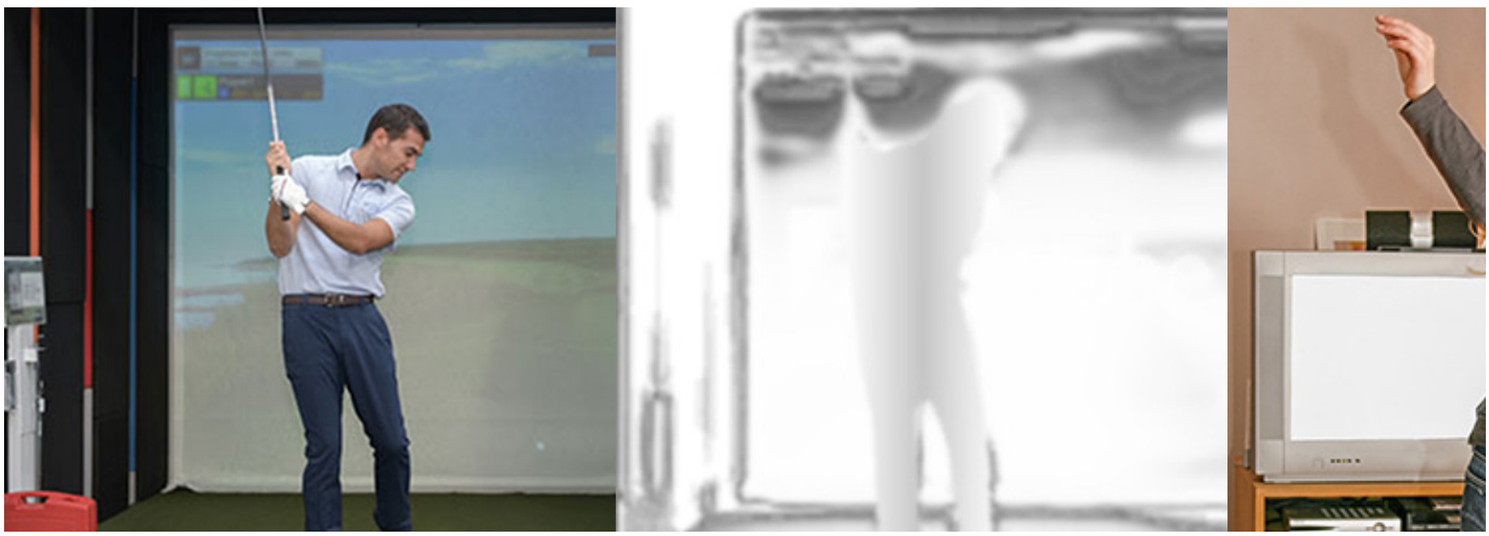
Texas A&M University researcher Zhangyang Wang, along with his two doctoral students, Zhenyu Wu and Haotao Wang, have partnered with Adobe Research scientists Dr. Zhaowen Wang and Dr. Hailin Jin to find new ways to protect user privacy from video-enabled in-home devices. The collaboration with Adobe began in September 2017.

"We must reach a balance that allows people to use cloud-based services without exposing personally identifiable information," said Zhangyang Wang, assistant professor in the computer science and engineering department.

Texas A&M and Adobe have developed new, cutting-edge techniques to solve this problem. Their work builds on adversarial machine learning, a research field that lies at the intersection of machine learning and cybersecurity.

"Traditional machine learning tries to preserve and extract information — to maximize it," Zhaowen Wang said. "Our approach is different. For example, adversarial learning can help us minimize recognizing a person's identity while still seeing and understanding their actions."

The team formulated a unique adversarial training framework to improve privacy-preserving visual recognition. Adversarial machine learning has two models. One



model is trying to protect the information, while the other model does the opposite, trying to steal the information. The models then learn from competing with each other and advance their techniques.

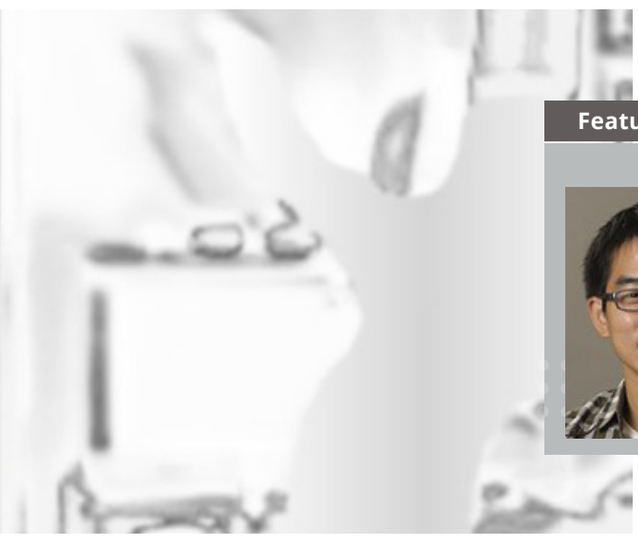
Their adversarial training framework learns a smart "filtering" mechanism that can automatically convert a raw image to a privacy-preserving version. The learned filter can be embedded in the camera front-end, so that the image captured by the camera will have privacy information removed at the very beginning, before any transmission, storage or analytics. Experiments show that it cannot be hacked by other machine learning attacker models, and only video contents free of privacy information can get past the scrutiny of the filter.

The filtering mechanism can also be used to secure privacy in human clinical trials. "Human research topics currently pixelate faces to retain privacy, but pixelating or downsampling is an oversimplified solution," said Zhangyang (Atlas) Wang. "We all know someone we could recognize merely by their body shape, clothing or body language."

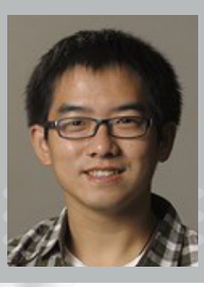
Not protecting an individual's data could lead to an unwanted security breach in these scenarios. Their filter presents a new, crucial layer of protection as their models have undergone many empirical experiments designed specifically to test the hackability of the image transmission and interpretation. A large-scale video dataset and benchmark study will be released soon verifying the results.

Their research is further described in the team's 2018 European Conference on Computer Vision paper "Towards Privacy-Preserving Visual Recognition via Adversarial Training: A Pilot Study."

The researchers look forward to the software being accessible as an update that users can download, built into future smart home cameras, or used as a data processing software for de-identifying privacy-sensitive data.



Featured Researchers



Dr. Zhangyang (Atlas) Wang

Assistant Professor

atlaswang@tamu.edu

5 Key Takeaways from the Fifth Annual **TAMUhack**

Since 2014, the student-run organization TAMUhack has hosted annual hackathons in conjunction with the Department of Computer Science and Engineering at Texas A&M University.

In celebration of its fifth year anniversary, here are five key takeaways from the 2019 TAMUhack:

1

AGGIE ENGINEERS SET THE STANDARD FOR STUDENT INVOLVEMENT

Not only did this year's hackathon break the record for student involvement in TAMUhack with over 800 participants, it also boasted the most project submissions for any hackathon in the state of Texas. While The University of Texas at Austin's HackTX received 86 submissions and Rice University's HackRice received 46, TAMUhack received more than both universities combined with a total of 138 project submissions and demonstrations.

2

INDUSTRY INVOLVEMENT WITH EDUCATION LENDS ITSELF TO INNOVATION

With a multitude of company booths and demonstrations at the event, the hackathon teams were given a direct line into the needs and knowledge of leading companies across the country. In addition to seeing and demonstrating new technology, students were challenged by company sponsors to use their hacking, coding and engineering skills to create solutions to real-world challenges — bolstered by the mentorship of industry experts.

"The department has been tremendously helpful in every aspect of organizing this event for our students and others around the country," said TAMUhack president and computer science senior Muin Momin. "We even had several students from Berkeley, Georgia Tech and MIT. We're incredibly proud of what the team was able to achieve this year and can't wait to see where TAMUhack goes next."

3

BUILDING RELATIONSHIPS OPENS DOORS TO FUTURE CAREERS

This year, more than 20 company sponsors, including American Airlines, Southwest Airlines, Microsoft and Charles Schwab, gave their support to the student-run hackathon held on Jan. 26-27. During the 24-hour event, students were given the opportunity to meet, mingle and give resumes to industry experts—creating a strong network to help prepare them for their future careers.

4

A LITTLE SWAG GOES A LONG WAY

Whether it's free swag or monetary and technology awards, participants of TAMUhack all go home with something to remember the experience by.

5

THIS IS ONLY JUST THE BEGINNING

For half a decade, TAMUhack has created a community of mentorship so students can work together in order to create software and hardware solutions to problems faced in the industry. With great leadership and ongoing commitment and interest, the organization has built a strong foundation for years to come.

QUANTIFYING CREATIVITY: *UNDERGRADUATE RESEARCHER RECOGNIZED BY THE COMPUTING RESEARCH ASSOCIATION*

Hannah Fowler, an undergraduate student researcher in the Department of Computer Science and Engineering at Texas A&M University, has been awarded an honorable mention in the Computing Research Association's 2019 Outstanding Undergraduate Researcher Award program. This distinction, which recognizes North American undergraduate students who show extraordinary potential in computing research, was given to her for her qualitative data analysis work in the Interface Ecology Lab.

Researchers in the Interface Ecology Lab directed by Dr. Andruid Kerne, professor in the computer science and engineering department, investigate the future of human expression with a focus on creativity, play, participation and learning.

"Hannah's work exemplifies the power of solving problems through a multidisciplinary approach, her research achievements are remarkable," said Dr. Dilma Da Silva, department head and professor in the department.

With nearly three years of experience in the lab and a qualitative analysis-driven internship, Fowler has played an integral role on a variety of projects, including studies on Massive Open Online Courses, pen and touch interaction, measuring ingenuity and the creation of the web-based collaboration platform LiveMâché.

Fowler attributes much of this success and interest in qualitative analysis to her double major in computing and philosophy, which has given her a unique approach to research.

In her philosophy courses, Fowler learned principles about how to think and ask relevant questions – which has become a valuable asset to qualitative analysis in the Interface Ecology Lab. In turn these teachings have allowed her to be able to explore and investigate the more theoretical side of computer science with a keen eye for detail.

"It has helped me develop this sensibility when looking at data to be able to say, 'this is something that could be interesting.' I think it takes a certain eye to notice those kind of things. But once you notice them, it's hard to ignore them," said Fowler.

Currently she is working on an ethnography covering Texas A&M studio design professors from visualization, mechanical engineering and landscape architecture. By conducting interviews with faculty and students, identifying key themes in the transcript, and segmenting data to measure specific patterns and phenomenon, she is able to gain insight into the status quo, teaching methods and issues therein.

"One of the things that we're interested in is how we can support instructors computationally," said Fowler. "So for example, how and if can we quantify creativity."

Looking toward graduation and beyond, Fowler will begin working for Microsoft in September as a program manager with the Identity Team.

"I interviewed with them last summer and the team was awesome," said Fowler. "It is the kind of work that I want to do and I can integrate what I've learned in the Interface Ecology Lab into that role, which is special."

DOCTORAL STUDENTS *WIN COMPUTER VISION AND PATTERN RECOGNITION PRIZE CHALLENGE*

Ye Yuan and Junru Wu, doctoral students in the Department of Computer Science and Engineering at Texas A&M University, collaborated with students from Peking University in China to win the 2018 Conference of Computer Vision and Pattern Recognition's (CVPR) UG2Prize Challenge.

The Texas A&M and Peking University team (TPU) was comprised of Yuan and Wu representing Texas A&M; along with Yueyu Hu, undergraduate student, Wenhan Yang, doctoral student and Xiaoshuai Zhang, undergraduate student, all at Peking University. The students were supervised by Dr. Wang, assistant professor in the Department of Computer Science and Engineering at Texas A&M, and Dr. Jiaying Liu, associate professor at the Institute of Computer Science and Technology at Peking University.

The UG2 challenge was sponsored by the Intelligence Advanced Research Projects Activity, with the goal to bridge the current gap between computational photography and visual recognition. TPU's objective was to develop image enhancement algorithms to improve visual recognition performance on a given set of intentionally difficult, real-world videos collected by unmanned aerial vehicles, manned gliders and ground cameras.

To improve the classification performance of the dataset, they developed an algorithm that assembles light adjustment, super-resolution, deblurring, denoising, high-dynamic ranging and deblocking into one deep learning pipeline.

"The competition was a great opportunity and unique experience to apply the computer vision algorithms that we developed to solving a real-world, cutting-edge problem," said Yuan, TPU's team leader.

The algorithm they created won them a $12,500 cash prize and an additional $5,000 to travel to the CVPR 2018 UG2 Prize Challenge award ceremony on June 18 in Salt Lake City, Utah, where they presented their winning algorithm.

A total of 24 teams from universities and industrial companies participated in the competition's two tracks. TPU was the only winning team to come from academia.

"This event has boosted my confidence in pursuing a future research career, and I am proud to have learned from and collaborated with such a dedicated team," said Yuan.

Yuan and Wu work under the supervision of Wang as researchers in the Visual Informatics Group at Texas A&M. They intend to invest their portion of the cash prize into research equipment to further contribute to their academic success and capability to combat real-world problems.

"During the competition I was very delighted to see that our students actively collaborated with peers and devoted extremely hard work to winning this prestigious honor," said Wang. "I am quite confident in these students and wish them every success in new endeavors."

TAPIA CONFERENCE OF DIVERSITY IN COMPUTING

The Tapia Conference brings together many individuals from underrepresented communities with research-oriented discussions regarding accessibility and socially-aware computing. This year's theme was "Diversity: Roots of Innovation." The conference emphasized the historical role of diversity with respect to STEM (science, technology, engineering and math) innovation, and declared it as a standard essential set of roots for computing innovation in the future.

We asked a few of our students to share their conference experience.

> I learned about the efforts in some states and programs that aim to expose girls in rural areas to technology who may not otherwise get experience with computers. I learned about the statistics and studies around women of color in tech. The conference was enlightening. It reinforced my belief that we, as stakeholders in the technology industry, should aim for greater diversity.
>
> *Maria Francine Lapid '19*

> One of the biggest advantages of attending this conference was the opportunity to meet so many new people. I met people from the technology field with the latest knowledge in this domain. I talked to companies at the career fair such as Google, Microsoft and Facebook. I even had two interviews. I loved the enthusiasm of the people at the conference. Given the chance, I would definitely do it again. Thank you.
>
> *Juicy Ray '20*

> As a person that is part of an underrepresented group in computer science, it is always amazing to see people who look like me and are from the same background. From industry leaders to prominent researchers, I see a diverse view of excellence.
>
> *Chris Madison '19*

> The conference was a life-changing experience for me. I learned so much more about the computer science field, and I think it helped me decide what I would like to work on.
>
> *Omar Santos '20*

> It was so encouraging to see Aggies across the nation doing cool things. I can't wait to find my place soon too.
>
> *Amy Li*

> I was nervous at first since I didn't know anyone on the trip, but I slowly began to meet people who showed me kindness and helped raise my confidence as a programmer. Everyone was so supportive. I was able to ask questions without being judged and was given support without even having to ask for it. It was wonderful to see so many strong female programmers as attendees, speakers and recruiters. It helped calm my fears of entering the tech industry by seeing so many women happy in their careers with a healthy work/life balance.
>
> *Gabi Nosworthy*

The computer science and engineering department has been a long-time supporter of the annual conference.

GRACE HOPPER CELEBRATION

When Roesha Nigos started as a freshman engineering student at Texas A&M University, she knew she wanted to study engineering but wasn't sure what to major in. When she decided computing was for her, she was told that she would never thrive in a computing environment, but despite those comments, she persisted.

Now as a junior computer science engineering student, she had the opportunity in October 2018 to attend the Grace Hopper Celebration in Houston, an annual international conference targeted at women in computer science that hosts a career fair, as well as presentations and technical workshops from leaders in industry. For Nigos, the experience provided her with a likeminded community of engineers she could turn to when she felt limited.

"Grace Hopper was the turning point in my road to computing," Nigos said. "This community is exactly what I need in times of doubt and uncertainty. These were the people I could turn to when a programming assignment is defeating me or my internship projects seem to go nowhere."

One of the many benefits of the conference is the networking and community focus outlined by Nigos, bringing women together to discuss and learn in an industry that is typically male dominated. More than 20,000 people attended the conference in 2018, with 70 students, 19 of which were male, attending on behalf of Texas A&M University.

"Many of our students are in the situation of taking classes containing 100 students and maybe two are women." said Dr. Dilma Da Silva, department head of the Department of Computer Science and Engineering at Texas A&M. "It is very different for these men to be in the opposite situation where everyone is mostly women and it gives them an understanding of what it is like to be a woman in this industry."

The department is able to support students with scholarships to the conference thanks in part to assistance from General Motors Inc. By sending these students to the conference, the department hopes to inspire students by successful engineers in industry and also help them make career connections.

"I learned so much in terms of technical skills, how to deal with specific challenges in my career, and interviewing and networking skills," said Lilly Maxwell, a senior computer science and engineering student. "The Grace Hopper conference opened up so many windows for me in terms of internships for next summer, and I got the opportunity to meet several incredible young women in this industry."

Da Silva, as well as Dr. Scott Schaefer, professor and associate department head for academics, both attended the conference. Da Silva gave two presentations during the course of the conference, continuing a tradition of leadership and speaking at the conference maintained by her and Dr. Nancy Amato, former Unocal and Regents Professor within the department and the director of the Engineering Honors program for the Texas A&M College of Engineering.

"There are more jobs in computing than talent right now so we need all the talent that we can get," Da Silva said. "This conference offers our students the opportunity to be inspired by successful women from industry and academia and we are proud to have our students be a part of it."

INDUSTRIAL AFFILIATES PROGRAM

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BRONZE LEVEL MEMBERS

Sandia National Laboratories

In 2004, the Department of Computer Science and Engineering created the Industrial Affiliates Program (IAP) as an avenue for fostering relationships between the department and industry. IAP creates an opportunity for faculty to gain insight into today's industry needs and practices and learn how to better prepare students for real-world careers. Similarly, industrial affiliates stay informed on the department's research and teaching objectives and are invited to engage with students through recruitment events and activities. IAP enables for more collaboration between department and industry and thanks to our members, students receive additional support through scholarships and funding. To date, our IAP companies have provided 980 scholarships.

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