UNIVERSITY of HOUSTON
DEPARTMENT OF COMPUTER SCIENCE

Spring 2015

CS NOW!

Computer Science Department Newsletter

In This Issue

Department Leading Way in Cyber Security with NSF Grant

It seems that every week brings some new story on cybercrime.

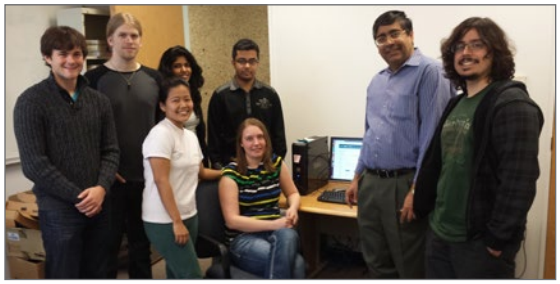
Recently, there were reports of breaches from Target, Home Depot, JP Morgan Chase and other banks, Sony, and the U.S. government. Medical records have been stolen from a health insurance company. The price for a medical record on the black market is about $50, whereas for credit card information it is about $5.

> Not every organization has the resources and the commitment needed to keep up with the latest attacks and defensive technologies.

ATMs in Russia were spewing cash without any credentials, and criminals were showing up to sweep it away from the ground. Video recordings led to the discovery of sophisticated and coordinated attacks on banks in five different countries. It is suspected that phishing emails with links or attachments that led to the installation of malware were used in these attacks.

Attackers are very determined and even collaborating with one another on what works and what does not. Defenders seem ill-prepared and uncoordinated.

The need has never been greater for professionals trained in cybersecurity. The U.S. Bureau of Labor estimates that U.S. organizations need at least 300K security professionals, whereas only a few thousand are graduating each year from U.S. colleges and universities.



The Computer Science Department at the University of Houston is leading an effort to narrow this gap with a $1.68 million grant from the National Science Foundation titled, "Scholarships for Service: Increasing Talented Trusted Computing Professionals." This program will produce M.S. and Ph.D. students who are trained in cyber security through courses as well as through theses and dissertations that specialize in cyber security.

According to a 2014 report by PricewaterhouseCoopers, "organizations do not adequately address employee and insider vulnerabilities, nor do they assess the security practices of third-party partners and supply chains." The report also states that organizations that do not train new employees on security issues reported significantly higher average losses from cybersecurity incidents, $683,000 versus $162,000 for companies that do have training.

In-house training programs are an excellent idea, but this type of training requires trained personnel, time, investment, and systematic effort.

"Not every organization has the resources and the commitment needed to keep up with the latest attacks and defensive technologies, said Rakesh Verma, principal investigator on the NSF grant. "Most organizations would prefer to hire workers who already have the training and the skillset necessary for maintaining a secure environment."

Two additional NSF-funded projects are also addressing security issues.

Computer Science faculty are leading a team of investigators developing plug-and-play course modules for enriching computer science courses and courses in other disciplines with leading-edge security topics. This project will help spread security knowledge beyond computer science courses.

Another relevant project supports research to detect phishing emails and opinion spam by using natural language processing techniques.

Message from the Chair

The importance of computing in today's digital world cannot be overstated, and the message is not lost on Generation Z, or whatever we choose to call the generation of young men and women joining college now. The enrollments in computer science at University of Houston have skyrocketed in line with national trends. The department is pleased with this rapid growth and energized to meet the associated challenges.

The overarching objective of any computer science program today is to prepare students for a new kind of digital economy that is driven by innovation, research, and entrepreneurship. In meeting this challenge, it is very important to engage with diverse stakeholders — industry, alumni, and students themselves — that we refer to as the UH Computer Science Community. This is the only way to ensure that the education and training the students receive continues to be on the cutting edge in a field that changes at a speed unprecedented in history.

We have started several initiatives to build stronger connections with the UH Computer Science Community.

- The UH "Friends of Computer Science" program was started a few months ago, and we would like to thank the following new members — Chevron, ExxonMobil, Flow-Cal, Intergraph Corporation, Pariveda Solutions, PROS, Spectra Energy, and Two Sigma. The Friends of CS companies have the opportunity to support and engage the department's students and faculty in a number of ways including career fairs, lunch-n-learn meetings, hack-a-thons, and much more.
- The department's Annual Alumni Happy Hour is growing into a popular annual event, with a full house at the last one held at Baba Yega restaurant in November.
- Our student group activities have grown significantly as reported in all issues of CS Now!

We are strongly committed to strengthening our partnership with the UH Computer Science Community and welcome broader participation.

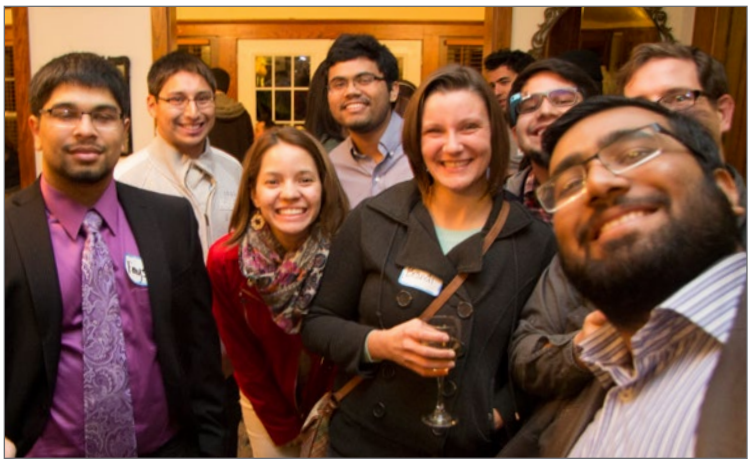
I would also like to focus on an often overlooked part of the CS departmental team — the Staff! We say goodbye to Jackie Baum, Computer Science Program Coordinator for many years. It is hard to say who misses Jackie the most: students, staff, or faculty. There were whispers as to whether the department could survive the loss of Jackie so quickly following the retirement of Barbara Murray, our long-time Business Administrator. I am very glad to say that the new staff team led by Desi Miller, Department Business Administrator, and Tiffany Roosa, Program Director, has filled those big shoes admirably and calmed the nerves of students and faculty alike.

I encourage all readers, especially alumni and industrial colleagues, to contact me with your thoughts and suggestions, even financial donations! Your participation is more important than ever as the department faces up to the challenge of rapid growth while sustaining and improving the quality of the education and research programs.

Jaspal Subhlok

Mixer at Baba Yega Brings Together Alumni, Students, Faculty

The Department of Computer Science and the UH Computer Science Alumni Association have been working together to build a strong community of CS professionals to help present and future students become competent computer scientists.



To celebrate the joint collaboration, the department sponsored an alumni mixer at Baba Yega restaurant in November. The event had double the number of alumni in attendance compared to a similar mixer held in 2013. Our community is becoming more engaged and active.

Alumni and students had a great time meeting new people, chatting with professors, catching up with old friends, and exchanging insights on new technologies. The group reminisced about old times and enjoyed the food and drinks with a room full of good company.

The event was a success! A big "Thank You" goes out to the department for organizing the event. The alumni had a great time and look forward to the next event.

I encourage everyone to come out and socialize with us at our future events. Until next time!

- Karis Ng ('12)

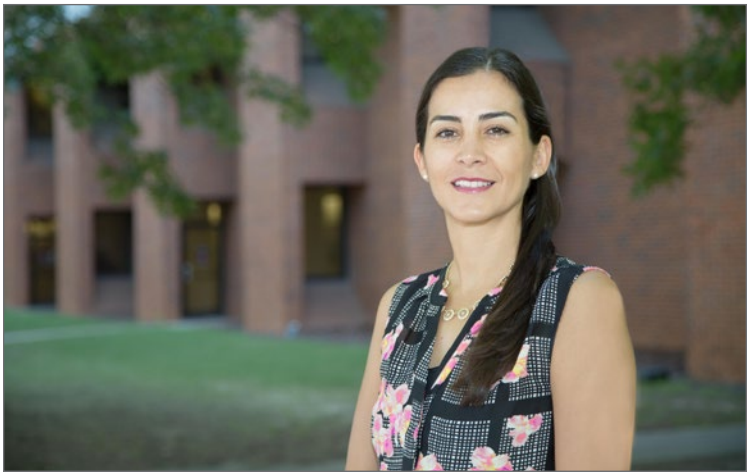
Solorio Receives Emerging Leader Award

Prof. Thamar Solorio is the recipient of the 2014 Denice Denton Emerging Leader ABIE Award. The Denice Denton Award from the Anita Borg Institute is sponsored by Microsoft and recognizes faculty women that have shown leadership in their field and have contributed to the goal of increasing the pipeline of women and other underrepresented minorities in STEM fields.

The award ceremony took place during the Grace Hopper Celebration of Women in Computing last October in Phoenix, Arizona. Solorio's acceptance speech encouraged other women not to compromise their ideals.

"It's not an either or choice," said Solorio, referring to the fact that it is possible to develop a strong research program while still caring and devoting efforts to increase diversity in the field of computer science.

Solorio joined UH in fall 2014 and founded the research group RiTUAL (Research in Text Understanding and Analysis of Language). Her research centers on the design of computational models that process spontaneous human language with applications in health informatics, forensic linguistics, language assessment, and analysis of mixed language data in social media.



She is also the recipient of an NSF CAREER Award for her research in authorship analysis in cross-domain settings.

Faculty News Briefs

Barbara Chapman Leads DOE Effort to Mend HPC Talent Gap

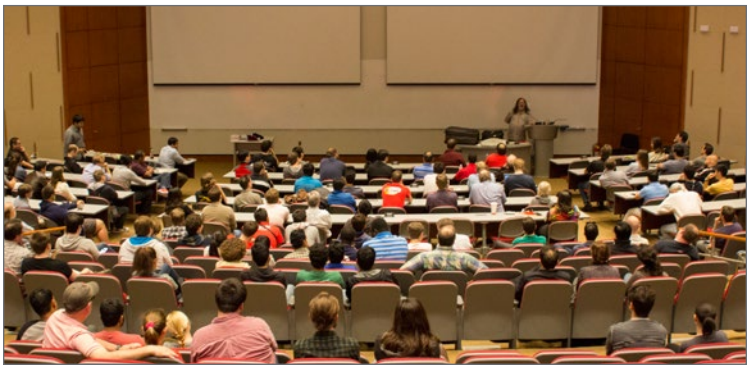
As subcommittee chair of the Department of Energy's Advanced Scientific Computing Advisory Committee, Barbara Chapman reported the group's findings at SC14. Chapman noted that these jobs require experts cross-trained not only in the relevant computational sciences but also applied mathematics, statistics, or traditional scientific fields such as chemistry and physics. Yet the subcommittee found that very few academic programs provide this kind of cross-disciplinary material.

Team Led by Jehan-Francois Paris Achieves Zero Maintenance Data Storage

Jehan-François Pâris led a multi-university group in simulating the reliability of a memory system in which both parity discs and spare discs are included. Based on the performance of 25,000 discs and their failure rates studied by the data storage company Backblaze, the simulation achieved 99.999 percent reliability. His achievement was cited by MIT Technology Review.

Richard Stallman Lectures at CougarCS Event

In November, CougarCS and the Department of Computer Science hosted a talk by Richard Stallman, the founder of the free software movement.



His two-hour talk covered subjects as far ranging as the philosophy of free software (also known as libre software), the right to tinker, and how software patents hinder innovation. He urged students to consider writing free software and to practice reverse-engineering skills in order to allow users of proprietary software to choose free alternatives.

With around 200 attendees, the talk was well received with much discussion on ways to support free software during the question and answer session. The event drew not only UH students and faculty, but also students from other universities, alumni, and local industry professionals who came out in large numbers.

After the talk, Stallman sold books, software manuals, buttons, and t-shirts. There was even heated bidding for a GNU Project mascot plush toy. All proceeds from the sales went to the Free Software Foundation.

High Performance Computing: Big Machines to Solve Big Problems

The beginning of the 21st century marked Edgar Gabriel's initial recognition in the field of High Performance Computing. It was auspicious by anyone's standard. He ended the old century as winner of the HPC challenge at Supercomputing '99 for his ground-breaking work on Transatlantic Metacomputing. A year later, he scored again as co-author of the Best-Paper Award at the High Performance Computing and Networking Conference that discussed the problems and the solutions of the metacomputing experiment in SC'99.

These awards and the research efforts behind them gained Gabriel his Dr.-Ing at the University of Stuttgart, and a post-doc with Jack Dongarra at the University of Tennessee, both institutes of highest prestige in the HPC community.

In 2005, Gabriel's background extended the breadth and depth of a critical mass of our department and allowed high cooperation with the likes of HPC veterans Barbara Chapman, Lennart Johnsson, Jaspal Subhlok, and others.

Today, he directs the department's Parallel Software Technologies Laboratory (PSTL), our interface to the world of Message Passing Systems, Parallel Computing on Distributed Memory Machines, and Grid Computing. Within the broad scope of these activities, this lab focuses on two central problems:

1. Using hundreds or even thousands of PCs simultaneously in major arenas such as weather prediction, aerospace simulations and seismic oil and gas data.
2. Analyzing hundreds of gigabytes of log-files or user profiles at social networking sites to identify user preferences faces many of the same challenges as High Performance Computing applications with the software customized to solve the corresponding problem.

Some of the software developed by PSTL has been released as part of the Open MPI software distribution (http://www.open-mpi.org), an open source implementation of the Message Passing Interface (MPI) – the most widely used communication library on High Performance Computing systems. In 2014, Open MPI has been downloaded nearly 24,000 times, making it one of the most popular software packages in parallel computing, used on some of the largest computers worldwide.

OMPIO

The OpenMP I/O (OMPIO) is a parallel I/O architecture for the popular Open MPI communication library that provides a portable solution to offset the most limiting factor on high-end machines for large scale parallel applications, namely I/O. OMPIO provides a highly modular approach to parallel I/O by separating I/O functionality into smaller units (frameworks) with an arbitrary number of modules in each framework.

Furthermore, each framework has customized selection criteria that determine which module to use depending on the functionality of the framework and external parameters. The library includes a large number of optimizations for I/O operations, including multiple collective I/O and shared file pointer algorithms, heuristics for determining the optimal number of aggregator processes used, and optimized process placement algorithms for I/O operations.

ADCL

The Abstract Data and Communication Library (ADCL) optimizes collective communication operations at runtime. The library provides a large number of implementations for a given communication pattern and incorporates runtime selection logic to choose the most optimal implementation. The library has demonstrated significant performance improvements for a number of communication patterns, including 3D neighborhood communication, all-to-all, and non-blocking collective communication operations.

Gabriel and his group also manage a Hadoop cluster for Big Data Analytics applications that is being used by graduate and undergraduate courses, and is also used to mine through the historic air-quality data gathered by researchers in the Department of Earth and Atmospheric Sciences and the Honors College at the University of Houston over the last decade.

Managing a compute cluster also provides graduate students with valuable experience that they cannot get through reading a textbook, so Gabriel insists on having students involved in the management of the cluster resources. Students quickly understand that procedures that used to work for them for their local PC do not hold up when dealing with tens or even hundreds of PCs. Automation of the software management on the cluster is a necessity that they have to incorporate into their procedures.

Chevron: A Long-Term Partner of UH Computer Science

Over the past five years, Chevron has hired more than 25 University of Houston computer science students for full-time and summer internship positions.

Their internship program was recently ranked the second highest of all U.S.-based companies in a survey conducted by Glassdoor, a national jobs website. Over 10,000 former and current interns provided the rankings. Facebook earned the No. 1 position, while Google, formerly No. 2, moved down to third position.

"My Chevron internship experience was unlike any other," said Maria Briceno-Rojas, UH CS student and Chevron IT Intern in Summer 2014. "I was welcomed with open arms, received trust, support and encouragement from everyone with regard to my assignment. Not once did I feel like an intern. Instead, I was a 3-month, full-time employee."

Glassdoor reported that the highly ranked intern programs have three characteristics in common: hands-on experience; the opportunity to work with smart, dedicated people; and access to top management.

Chevron was also noted for taking "excellent care" of employees and stressing the importance of a healthy work-life balance.

According to Lucinda Macias, Intern Program Manager, Chevron identifies a large number of full-time university hires through the intern program. Macias said that Chevron seeks interns with good leadership; strong communication and problem-solving skills; critical thinking; decision-making ability; and industry-related internships or work experience. She summed up, "We want well-rounded students who share the same values as Chevron and display a passion and interest to work here."

Bill Hunter, Chevron University Partnership Portfolio Manager says, "Chevron provides support to partner universities to help build the capacity needed to supply the workforce of tomorrow. Chevron is proud of the partnership we enjoy with UH and the Department of Computer Science through our support of the 'Friends of Computer Science' program."

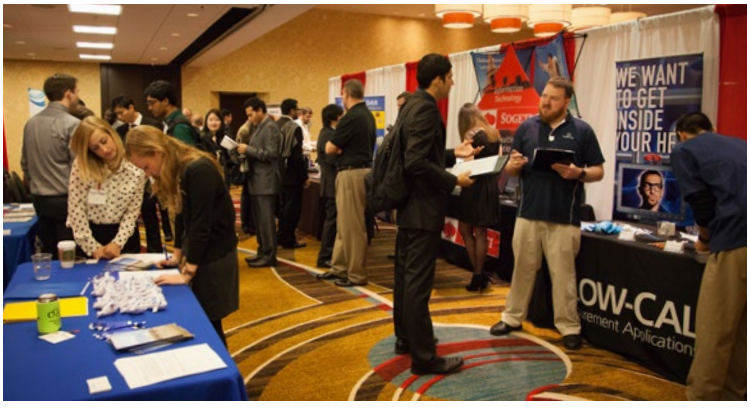
Chevron's Information Technology (IT) organization delivers and supports business solutions for the rapidly changing global oil and gas industry. As a result, a career in information technology at Chevron offers the opportunity to work in a leading-edge computing environment with a global reach.

Chevron's summer interns have the opportunity to design, build, implement, and support solutions to enable core business needs. As interns work in these areas, they are supported by a value-driven culture that makes a priority of employee safety, operational excellence, cultural diversity, skills development, ethical standards, social responsibility, and environmental protection — and fostering the growth of every individual employee.

Chevron IT recruiters typically meet students at UH early in the fall semester. To be considered for an internship with Chevron IT, watch for an intern job posting in the fall at University Career Services. Students can also check the Chevron Careers website for a list of UH campus events Chevron attends: *careers.chevron.com/students/recruiting_events.aspx*.

Career Fair Involves 32 Companies, 300 Students

The Fall Computer Science Career Fair drew more than 300 Computer Science undergraduate and graduate students.



The four-hour event, held on October 1 at the Hilton University of Houston, brought 32 companies from major oil and gas, medical, software, technology, and government sectors on campus to recruit talented UH Computer Science students. In terms of the number of students and companies, this career fair was by far the largest one since the department first offered career fairs about a decade ago.

CougarCS and the Department of Computer Science team up each semester to organize a career fair.

A reception, held following the event, was attended by the company representatives, CougarCS officers, and select faculty members from the department. The group discussed issues such as department-industrial collaborations and improving curriculum.

The Career Fair is an integral component of the Friends of Computer Science program intended to build a broad-based relationship between the Department of Computer Science and companies that have a strong interest in a high-quality computing program at UH.

Four companies, Chevron, ExxonMobil, Flow-Cal, and Intergraph Corporation, supported the event as Friends of Computer Science members. The Friends of CS program is designed to meet the needs of industry and give companies the opportunity to have a greater impact in the development of the computer science workforce.

Staff Spotlight: Jackie Baum

At some point in time in CS, you have probably met Jackie Baum.

Maybe you've seen her running through the 5th floor hallway of PGH trying to be in five places at once. Or, you needed to get into the Computer Scientists and the Society course or another CS course that you needed for graduation. Or, you were the lucky person in the lab to be persuaded into helping her move a few tables from the 5th floor to the 2nd floor.

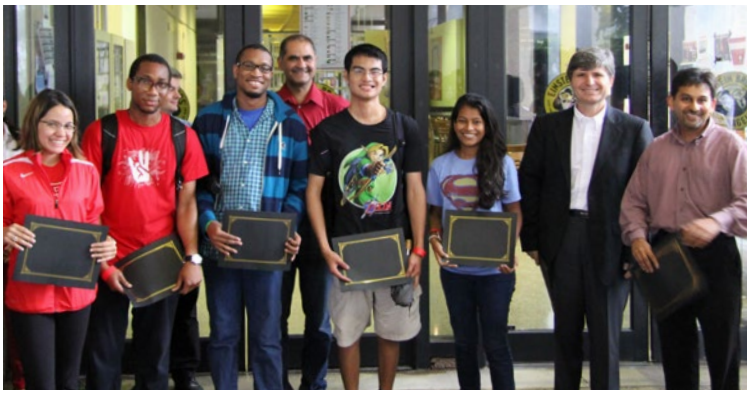
Jackie became the department's Program Coordinator six years ago after working in the department as an Office Assistant for a year. Her responsibilities included assisting the Undergraduate Director with the undergraduate program, supporting student and faculty requests, and planning functions for the department. As an example, she closely worked with CougarCS student organization to help them host the CS Career Fair each semester.

After spending seven years in the department, Jackie has relocated to Buffalo, New York.

"CS was like my second home, and there will not be another place like it," Jackie said. "I will miss the students stopping by to say hi and letting me know how they are doing, talking to everyone in the department office, and catching up with faculty and listening to their stories."

Welcome Back Party Kicks Off 2014-2015 School Year

To welcome new and returning students and celebrate the new school year, the Department of Computer Science hosted a CS Welcome Back Party in September. More than 100 B.S., M.S., and Ph.D. students, most of the CS staff, and a dozen faculty members joined the party and celebrated together with BBQ dinner and cake.



Spectra Energy, the industry partner that financially sponsored the event, sent representatives to congratulate the department on the successful launch of the new school year.

Department Chair Jaspal Subhlok gave welcoming remarks and presented several awards to those who made significant contributions or excelled in the department during the previous school year. The recognition included Best Undergraduate, M.S., and Ph.D. Student, Best Oral and Poster Presentation, and Faculty Academic Excellence Awards.

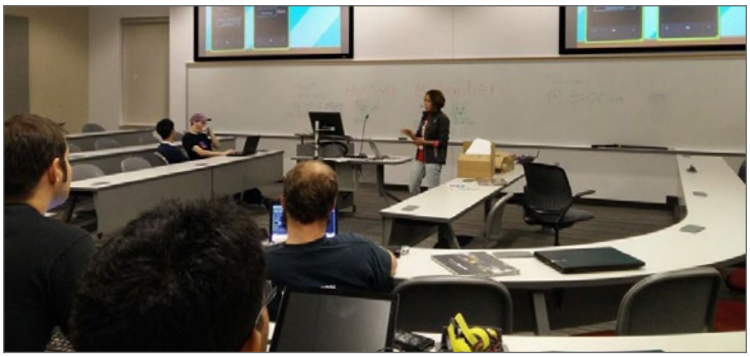
Although the party was held outside in the occasional heavy rain, spirits were not dampened and the party lasted over two hours.

Mo' Code Movember Focuses on Collaboration

CSGirls and CougarCS ran a month-long event called "Mo' Code Movember" in November. Its purpose was to get students from across Houston to share what they are working on and focus on software engineering skills such as documentation and testing by working on projects.

In order to make sharing projects easier, all projects were posted on GitHub. This allowed participants to follow along with each other's work and give feedback throughout the month. However, all the work was not done solely online. Each week had a checkpoint event where everyone met in person to make collaboration easier. Projects included mobile apps, games, and even a quadcopter.

At the end of the month, there was a showcase where participants presented what they had worked on for judging. Paul DeCarlo from Microsoft and Devlin Liles from Improving Enterprises helped judge projects based on criteria such as reusability and best use of DevOps. Prizes included tablet computers and Arduino boards which were all provided by Microsoft. A full list of projects and winners is available at *http://bit.ly/MoCode2014*.



By working over a month, participants had time to pace themselves, polish their projects, and think ahead in terms of maintainability. A large number of the projects built during Mo' Code Movember are still being worked on months later.

AWARDS

Student and Faculty Awards - 2014

Student Awards

Best Ph.D. Student Awards

- Cheng Wang, Yen Le

Best Junior Ph.D. Student Award

- Li Wei

Ph.D. Showcase Awards Spring 2014

Oral Presentation Award

- Binh Le

Poster Presentation Awards

- Remi Salmon, Salah Aldeen Taamneh, Sujing Wang

Faculty Awards

UH Computer Science Chair's Choice Award

- Omprakash Gnawali, Stephen Huang

UH Computer Science Academic Excellence Award

- Edgar Gabriel, Ioannis Pavlidis, Larry Shi

UH Lifetime Faculty Award for Mentoring Undergraduate Research

- Rakesh Verma

UH Teaching Excellence Award for Group Teaching

- Jose Baez-Franceschi, Zhigang Deng, Olin Johnson, Chang Yun

Fall 2014 Graduates

B.S.

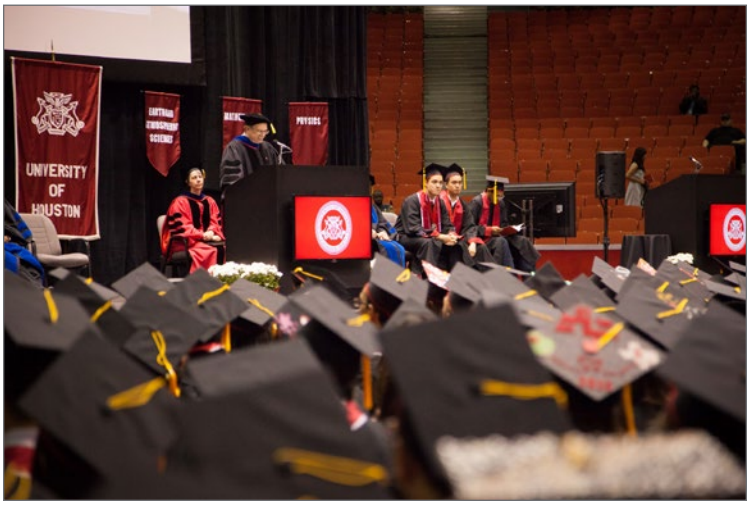
Hung Vong
Francisco Arevalo
Arturo Ayala
Mohamad Bataineh
Yining Cai
Ebby Daniel
Tung Dao
Steven Dao
Nicholas DeSalvo
Cong Do
Joseph Ernstes
Stefano Fiumara
James Garcia
Rafael Gonzalez
Joseph Hart
Jose Hernandez
Duy Ho
Hieu Minh Huynh
Christopher Krivik
Jason Kwon
Zhan-yu Lai
James McGee
Mark Miller
Muhammad Naviwala
Trung Nguyen
Diep Nguyen
Gabriel Ohlson
Brijesh Patel
Alpeshkumar Patel
Hien Phan
Matthew Phillips
Daniel Semac
Gurmeet Singh
Sidak Singh
Daniel Southward
Tobin Thomas
Ky Vu
Kathleen White
Brandon Wilson
Syed Zaman

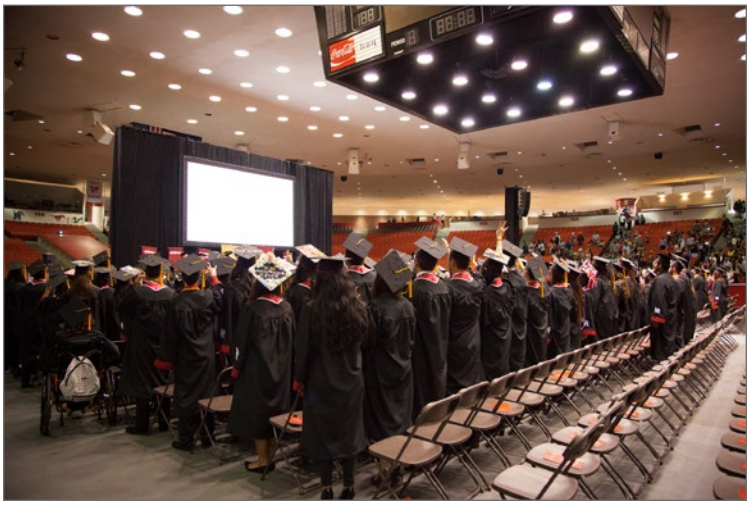
M.S.

Nicholas Bannister
Wellington Cabrera Arevalo (w/ thesis)
Pooja Chitral (w/ thesis)
Subash Chandra Dantuluri
Mahima Joshi (w/ thesis)
Qiang Li (w/ thesis)
Xiaoxi Man (w/ thesis)
Manavi Sharma
Jingjing Yu

Ph.D.

Bassam Almogahed
Dong Han





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