UNIVERSITY of HOUSTON
DEPARTMENT OF COMPUTER SCIENCE

Spring 2017

CS NOW!

Computer Science Department Newsletter

In This Issue

Sixth Sense Protects Drivers Except When Texting

While much has been made about the dangers of texting and driving, less attention has been focused on the age-old distractions of being absent minded or upset while driving. A team of researchers from the University of Houston and the Texas A&M Transportation Institute (TTI) focused on all three of these important factors.

Led by Ioannis Pavlidis, the Eckhard Pfeiffer Professor of computer science at UH, and Robert Wunderlich, director of TTI's Center for Transportation Safety, the research studied how drivers behave when they are absent minded, emotionally charged or engaged in texting. The work was funded, in part, by the Toyota Class Action Settlement Safety Research and Education Program.*

The study looked at 59 volunteers who were asked to drive the same segment of highway four times - under 'normal conditions' of being focused on driving, while distracted with cognitively challenging questions, while distracted with emotionally charged questions and while preoccupied with texting trivialities. To avoid bias, the order of the drives was randomized.

In all three interventions - absent minded, emotional and texting - the researchers found that the drivers' handling of the wheel became jittery with respect to normal driving. This jittery handling resulted in significant lane deviations and unsafe driving only in the case of texting distractions. In the case of absent-minded and emotionally charged distractions, jittery steering resulted in straighter trajectories with respect to a normal drive and safer driving.

"A likely explanation for this paradox is the function performed by a part of the brain called the anterior cingulate cortex, or ACC," said Pavlidis, who directs the Computational Physiology Lab "ACC is known to automatically intervene as an error corrector when there is conflict. In this case, the conflict comes from the cognitive, emotional and sensorimotor, or texting, stressors. This raises the levels of physiological stress, funneling 'fight or flight' energy to the driver's arms, resulting in jittery handling of the steering wheel."

What happens when the brain's ACC automatically intervenes, Pavlidis said, is that it counterbalances any strong jitter to the left with an instant equally strong jitter to the right and vice versa. The end effect of this forceful action is nullification of any veering to the left or the right of the lane and, thus, very straight driving.

For ACC to perform this corrective function, it needs support from the driver's eye-hand coordination loop. If this loop breaks, which it does when the driver texts, then ACC fails and the jittery handling of the steering wheel is left unchecked, resulting in a significant lane deviation and possible accident.

Pavlidis and Wunderlich think the scientific and manufacturing community can benefit from their team's study. They posit that the question of what happens when self-driving cars experience failures needs to be asked now rather than later.

"Following up on the results of our science study, we are currently looking into the development of a car system to monitor outward driving behaviors, such as steering jitter or lane deviation, as well as the internal state of the driver that causes them," Pavlidis said. "This system, which I call 'stressalyzer,' a play on the word breathalyzer, may serve not only as a 'black box' in car accidents, but also as a driver alert and prevention mechanism, since it will continuously sense a driver drifting to distracted mode."

The findings were described in a paper titled "Dissecting Driver Behaviors Under Cognitive, Emotional, Sensorimotor, and Mixed Stressors," that appeared in *Scientific Reports*, an online open-access research journal from Nature Publishing Group.

- Lisa Merkl

*Editor's note: Conclusions expressed are the authors' only and have not been sponsored, approved or endorsed by Toyota or Plaintiffs' Class Counsel.

Message from the Chair

Welcome to the Spring 2017 issue of CS Now! As far as milestones go, 2017 is an important year. We are celebrating 50 Years of Computer Science at the University of Houston! It is also the 40th anniversary of the College of Natural Sciences and Mathematics. If you are thinking "How come…", the new NSM College was formed in 1977 to include mathematics and existing science departments. The current issue of CS Now! includes the first of a series of articles on the history of the computer science department authored by Olin Johnson, Emeritus Professor of computer science. It is notable that UH started one of the first computer science departments in the country. I am certainly looking forward to the rest of the series in the coming issues of CS Now!

Academically, the focus in the past year has been to observe and evaluate the impact of program changes that have been introduced in recent years. Transition to the new CS undergraduate degree program is now nearly complete, with almost all current students belonging to the new program. An important goal of the new curriculum is to allow CS undergraduates to include a larger number of advanced CS electives in their degree plan. As expected, we are seeing a satisfying steep increase in the sizes of CS electives classes like Computer Graphics, Computer Networks, and Artificial Intelligence. The accelerated BS/MS program is also growing from a small base. We will continue to evaluate how these programs improve the outcomes for our students.

The year 2017 also brings new challenges. You have probably heard that the state of Texas is cutting higher education budgets, which has a direct impact on the operations of the department. The challenge for us is to continue the growth in enrollments and the enhancements in the quality of education and research with potentially reduced funding. Fortunately, the Dean of Natural Science and Mathematics, Dr. Dan Wells, and the university administration, is well aware that it is important that computer science at UH continues to grow and prosper. We are actively recruiting faculty despite the funding cuts and expect to have 4 new faculty on board by Fall 17. But I would like to emphasize that support and advice from alumni and industrial friends is also critical for us to stay on track.

I end this letter with an appeal to the UHCS community to send me your thoughts and suggestions, as well as potential articles for the future issues of CS Now!

- Jaspal Subhlok

Career Fair: Meeting Needs of the Computing Workforce

Last September, the Department of Computer Science hosted its largest career fair to date. Approximately 400 students packed the Student Center South Ballroom – a new location selected to accommodate the growing numbers of attendees and companies.

Forty-two companies attended the bi-annual event, nine of which were first-time attendees. A few of the new and most popular included Chevron, General Motors, Halliburton, IBM, INT, Leidos (formerly Lockheed Martin IS&GS), Pariveda, and Williams.

Coordinated by the department in collaboration with CougarCS, the career fair also received support from Caitlin MacNeil, STEM Career Counselor with University Career Services (UCS). A few days prior to the career fair, Caitlin helped students prepare to interact with prospective employers by conducting resume reviews.

Thanks to the generosity of UCS, the department borrowed a new registration system that facilitated a fast and efficient check-in process as well as provided a central database with basic student information used for post-event evaluation and follow-up. CougarCS officers and members volunteered their time to ensure the event ran smoothly and in a timely manner. Volunteers also staffed the back-pack check-in room – a newly offered service not provided by other career fairs on campus.

The event was highly rated by most of the companies. A company representative commented, "Overall it was a nice event, good amount of students and well organized despite water issue." Another company remarked their booth received a lot of student traffic and that they would be back for future fairs.

The surveys completed by the companies indicated that the event organization either met or exceeded their expectations. Additionally, according to 100 percent of the companies responding, expectations were met or exceeded in regard to quantity and quality of the students. Without a doubt, we are proud of these accomplishments.

The department thanks all student attendees and employers for contributing to a successful career fair. The fair could not have been a success without the help of department staff Chris Pedraza and Babu Sundaram, teaching assistant Mohammed Alshair, the CougarCS officers and volunteers, including CougarCS president Ronak Shah and CougarCS faculty advisor Dr. Chang Yun, and Caitlin MacNeil from UCS.

The department looks forward to continuing to host career fairs with the goal of connecting quality students with quality employers to fill the needs of the computing workforce.

History of UH CS -- Part 1: The Beginning

By the mid-1950s, the computer industry had passed its infancy. It had achieved distinction as a vigorous new sector of technical innovation and achievement. Several important U.S. companies, notably IBM, Sperry Rand, Honeywell, Burroughs, and GE, offered a variety of electronic products of varying speeds and capacities.

Universities responded by creating courses to train users. The new bi-monthly magazine, Datamation, mentioned Arizona State University as a foremost example of curriculum innovation. But, there were no computer science departments as such.

The creation of such departments was a subject of discussion. George Forsythe of Stanford and David Young of Texas subscribed to a particular model to follow. These departments should offer a technical equivalent to the M.B.A. The curriculum would train holders of B.S. degrees in the additional areas of knowledge required to manage and use the new technology.

Stanford and Purdue staked competing claims to having the first computer science departments. The year was 1962. UH did not follow until 1967 when Elliott Irving Organick was named as its first chair.

Organick offered the University a distinguished background. His Ph.D. was in chemical engineering from the University of Michigan. He had been a member of the secret Manhattan project during World War II. He came to UH in 1955 as an associate professor of chemical engineering to work in the computing center. By 1960, he was the center director, and in 1963, he was promoted to the academic rank of professor. He held the title of chair of computer science from 1967 to 1969, but took a leave of absence in 1968 to spend a year at MIT on project MAC.

The Multics operating system of project MAC revolutionized computing by connecting computing with communications. A Honeywell mainframe was front-ended by a battery of teletype machines. Input to the computer was from the teletype keyboard, not from a deck of punched cards.

Each user of the computer had his own teletype and used it as if no one else were on the machine. The operating system provided high-speed time sharing that allowed each user the freedom to ignore other users.

The operating system protected each user's files and memory allocations. It also acted as the guardian and scheduler of all machine resources.

Multics was not the only interactive operating system being produced at this time. Bell Labs was creating one for the new small computers being produced by the new Digital Equipment Corporation. This OS was designed for single users and was thus named Unix.

Organick published the definitive account of Multics in *Multics System: An Examination of Its Structure*, published by MIT Press in 1972.

He was also co-author of *Computer Science: A First Course*, published by Wylie in 1969, the first textbook on computer science as a subject. This book became the de facto standard text for most new departments as they sprang up around the country. One of the other authors was Alexandra Forsythe, wife of George Forsythe, the founder of Stanford's department.

Organick's technical biography, published shortly after his death, can be found in Lindstrom, Gary, "Elliott I. Organick: 1925-1985," Comm. ACM, Vol. 29, No. 3, Mar. 1986, p. 231.

- Olin Johnson

Students and Faculty Energized at Grace Hopper Celebration of Women in Computing

For the second year in a row, the Grace Hopper Celebration (GHC) of Women in Computing was held in Houston. Being locals, the UH Computer Science community was able to take advantage and had ~70 attendees led by Dr. Thamar Solorio.

Highlights of the conference were the talks by Latanya Sweeney, Ginni Rometty, Megan Smith, and Marc Bienoff.

Latanya Sweeney, currently a professor of government and technology at Harvard University, was the first African-American woman to earn a Ph.D. from MIT in 2001. During her talk, she discussed her research on how technology can perpetuate racial bias.

Ginni Rometty, IBM CEO, spoke candidly about her own mother's determination to go back to school when her father left them. She encouraged women to "not let anyone define who we are," and to be fearless when facing challenges. Another quote from her speech was that "growth and comfort never coexist."

Megan Smith, the third Chief Technology Officer of the U.S., spoke about woman's struggles for equality going back to the time of the Silent Sentinels, a group of women fighting for the right to vote. Smith talked about initiatives she's leading to make pre-college computer science education accessible in the public system.

Besides being an inspiring event, attendees had a unique opportunity for job hunting in one of the largest career fairs for the tech industry. Several UH students were able to land job interviews and some got immediate job offers.

The Department of Computer Science had a booth in the exhibit hall as well. Thanks to the skilled team led by Dr. Chang Yun, the booth was a popular stop for participants interested in a computer science degree.

The conference is named in honor of the late Navy Rear Admiral Grace Murray Hopper. She invented the first compiler for a programming language, a very important contribution to the field. She was one of the first programmers of the Mark I computer used during World War II. The Anita Borg Institute, in partnership with the Association for Computing Machinery, organizes the event each year.

Attendance at the conference was made possible by generous support from College of Natural Sciences and Mathematics Dean Dan Wells, the CS department, and a small corporate sponsorship. The Anita Borg Institute also sponsored several of the department's attendees.

The event continues to be a great experience for women in the field. It's probably the only place in a tech-related conference where the minority becomes the majority!

Gabriel Contributes to Popular Software Package Open MPI 2.0.0

Today's biggest challenges in science are being solved, in part, by high-performance computers. From predicting the weather to simulating drug design, high-performance computers provide the speed and power to answer these big questions.

Edgar Gabriel, associate professor of computer science contributed to the release of Open MPI 2.0.0, a software that allows the different components within a high-performance computer to communicate with each other.

This new release includes major contributions by Gabriel's research group which are the result of six years of research and development. Open MPI 2.0.0 contains features that account for newer technologies while still retaining a user-friendly interface.

High-performance computers are a conglomeration of hundreds to tens of thousands of computers, with each computer called a node. Getting high-performance computers to operate efficiently is a huge logistical challenge.

Solving problems using high-performance computers requires breaking up the initial data into smaller subproblems, then allocating these subproblems to different nodes, which then run individual calculations. Then, the results from the many, many calculations get bundled up and released in the form of answers. The ability to run these problems in parallel is what gives high-performance computers their speed and power.

The calculations being performed by different nodes often have to communicate with each other, as solving one subproblem may depend on results from another subproblem.

For example, calculations for weather predictions are accomplished by breaking the predictions down into smaller areas, then calculating weather changes in each small area. However, since weather patterns move from one area to another, the calculations in each area are in part dependent on the changes in the weather nearby.

Open MPI, which stands for Open Message Passing Interface, coordinates all of this: directing the initial data into the nodes, facilitating communication among nodes during the calculation process, and then writing the results into an output file.

"One of the limiting factors in a high-performance computers' speed is the ability to read input files and write result files quickly. Otherwise this step takes up a big chunk of the overall time," Gabriel said. "One of our contributions was to develop new techniques to solve this problem."

Gabriel was involved in the initial development of Open MPI in 2003, an experience he describes as an "enormously satisfying" gathering of experts "all banging their heads against each other and against the wall to agree on something."

His describes his research for the 2.0.0 release on maximizing the efficiency in two areas: reading the initial input files and writing the result files.

"If you access data in the right order, then you will have significantly better performance," Gabriel said. "If you don't have the right order, then you end up wasting a lot of time because the disk has to rotate first into the correct position."

On a single computer, accessing files in the wrong order simply leads to a short stalling; the computer will freeze up or slow down. In a high-performance computer, with thousands of nodes, accessing data in the wrong order leads to huge delays in speed.

Gabriel's contributions focused on organizing and optimizing how high-performance computers access data. This included organizing the input of initial data into individual nodes, as well as the output of results.

"The key difference in our approach was to take advantage of the fact that we have the access pattern of an entire group of nodes," Gabriel said. This approach has led to increased efficiency of high-performance computers, by helping to reduce the time it takes to read input files and write output files.

"Our computers are getting bigger and faster, while the problems that we trying to solve are getting more and more complex. As these high-performance computers get larger, avoiding these steps where the computer slows down, such as reading large input files, is actually getting more challenging," Gabriel said.

Contributions also included the work of many students in Gabriel's research group, including four graduate students devoted full time to the Open MPI project over multiple years. Other major contributors to Open MPI 2.0.0 were Los Alamos National Laboratory, University of Tennessee, Cisco Systems, Intel and IBM.

- Rachel Fairbank

Edgar Gabriel, associate professor of computer science, made major contributions to the Open MPI software, which is used in high performance computers.

Opportunities at Williams: Internships and Early Career

Williams, a CS Friend, is an energy infrastructure leader operating more than 31,000 miles of pipelines connecting the best supplies of natural gas and natural gas products to the best markets. It is one of the largest providers of energy infrastructure in North America, moving approximately 30 percent of U.S. gas volumes through its systems.

Williams' 100+ years of business history started in 1908 in Fort Smith, Arkansas, with construction projects. By the time the brothers relocated to Tulsa in 1919, they had a reputation for doing a job on time and on budget and conducted business as Williams Brothers for more than 60 years. The company became "The Williams Companies, Inc.," in the 1970s to reflect its diverse businesses. That remains the legal name today, but the company began going by the simplified name, "Williams," in 1997.

Williams has many opportunities for college students and recent college graduates through its Intern and Early Career Programs. Vincent Diaz, a current Williams young professional and UH alumnus, shares his experience about how what he learned as a Computer Science major applies to his job at Williams:

"Until one actually gets to work with code on a large scale, it is hard to fully grasp the complexity and intricacy of coding. As an intern at Williams, I went from small school and in-home projects to a full blown application that required hundreds of people to develop. It was overwhelming at first even with the small issues that were assigned to me, but I survived with a strong team around me that had years of knowledge to share.

A year-and-a-half into being a full-time developer, there is still so much to learn. I still use a bit of everything I learned from my time at UH, but I feel like software design is the class that sums it all up and what I refer to the most. There are a million ways to develop an application, but a solid design makes everything easier, from fixing bugs, adding functionality, to even just understanding the purpose of someone else's code. Knowing how to make something work is one thing. Knowing how to work as a team, accept failure and success together, and apply one's knowledge to achieve a greater solution is my greatest takeaway from my time at Williams." – Vincent Diaz

To find out more about Williams' internship and early career programs, visit the Williams careers website (co.williams.com/williams/careers/) and explore the College Students (jobs.williams.com/go/Internships/1067100/) and Early Career (jobs.williams.com/go/Early-Career-Jobs/1066600/) pages.

- Jessica Crews and Vincent Diaz

UH Computer Science Co-Hosts Immersive Technology Conference

Virtual Reality (VR) and Augmented Reality (AR) have garnered great attention in gaming and entertainment, but as the technology begins to mature, it is finding a wide range of uses in business and industry.

Houston is a global hub for oil and gas, aerospace, medicine, education, and many other industries. When members of the Houston Virtual Reality Meetup discovered that no conference existed to foster VR and AR in business and industry, they became convinced Houston was the ideal place to create one.

In November 2016, in partnership with the UH Computer Science Department, the first Immersive Technology Conference debuted, drawing speakers and attendees from across the U.S., Europe, South America, and even as far abroad as Egypt. The three days of talks, demos by exhibitors, and networking on the expo floor supported the goal of connecting industry leaders with VR innovators.

The conference also encouraged the cross-pollination of ideas and applications between normally distinct and insular industries. Luminaries from nine different fields rubbed elbows and shared what they had learned and discovered in their work with VR and AR. Many attendees sat in on talks by all 23 speakers, insisting that every talk, regardless of industry, provided them ideas and information of use in their own work.

Sharing insights from the aerospace industry, Eddie Paddock of NASA Johnson Space Center VR Simulation Lab talked about the past, present and future efforts of NASA using Virtual Reality. He explained the lab's use of VR to train astronauts for extra-vehicular activities, damage inspection from orbit, and collaborative repair and construction in zero-g. NASA's Chris Gerty gave a presentation on systems engineering using the HTC Vive.

Other talks focused on VR's applications in medicine and pain management. Dr. Christie Taylor of Memorial Hermann Prevention and Recovery Program discussed her department's use of VR for acute pain management for patients in detox. Joowon Kim of Houston-based OnComfort gave insights into her company's journey as a startup in the medical field.

On the expo floor, Serious Simulations showed off their low-latency wireless VR solution for use in untethered VR training. TCA Architects demonstrated their use of VR to let clients and architects explore and modify proposed architectural plans, while Eon Reality showed off their use of VR to allow real estate customers to virtually visit potential new homes and business properties. Terence Loo of Sheer Industries let attendees construct and walk around a virtual tricycle, displayed at scale in Augmented Reality on a Microsoft HoloLens.

Bigger and better in its second year, the Immersive Technology Conference will be returning to UH for ITC 2017, November 6-7. As VR grows and matures, and as it finds more and better uses in a wide range of industries, The Immersive Technology Conference will work to foster that growth, share ideas across industry lines, and connect those looking to take advantage of VR and AR with those best capable of helping them meet their goals.

More information: www.immersivetechnologyconference.com

Startup Earns Commercialization Grant for New Technology

GuidaBot, LLC, a joint venture between UH and Fannin Innovation Studio, received a one-year, $225,000 grant from the National Science Foundation to develop and commercialize a robotic manipulator designed to work within the powerful magnetic field of an MRI machine.

The small business technology transfer grant will be used to support ongoing research and testing of prototype systems based on GuidaBot's force transmission mechanism and proprietary software. The GuidaBot technology will enable doctors to perform biopsies while the patient remains within the MRI machine, allowing for faster and more precise procedures.

"The grant will help us maintain momentum in the lab to commercialize the device for medical use," said Michael J. Heffernan, GuidaBot director of research and development. "Continued support from the NSF further validates our work and positions us to actively and effectively pursue strategic partners and investors."

Financial support for the initial work was provided through an NSF grant to UH and Fannin Innovation Studio, which works with institutions in the Texas Medical Center to create and support life sciences businesses.

"The National Science Foundation supports small businesses with the most innovative, cutting-edge ideas that have the potential to become great commercial successes and make huge societal impacts," said Barry Johnson, director of the NSF's Division of Industrial Innovation and Partnerships. "We hope that this seed funding will spark solutions to some of the most important challenges of our time across all areas of science and technology."

The company's technology was developed with a $1.5 million NSF Cyber-Physical Systems award entitled 'Multimodal image-guided robot-assisted surgeries.'

"This award has resulted in a suite of robotic, magnetic resonance imaging and computational methods seamlessly integrating the robot, the MRI scanner, and the physician to streamline MRI-guided procedures and improve patient outcomes," said Nikolaos V. Tsekos, associate professor of computer science at UH, director of the Medical Robotics Laboratory and principal investigator of the research project that developed the fundamental technology for in-MRI robotic manipulator. "While similar robotic systems use complex piezoelectric, pneumatic or hydraulic motors, we're developing ours using solid-media transmission, a fundamentally new way of transmitting force."

Pilot studies have demonstrated the compatibility of the novel force transmission system with the MRI scanner, and the new grant will support further development of the prototype robot and proof-of-concept studies with MRI phantoms.

"The NSF grant is instrumental in continuing valuable research and development of the robotic manipulator," said Fannin executive chairman Leo Linbeck III. "This is one of many validations of Fannin's ability to commercialize technologies and its commitment to Houston's life sciences infrastructure."

Ramanan Krishnamoorti, interim vice president for research and technology transfer at UH, said the partnership with Fannin Innovation Studio has been pivotal. "Bringing innovative technology like that developed by Dr. Tsekos and GuidaBot to the marketplace requires a strong support network of services," he said. "Combining the intellectual and technical strengths of our faculty with those of our partners in the community can boost the benefits to society."

- Jeannie Kever

Nikolaos V. Tsekos, associate professor of computer science and director of the Medical Robotics Laboratory, was the principal investigator of the original NSF award.

Forecasting the Spread of Diseases: Providing Speed

Whenever a disease starts spreading, health officials need forecasts they can use in real-time. These forecasts need to keep up with changing conditions, such as vaccination drives or school closings, all while providing the most effective methods of limiting new infections.

"How do infections spread, and even more importantly, how do we predict the most effective intervention methods for limiting the spread?" said Gopal Pandurangan, associate professor of computer science at UH. "The most accurate methods we have for answering these questions are computationally intensive, requiring a lot of time."

Methods for calculating the spread of disease can be used to forecast everything from the flu to emerging diseases such as Ebola or Zika. Although the exact method of transmission varies between diseases, the commonality is that they can all be modeled through the use of social contact networks. Algorithms designed for use on large-scale networks allow for the computation of metrics associated with the spread of disease, such as the number of new infections and rate of spreading.

Pandurangan was awarded a four-year, $550,000 BIGDATA grant from the National Science Foundation. This grant, part of a $1.8 million collaborative project, will focus on the design and analysis of efficient and scalable distributed algorithms for network problems with an emphasis on improving the speed at which computational epidemiologists can simulate the spread of disease.

Continued on page 7...

Pandurangan's research group, along with collaborators at Indiana University, will focus on developing provably efficient algorithms for large-scale network problems. Meanwhile, collaborators at Virginia Tech will focus on applying these algorithms to computational epidemiology.

Simulating the spread of disease means constructing a social contact network for an area, which provides estimates for how people move and interact. Every time a person comes into contact with another person, there is the risk of spreading disease. This network of social contacts is what enables epidemiologists to forecast how a disease might spread.

The number and duration of social contacts can vary based on a person's job, use of public transport or whether they have children enrolled in school. All of these factors alter how and when disease will spread.

"To simulate the spread of a disease, you have to run each calculation multiple times, taking into account the average probability of an individual getting infected. This can be time-consuming, with tens of millions of calculations," Pandurangan said. "For this project, my research group is focusing on using distributed computing to study large-scale network data."

Distributed computing is when different entities, such as individual computers, interact with each other and jointly do computation. It can be used to speed up calculations by breaking up a larger problem into smaller portions, parceling these out among many different processors. Distributed computing allows us to solve problems that are too large to solve in a single computer.

Currently, one of the limiting factors in speed is the time it takes for different computers to communicate with each other.

"Communication is costly in terms of speed," he said. "We want to optimize this step, so that we can get to a point where we can make these calculations in real-time."

Pandurangan's group, along with the group at Indiana University, will be working on minimizing the amount of computer communication needed for running calculations. Meanwhile, the Virginia Tech group will focus on integrating the new algorithms into their epidemiological methods.

"The theory we are developing will have much larger applications to fundamental problems in computer science," Pandurangan said. "The fact that this has applications to epidemiology, including the Zika virus, is very exciting."

- Rachel Fairbank

Gopal Pandurangan, associate professor of computer science, works on algorithms that increase the speed of forecasting the spread of disease.

Student and Faculty Awards – Fall 2016

Student Awards

Best Ph.D. Dissertation
- Xifeng Gao

Best M.S. Thesis
- Yiqun Zhang

Best Ph.D.
- Yu Li, Muhsin Zahid Ugur

Best Junior Ph.D.
- Santosh KC, Mengjun Leng

Faculty Awards

UH Computer Science Academic Excellence Award
- Albert Cheng, Ph.D., Ioannis Kakadiaris, Ph.D., Shishir Shah, Ph.D.

Fall 2016 Graduates

B.S.

Tyler Allen
Jessica Balanag
Orlando Balderas
Devin Bellomy
Randall Best
Rushabh Bhakta
Axel Bolin
Sebastian Bonilla
Nicholas Boros
Jon Jerico Calanio
Travis Chesnutt
Kendrick Choate
Gabriela Cruz
Nguyen Doan
Alexander Dobson
Levi Dooley
Braden Duke
Javier Espinoza
Anthony Eustachon
John-Michael Faircloth
Shannon Furr
John Grzehowiak
Arby John Gudes
Edison Guevara
Russel Hampton
Joshua Hart
Jophy Johnson
Deyi Kong
Neil Labrador
Anthony Ladin
Michael Lagrasso
Tuan Van Le
Ka Lum
Thien Nguyen
Joseph Obeahon
Elizabeth Pham
Phillip Phares
Carlos Romero
Ali Salim
Nicholas Sample
Erkan Sen
Benjamin Sherman
Alejandro Sifuentes
Joel Swift
Duy Ta
Wen Sen Tang
Steven Theck
Andrew Thompson
Michael Ticer
Jenny Tran
Quan Anh Tran
Patrick Tse
Aliza Uddin
Joshua Wilburn
Jacob Wismer
Tzu Yang
Jordy Yau

M.S.

Abdulelah Abdullah H Altuaimi (w/thesis)
Can Cao (w/thesis)
Arthur Dunbar (w/thesis)
Christopher Elsik
Marcus Hervey (w/thesis)
Yiwen Shi
Madhusudan Sridharan
Pradheebaa Srinivas (w/thesis)
Randal Staewen (w/thesis)

Ph.D.

Fatih Akdag
Siddhartha Jana
Yu Li
Toan Nguyen
Behnaz Sanati
Salah Aldeen Mohammed
Mahmoud Taamneh
Li Wei

CONTACT

Sponsors

Chevron

ExxonMobil

FLOW-CAL Measurement Applications

INTERGRAPH

NOKIA

NVIDIA

PARIVEDA SOLUTIONS

PROS

Spectra Energy

Texas Instruments

TOTAL

Submit News

Please submit Alumni News to csnow@cs.uh.edu.

For information on upcoming alumni events, Join the **Computer Science at University of Houston** group on LinkedIn.

Contact Us

Department of Computer Science
501 Philip G. Hoffman Hall
Houston, Texas 77204-3010

P: 713.743.3350 - **F:** 713.743.3335
www.cs.uh.edu