DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

2020





LETTER FROM THE **DEPARTMENT HEAD**



The Department of Computer Science and Engineering continues to evolve as we work to meet today's computing challenges. Our faculty are invested in producing the highest quality of students as well as advancing the state of technology through research to provide new solutions to the world's problems.

It is impossible to reflect upon the previous year without addressing the COVID-19 pandemic. While our classes were required to move online in a very short period of time, our faculty and teaching assistants performed this transition admirably. I held numerous town halls with students where the sentiment was largely that our department managed the transition well. The pandemic affected our ability to hire new faculty as well since travel was no longer possible in the spring. However, over the last year we added three new faculty members with interests in areas such as programming languages.

We have also continued to see our student population grow, and admission to our major remains very competitive as the demand for computing rises. This growth has necessitated new space. Renovation on a

new home for the department started early this year in the Peterson building with an expected move-in date of spring 2021. In addition, Lynn '84 and Bill Crane '83 recently established a department head chair to invest in the long-term future of the department.

Our curriculum remains strong, but we continue to evolve our courses to meet the ever-changing needs of society through feedback from our students, alumni and industrial affiliates. The field of computing continues to advance rapidly, changing how we interact with each other and the world around us, which is perhaps even more visible now as we rely on technology to continue our interactions while isolated. I am proud to be part of this field and this department as we rise to meet the challenges of today and tomorrow, and I think both current students and alumni will be impressed with the growth of our department. It is an exciting time to be in computing and always an exciting time to be an Aggie. We are the Aggies, the Aggies are we.

Sincerely,

Just Entraps

Scott Schaefer Department Head Professor Lynn '84 and Bill Crane '83 Department Head Chair



TEXAS A&M UNIVERSITY Department of Computer Science & Engineering

BY THE NUMBERS



#15

Graduate Program Ranked No. 15 (Public) (U.S. News & World Report)



FACULTY (2020)

Tenured/ Tenure Track

Academic Professional Track



U.S. Government Awards, Including NSF CAREER

STUDENT SUCCESS



Engineering Honors Track



Classes Are Under 100 Students



Undergraduate Scholarships



Students Took Our Introductory



SOFTWARE UPDATES SLOWING YOU DOWN?

We've all shared the frustration — software updates that are intended to make our applications run faster inadvertently end up doing the opposite. These bugs, dubbed performance regressions, are time consuming to fix since locating software errors normally requires substantial human intervention.

To overcome this obstacle, researchers at Texas A&M, in collaboration with computer scientists at Intel Labs, have developed an automated way of identifying the source of errors caused by software updates.

"We have designed a convenient tool for diagnosing performance regressions that is compatible with a whole range of software and programming languages, expanding its usefulness tremendously," said Dr. Abdullah Muzahid.

Debuggers often check the status of performance counters within the central processing unit to pinpoint the source of errors within software, but newer desktops and servers

have hundreds of performance counters, making it virtually impossible to keep track of all of their statuses manually.

Muzahid noted there are other research applications for the software such as developing the technology needed for autonomous driving.

Other contributors to the research include Dr. Mejbah Alam, Dr. Justin Gottschlich, Dr. Nesime Tatbul, Dr. Javier Turek and Dr. Timothy Mattson from Intel Labs.

This research is partly funded by the National Science Foundation CAREER Faculty Early Career Development grant and Intel.



FEATURED RESEARCHER Dr. Abdullah Muzahid Assistant Professor

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TAMUHACK HOSTS SIXTH ANNUAL HACKATHON

In January, the student-run organization TAMUhack held its sixth annual hackathon in conjunction with the department. During the two-day marathon, student programmers were tasked with developing innovative software and hardware solutions to solve problems faced in industry today.

More than 240 teams representing over 40 schools across the nation participated, making it the most successful hackathon the organization has hosted to date.

Students had the opportunity to work on a variety of challenges presented by several company sponsors. Among them, American Airlines charged the teams to create a product that would help elevate the customer travel experience, boost operational efficiencies and employee performance, or enhance American's brand image. Global financial services firm JPMorgan Chase & Co. challenged students to develop a web or mobile application that would help to encourage people to provide more structured information on accessible spaces.

"One of the greatest takeaways that I hope students get from TAMUhack is seeing that the world is so much bigger than just the classroom setting," said Humza Jaffri, TAMUhack member. "I like to think about hackathons as a proof of concept that you are capable of developing anything as long as you put your mind to it. I hope they can see their potential and that they are capable of learning and creating incredible things given the right resources and environment."

ARTIFICIAL INTELLIGENCE FIGHTS SECONDARY EFFECTS OF COVID-19



A team of researchers led by Dr. Shuiwang Ji is looking to help scientists combat the secondary effects of COVID-19 using artificial intelligence (AI) by participating in an open challenge called AI Cures.

In a recent study published in *The Lancet*, scientists observed that a large number of deceased adult patients who were severely ill with COVID-19 developed a secondary bacterial pneumonia infection due to significantly depleted lung function. New antibiotics are desperately needed to fight the emerging antibiotic-resistant bacteria that cause bacterial pneumonia, but developing them can take several years and cost more than \$1 billion.

The teams have been tasked with developing an AI model that can predict whether a molecule will be positive or negative for bacterial pneumonia and then be used to identify new antibiotics. Ji's team is proposing the use of advanced deep learning and machine learning methods for graph neural networks to achieve this.

"COVID-19 is one of the most contagious pandemics we've experienced, and it has resulted in a great loss of human life," said Ji. "Developing new drugs can be an effective way to control the virus, and researchers from all over the world have gotten involved to achieve this. AI Cures provides a platform that brings researchers together to develop AI tools for drug discovery, and as computer scientists it is our honor to contribute to the development of a new drug."

HUANG RECEIVES **NSF CAREER** AWARD FOR EVENT RELATIONS RESEARCH

Dr. Ruihong Huang received the National Science Foundation's Faculty Early Career Development Award for her research focused on extracting events and understanding the relationship between them from natural language texts (news articles, manuscripts, blogs, etc.).

This understanding is the key to carrying out various analytical tasks such as predicting future events, detecting misinformation and other attempts to validate events, managing extreme events, answering complex questions and generating concise text summaries for analysis. These insights will help government entities, companies and the general public with improving situational awareness, reducing information overload and assisting with timely decision-making.

Events described in various natural language texts play a large role in forming a cohesive story, and their presence is tightly related to the overall structure of a document and how it is organized.

With the number of documents describing realworld events growing larger on a daily basis, document-level event graphs, which are models used to filter and structure information about the events described in text, are in high demand.

"During this research I will study correlations between events and the way in which an entire document is organized, in order to overcome the fundamental difficulties in identifying event-event relations posed by the long distance between event mentions and the range of different words used to describe them," said Huang.





TEXAS A&M UNIVERSITY Department of Computer Science & Engineering

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AREAS OF FOCUS

Algorithms and Theory

Artificial Intelligence, Intelligent Systems, Machine Learning, Natural Language Processing

Bioinformatics

Computational Science

Computer Architecture

Computer Vision

Cyber-Physical Systems

Cybersecurity

Data Mining and Information Retrieval Systems

Digital Humanities

Embedded Systems

Graphics, Visualization and Computational Fabrication

Health

Human-Computer Interaction

Networks

Parallel and Distributed Computing

Programming Languages and Compilers

Robotics and Human-Robot Interaction

Software and Software Engineering

Systems