CS NOW!
Computer Science Department Newsletter

UH Game Design Team Wins U.S. Microsoft Imagine Cup

University of Houston's computer science students continue proving the UH game design program is one of the best in the nation and perhaps the world.

Randal Staewen and Sean Howard, known as Team Solipsoid, were one of three U.S. teams that advanced to the Microsoft Imagine Cup World Semifinals. Team Solipsoid represented the U.S. in Game Design; the other two teams represented the Innovation and World Citizenship (software design) categories.

"Team Solipsoid is the first UH team to advance to the World Semifinals," said Chang

The UH gaming team represents U.S. in the gaming category of World Imagine Cup Semifinal.

Yun, interactive game development instructor and research assistant professor in the Department of Computer Science. "For the past five years, our game design teams have made the U.S. finals, showing the strength of the Interactive Game Design Program. Making the World Semifinals is the next big step."

To represent the U.S. in the World Semifinals, the team first competed in Microsoft's U.S. Imagine Fund program, an early-stage student startup fund and school. Microsoft selected 11 teams for Imagine Fund, providing each team with $10,000 in seed money to kick off their business and a 10-week immersive program. Teams gained access to tools, learning resources, technical experts and 1:1 mentoring.

Team Solipsoid's game, called *Unnatural Selection*, is set far in the future, where a war between machines and organics ended with the victory of the machines. However, the machines eventually get bored, and begin to recreate life inside an aquatic test facility.

"The player takes the role of a rapidly mutating aquatic species and tries to eat everything it can to grow large enough to escape," said Staewen, a second-year computer science graduate student. "Players control the path of evolution through their diet and unlock further mutations by completing objectives."

The game is designed as a fully-featured online multiplayer. "You can play alongside your friends and compete for the limited food supplies. In this competitive, futuristic world, your friends are also on the menu," Staewen added with a laugh.

The inspiration for *Unnatural Selection* came from several games in the past, the most recent being *Spore*. "Not even *Spore* had a real-time multiplayer component, and I remember thinking what a missed opportunity that was," he said.

Message from the Chair

As I am writing this column on the flight back from the biennial North American Computer Science Chair's Conference, my overarching thought is that we in the field of computer science today are indeed fortunate. There is no field more exciting than computing today, and there is no better time to be in computer science than now!

This is not an exaggeration. Government data points out that a majority of the job growth in the U.S. economy will be in computing. This is an incredible statistic; the number of new jobs in computing over the next decade is likely to be significantly higher than the number of new jobs in all other fields combined, including science, engineering, and social sciences.

Computing is emerging as the major new driver of the economy. Clearly, the word has gotten out as the number of computer science majors and enrollment in computer science classes has exceeded the most optimistic expectations. At the University of Houston, we have seen a tripling of the number of undergraduate majors in recent years!

Computer science departments face significant challenges in providing high-quality education as student interest in the field grows and new subdisciplines of computing emerge. Among the challenges is recruiting new faculty. In the past year, we reviewed hundreds of applications and conducted many interviews to identify faculty who can enhance the quality of the department.

We are excited that three excellent computer scientists – Arjun Mukherjee, Gopal Pandurangan, and Thamar Solorio – chose to join the department in Fall 2014. There is no doubt that we are a much stronger department as a result. This issue of CS Now! highlights our new faculty members.

Indeed, this was a summer of change in the department. Barbara Murray, department business administrator, retired after 45 years at UH. Barbara is the only business administrator most faculty have worked with. Tom Cumpian, our network administrator for the past 14 years, also retired. We miss Barbara and Tom tremendously. This issue of CS Now! includes some thoughts from faculty and staff on their retirement.

Finally, if you are reading this, you are most likely a member of the larger UH computer science community. I invite you to join the *Computer Science at University of Houston* LinkedIn group and come to departmental events that are open to the community.

We need your help and advice in building a stronger department and helping improve computer science education and research. Many functions of the department are critically dependent on the UHCS community, including placement, fundraising, external instructors, industrial relations, and strategic planning.

Please do not hesitate to contact me if you would like to discuss your ideas and suggestions.

Jaspal Subhlok

Ph.D. Showcase: Celebrating Computing Innovations

The department hosted the annual Ph.D. Showcase (csphdshowcase.nsm.uh.edu) on February 28 to highlight the research of our Ph.D. students. The day-long event included a number of technical sessions that allowed our students to demonstrate their research, receive feedback, and exchange information.

This year, the event focused on innovation, which is essential to our nation's scientific enterprise. Dr. Robert Ness offered an inspiring keynote talk, "So You Think You Can Innovate?," highlighting the need for novel methods of teaching the principles of innovative thinking.

The Showcase included 14 oral and 27 poster presentations featuring the latest research advances from our department. The three faculty panels that reviewed the presentations were impressed with their quality and provided detailed feedback. The winner of the best oral presentation was Binh Le, and the three best poster presentations were Remi Salmon, Salah Aldeen Taamneh, and Sujing Wang.

"The innovative inter-disciplinary and cross-disciplinary research presented was a reflection of the field of computing. Computing affects every aspect of life," said Jaspal Subhlok, department chair.

Prof. Edgar Gabriel, director of graduate studies, commented on the importance of effectively communicating computing research not only to technical audiences but to lay audiences as well. "Communication is one the transferrable skills that we focus on as part of the holistic education that our department offers," he said.

This event would not have been possible without the tireless efforts of Jackie Baum, program coordinator, and the help from our student organizations: CSGirls, GSA and CougarCS.

Correction – Spring 2014 Issue

In "Students Bring Creativity to Hackathon," the article was about UH students participating in a Hackathon at Rice University. It incorrectly states that the event took place at UH.

Three Rising Stars Join the Department

Arjun Mukherjee

Our new assistant professor Arjun Mukherjee received his Ph.D. from the University of Illinois at Chicago (UIC) and his bachelor's degree from the Sikkim Manipal Institute of Technology, India. Previously, he was a research intern fellow at Microsoft Research and Indian Statistical Institute. He is the recipient of several highly competitive fellowships from UIC, such as the Dean's Scholar Award, Chancellor's Graduate Research Fellowship, and the Provost's and Deiss Award for Graduate Research.

Mukherjee enhances the department's growing research strength in data sciences and big-data analytics. His research spans areas such as Bayesian inference, statistical data mining, machine learning, natural language processing, and social and information sciences with a particular emphasis on solving big-data problems in social media and on the web.

His works have addressed a wide variety of social computing problems including modeling opinion spam, deception, and user behaviors; fine-grained sentiment analysis; modeling social conversations; and knowledge induction in graphical models for aspect extraction.

He is interested in working with faculty and students to enhance technologies in data sciences and developing state-of-the-art frameworks for a viable end-to-end actionable web data mining infrastructure.

Gopal Pandurangan

An associate professor, Gopal Pandurangan's addition enriches the department's strengths in algorithms and theory, distributed and parallel computing, networks, and big data.

In particular, he has conducted research in randomized algorithms, distributed and parallel algorithms, graph algorithms, distributed processing of big data, communication networks, modeling, and algorithmic aspects of Internet, World Wide Web, and social networks. Applications include bioinformatics and computational biology.

A senior member of the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers, Pandurangan has published more than 75 refereed research papers. He has supervised and graduated three Ph.D. students and mentored and worked with several other Ph.D. students and postdoctoral fellows.

He received his Ph.D. from Brown University, his M.S. from SUNY at Albany, and his B.Tech. from the Indian Institute of Technology Madras. He has held faculty and visiting positions at Nanyang Technological University in Singapore, Brown University, Purdue University, and Rutgers University.

Pandurangan is looking forward to collaborating with faculty and students in algorithmic problems arising in his areas of interest.

Thamar Solorio

Prior to joining UH as an associate professor, Thamar Solorio was an assistant professor of computer science at University of Alabama at Birmingham. Before that, she was a postdoctoral researcher at University of Texas at Dallas.

Solorio's research focuses on authorship analysis, language assessment from narratives, mixed-language processing in social media, and information extraction from clinical records and patient-generated data. Her addition to the department will broaden our research and teaching portfolios in the area of natural language processing.
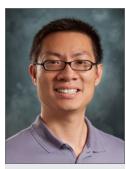
She recently received a prestigious NSF CAREER award for her research on authorship attribution and the 2014 Denice Denton Emerging Leader ABIE Award from The Anita Borg Institute.

Solorio has served as area chair for the Annual Meetings of the Association of Computational Linguistics and as a reviewer for several journals including Artificial Intelligence in Medicine and Natural Language Engineering. Her research is funded by the National Science Foundation and the Office of Naval Research.

Solorio received her Ph.D. and M.S. in computer science from the National Institute of Astrophysics, Optics and Electronics, in Puebla, Mexico. Her B.S. is from the Universidad Autónoma de Chihuahua.

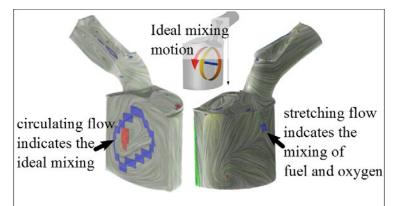# Visualization Propels Critical Research in Science and Engineering

Guoning Chen

The Data Visualization and Modeling (DaViM) Lab, directed by Prof. Guoning Chen, continues our department's quest for excellence in research and teaching by developing efficient techniques to extract and visualize meaningful images from massive data sets.

It's big data! And, it consists of 2D+T and 3D+T vector fields stemming from applications ranging from automobile and aircraft design to mechanical engineering, oceanography, and climatology, among others.

It is challenging work that requires research associates and students with well-founded mathematical backgrounds and highly competent analytic and programming skills.

A gas engine simulation that studies the ignition phase of the combustion process. During this phase, the valve in the engine moves downwardly and sucks in fuel and oxygen. In order to achieve optimal mixing, the fuel and oxygen should rotate around an imaginary axis that is perpendicular to the engine cylinder as shown in the top inset. The visualization is generated by computing the Morse decomposition of the vector fields displaying the results on top of the flow texture image. It successfully captures the expected motion at the front and back of the engine.
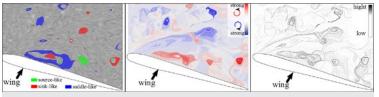
It all began in the 19th century with the genius of Michael Faraday, who realized that his magnetic lines of force formed a field that should be an object of study. It now is, in the form of field theory. Faraday's experiments were transformed into computational science by James Maxwell, who stated:

"All the mathematical sciences are founded on relations between physical laws and laws of numbers, so that the aim of exact science is to reduce the problems of nature to the determination of quantities by operations with numbers."

Chen and his group have some large shoes to fill. Not only do they need to follow in the footsteps of Faraday and Maxwell, but also in those of our department's celebrities.

Computer science at UH has long been recognized as a leading department in high performance computing. Previous departmental luminaries such as Bowen Loftin set the pace.
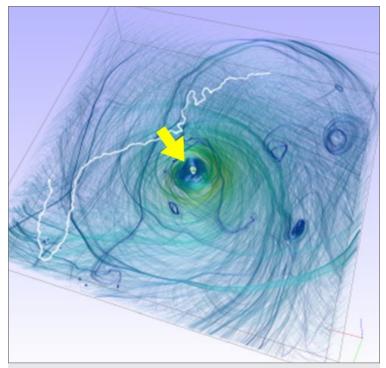
Loftin served a term as chair of our department before becoming president of Texas A&M University. He is now chancellor of the University of Missouri. Loftin also directed our Virtual Reality

Laboratory. His group developed remarkable vector field tools and exhibits such as Newton's World and Maxwell's World. Users could see the fields as they change in 3D space visualized as armies of densely packed small arrows.

The velocity field of an aero-dynamical system around a wing in a wind tunnel experiment. A number of vortices (i.e., swirling motion) in the field can be seen from the visualization, i.e., the regions that are highlighted with colors. The techniques used to generate the above images include Morse decomposition and the computation of a derived scalar field and its gradient.

The DaViM Lab has improved scientific data visualization and computer graphics with its emphasis on vector and tensor data analysis using topological-based methods. These have been applied to many engineering applications and various computer graphics tasks, such as geometric modeling, geometry processing, non-photo-realistic rendering, computer animations, video editing, and digital arts.

One only has to look at Chen's web pages to find great artwork to improve your home or office.

Simulation of hurricane Isabel. The yellow arrow points to the eye of the hurricane.

Summer Research Experience for Undergraduates Celebrates 10 Years

Since 2005, undergraduate students from across the U.S. have come to the UH Department of Computer Science for the Summer Research Experience for Undergraduates (REU). The program, funded for 10 years by the National Science Foundation, offers students a taste of graduate research.

Thirteen students, representing 11 universities in seven states and the District of Columbia, participated in the 2014 program focusing on multimedia data analytics. Each student worked for 10 weeks with a faculty mentor on a specific research project.

"Our goal is to encourage more undergraduate students in computer science to pursue graduate studies and research careers," said Stephen Huang, professor of computer science and principal investigator for the NSF grant. "We want to help them realize their full potential."

Students selected for the program receive a $5,000 stipend, on-campus housing and meals, and a travel allowance. Since the program's start, 121 students have participated.

"The program attracts students from all over the nation, so it is a great way to promote the department's research to other computer science departments," Huang said.

Angela Chin, a junior at Harvey Mudd College in Claremont, Calif., worked on a project to find a way to automatically determine the number of clusters in a given data set. The findings will be helpful in analysis of medical data.

"Instead of having to juggle research with other jobs or courses, the UH REU program let me entirely focus on my research project," Chin said. "I have also learned more about specific fields in computer science—data mining and machine learning."

In addition to working on their research projects, students attended weekly seminars, career development lectures and GRE preparation classes. Two field trips exposed participants to collaborative projects at Houston Methodist Hospital and NASA Johnson Space Center.

Huang added that the program has attracted six students to UH for their Ph.D. since 2010. Past attendees have also entered Ph.D. programs at other universities. Several have received NSF Graduate Research Fellowships.

The REU was the department's first effort in attracting federal grants to support education and outreach in science, technology, engineering, and mathematics (STEM) fields. Over the years, the UH computer science department has built on the REU program's success and received additional STEM awards from NSF.

Social Cues Provide Insights into Human Motion and Behavior

The increasingly ubiquitous presence of video cameras has led to an ever-growing amount of video data generated daily that is awaiting further analysis for different purposes. Humans are the center of interest in most videos, and vision-based human behavior analysis has found many applications such as surveillance, video indexing, and human computer interactions.

Human behavior has been extensively studied by sociologists to understand social interactions and crowd dynamics. It has been argued that characteristics that dictate human motion constitute a complex interplay between human physical, environmental, and psychosocial characteristics.

It is a common observation that people, when free to move about in an environment, tend to respect certain patterns of movement. More often, these patterns of movement are dominated by social mechanisms.

While much of computer vision has focused on studies that try to model the physical and environmental characteristics, psychosocial influences have largely been overlooked.
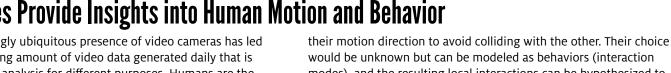
Consider a simple scenario with two people as illustrated, where each can either decide to meet and interact with the other or choose their motion direction to avoid colliding with the other. Their choice would be unknown but can be modeled as behaviors (interaction modes), and the resulting local interactions can be hypothesized to guide a motion predictor.

If the local interactions between the two people are limited to express avoidance or approach, the possible motion for each person is limited to two directions. With these limited possibilities, the predictor can provide a more accurate model for human motion.
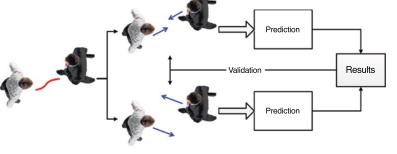

Conversely, the output of the predictor reconciled with actual observation would also validate the interaction mode and therein the local behavior of each person.

A recent paper published by Prof. Shishir Shah presents a model for complex local interactions among humans through mechanics of local repulsion and attraction forces. Such interactions are more common in unconstrained environments and can be leveraged to recognize various human interaction behaviors such as people meeting, people following, and/or group interactions. This model has enabled human motion prediction and led to improved solutions in video surveillance.

STUDENT NEWS

CougarCS Hosts Code Retreat

The Code Retreat, organized by CougarCS, gave future software developers an opportunity to hone their craft. The four-hour retreat was open to UH computer science students and focused on programming Conway's Game of Life using Test Driven Development.

"Through the code retreat, we wanted to encourage students to think hard about the problem they are trying to solve before implementing the code. The retreat was structured in a way that allowed participants to think about the problem instead of just hacking away, hoping for a solution to arise," said Joel Loucks, a CougarCS officer and the coordinator of the event.

Test Driven Development, commonly referred to as TDD, is a technique for building software driven by tests. The technique involves writing the test first, then implementing only enough code to make the test pass, and then refactoring. It helps to drive the software to a better design and build well-tested software.

"In the code retreat, we used round robin pair programming for 45 minutes. We would then break, discuss our progress, delete our code, and switch partners for the next session," Loucks said. "Having to delete the code helped the students continue to think about the problem with different solutions. Deleting the code can sometimes be hard and is definitely the most diabolical component."

The code retreat brought in students as well as alumni and was a complete success.

CSGirls Hold Arduino LilyPad E-Textiles Workshop

During Spring 2014, the CSGirls organization held a workshop on the Lilypad Arduino. Prof. Barbara Chapman sponsored the event.

There are many types of Arduino, which is an open-source electronics platform, and the group decided to focus on the Lilypad version, an e-textile microcontroller board. The board has LEDs that can be programmed in the Python language to respond to various stimuli and blink at different time intervals.

Working with the Lilypad Arduino takes a lot of creativity, and the CSGirls were able to come up with many fun ideas in the workshop. Some people worked in pairs, and others worked individually. Lilypad Arduinos were sewn with conductive thread onto items such as T-shirts, reusable shopping bags, bandanas, origami, and gloves.

The idea behind the workshop was for CSGirls to design projects that can be demonstrated at high schools and middle schools to get younger students more interested in the possibilities offered by computer science. The CSGirls hope that such a creative project will spark the interest of young girls in the Houston area.

Delphian Grant Impacts Student Education

In May, the Department of Computer Science received an award from the Houston Assembly of Delphian Chapters to purchase Xilinx Zynq Extensible Processing Platforms. The platforms will be used to help train undergraduate students in directly programming state-of-the-art commercial processors that are at the core of many mobile and embedded devices today.

The award was presented to Computer Science Department Chair Jaspal Subhlok at the Delphians' Annual Awards Luncheon.

Founded in 1925, the Houston Assembly of Delphian Chapters is an organization of women dedicated to intellectual enrichment, social enhancement, and philanthropic endeavor. Educational philanthropy is the touchstone of the organization's core values and mission.

UH was still a junior college in 1930 when the Delphians awarded

Delphian Sunny Carpenter and Computer Science Chair Jaspal Subhlok

what they believe was the first scholarship ever given to a UH student. Since then, it is estimated that Delphian scholarships have directly touched the lives of more than 550 students and over $1 million in scholarships and grants have been awarded.

The Delphians also mentor their scholars, giving them different types of support to succeed in school and beyond.

Staff Spotlight: Barbara Murray

After over 45 years with the university in various capacities, our long-term departmental administrator, Barbara Murray retired at the end of August.

Barbara started working at UH in 1968 in the Dean of Students office. In 1973, she started as the project administrator of the Energy Institute, then moved in 1978 as departmental administrator to the Energy Laboratory that subsequently became the Allied Geophysical Laboratories (AGL).

At its height, the AGL consisted of three main consortia with over 50 participating companies. Barbara managed all AGL grants and in the process had to deal with faculty from multiple departments and colleges.

One of the AGL consortia was the Research Computation Laboratory (RCL), originally run by Olin Johnson and later by Ernst Leiss. The RCL specialized in researching and developing geophysical algorithms appropriate for the new vector and parallel architectures.

In 1997, she began as our departmental administrator. Although we are one of the oldest computer science departments in the nation, the number of administrators has only been a mere handful. Barbara was deeply involved in the department's rise in the past decade or two. We have grown in size (faculty, students, and staff), and even more importantly, in moneys to be administered, all of which made Barbara's job increasingly more interesting! She rose to every challenge cheerfully and with humor.

Born and bred in Lafayette, Louisiana, Barbara knew about the need for good food and regularly provided Creole (and other) food to her staff and also some hungry-looking faculty stragglers who wandered by.

Her good spirit, efficiency, and professionalism will be missed by all of us. We wish her all the best in her well-earned retirement.

Staff Spotlight: Tom Cumpian

The department operates and maintains its own network, and Tom Cumpian kept it running for 14 years as the Network Administrator. His charge included managing core network switches, keeping teaching and research labs running, supporting audiovisual conferencing, helping with departmental renovations, and much more.

Dr. Victoria Hilford, instructional associate professor of computer science, summarized the sentiment of the computer science community by saying:

"For the last 13 years, I've had the pleasure of working with and knowing Tom. I never met a nicer and more professional person. We sat many hours trying to solve technical challenges of continuously changing software and hardware.

"Always well organized, Tom can pull up 'the folder' of solved challenges from years before, then research, solve, and log the new challenges. And in the process, I got to talk to a great person. It was fun and educational working together. Tom's support to the class databases account was always outstanding. One word to describe Tom is … awesome."

Thank you, Tom, for many years of technical support and dedication – always with patience and a smile. Here's wishing you an active and enjoyable retirement; you deserve it.

Graduates – Spring 2014

B.S.

Sabah Akbani
Joshua Alphonso
Chibuikem Amaechi
Ramon Avalos
Bassam El-Azzeh
Christian Gutierrez
Estefannie Gutierrez De La Garza
Nathan Huynh
Osagie-Oduwa Igbinosa
Zachary Kaspar
Khoa Le
Matthew Liang
Marc Longoria
Joel Loucks
Robert Love
Jikai Ma
Andrew Miller
Kevin Muppattayil
Patrick Pahls
Jose Peraza
Justin Scott
Hai Tran
Hai-Y Michael Tran Nguyen
Hui-Kee Wong

M.S.

Owais Ahmed (w/ thesis)
Soumya Sri Akula
Venkata Narasimha Pradhith Chaganty
Megha Chemminiyan Pothody
Cheng Chen (w/ thesis)
Amar Teja Cherukuri
Chockalingam Chidambaram
Krushna Reddy Chinnakka
Yashraj Jayaraj Digge
Saitej Erupaka
Venkata Sai Phanindra Gandham
Edgar Gutierrez
Liangchi Hao
Dipti Katkar
Madhuri Keshavarao
Praveena Khasnis
Manoj Kidambi
Akhila Kolasani
Kyeong An Kwon (w/ thesis)
Sai Keerthi Maryala
Venkata Yeshes Meka
Yang Miao
Divyanshu Mittal
Deepa Nagarajan
Naveen Narang
Adithya Nayabu
Sruthi Pendyala
Venkata Narasimha Saiganesh Puranam
Tharun Ramagoni
Viswanathan Ranganathan
Madhuri Rangineni
Ananta Saple
Tejas Shah
Vibhor Singh
Venkata Avinash Susarla
Michelle Tran
Shuyu Xu (w/ thesis)
Aiguo Zeng
Hongyang Zhang (w/ thesis)

Ph.D.

Otto Dobretsberger
Waleed Faris
Apurva Gala
Binh Le
Yen Le
Swaroop Pophale
Meenakshi Sharma
Munara Tolubaeva
Sujing Wang

Bowling and Pool Night Draws a Crowd

In April, UH Computer Science Alumni Association hosted a free pool and bowling night at the new UH University Center Underground Game Room. Paul DeCarlo, president of the CS Alumni Association and Technology Evangelist at Microsoft, and a group of CS alumni opened this event to both alumni and students as a way to provide an opportunity for them to get acquainted and build friendships.

Six alumni – Paul DeCarlo, Ricky Gentry, Chris Gonzales, Jesus Hernandez, Karis Ng, and Michael Walston – provided financial support to reserve the entire game room and provide meals for the guests. The CougarCS student organization worked closely with the Alumni Association to help reserve the space and advertise the event to CS students.

Though organized and advertised quickly, about 20 alumni, spanning from the Class of 2009 to the Class of 2013, and more than 30 students, including graduating seniors (Class of 2014), gathered to mix and network at the three-hour event. Almost everyone stayed until the end of the event.

Everyone had great time meeting each other, networking among alumni and current students, and playing various games (bowling, table tennis, and pool). The event succeeded in strengthening the bond among alumni as well as between alumni and students.

Alumni and students are looking forward to similar events in the near future that will allow them to continue to build and maintain a strong relationship as former and current UH computer sciences majors.

Sponsors

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