Two assistant professors of computer science, Xi Chen and Junfeng Yang, have been named Alfred P. Sloan Research Fellows for 2012. They are among 126 early-career researchers of outstanding promise who have each been awarded a $50,000 fellowship for use in their research.

“I am very excited to receive a Sloan research fellowship,” says Chen. “It is a great honor, and the funding will support both my ongoing and new research projects in algorithmic game theory and complexity theory. I am very grateful especially to my department and colleagues for their great support ever since I joined Columbia two years ago.”

Chen is interested in applying concepts and methodologies from game theory and economics to areas of computer science, to understand how selfish behavior and outside influences impact decision-making processes in the computing world. He studies algorithmic game theory, a new and rapidly growing field, and works on computational problems that arise from the game-theoretic study of the Internet, e-commerce, and other decentralized systems. His current research examines algorithmic issues related to some of the most fundamental models and solution concepts in game theory and economics. Chen, who earned his B.S. in physics/math and Ph.D. in computer science from Tsinghua University (Beijing), was a postdoctoral researcher at the Institute for Advanced Study, Princeton University and University of Southern California. He won an NSF CAREER award in 2012.
It feels great that my research has been recognized by the Sloan Foundation and the fellowship committee,” says Yang. “I owe so many thanks to my collaborators, my colleagues at Columbia, and my brilliant students for their constant and tremendous support over the years. I am really thrilled to continue pushing the research frontiers in software systems.”

Yang’s research centers on creating effective tools to improve the reliability and security of real software systems. While in graduate school, he created an automated and comprehensive approach to detect storage system errors and then went to work at Microsoft, where he extended his research to distributed systems on large networks. His work led to numerous patches for the Linux Operating System and a technology transfer at Microsoft.

At Columbia Engineering, he co-directs the Software Systems Lab (SSL), and is focusing on efficient and reliable multi-threading, tools for the cloud and operating systems support for reliability.

Jacob Andreas Wins Churchill Scholarship

Jacob Andreas, a senior computer science major, is one of five students from the School to receive the Churchill scholarship, which gives exemplary students the opportunity to study for one year at the University of Cambridge with all tuition and fees paid, including a living allowance and travel and research expenses.

Jacob was surprised when he got the call in early January that he had won the scholarship from the Winston Churchill Foundation. Having missed an earlier email announcing the date on which finalists would be notified, he actually assumed he was already out of the running. The winners were announced on February 6.

“So for the last month or so I’ve been wrestling at nights and moments without being able to explain why,” said Jacob, 21, from Piedmont, CA. “It’s a relief to finally be able to talk about it!”

Jacob began working on his senior thesis on a model of machine translation driven by meaning, and as a researcher in the Natural Language Processing Group, under the guidance of his professors Kathleen McKeown and Michael Collins.

“I tell people I’ve been interested in natural language processing since the fifth grade,” said Jacob. The first computer program he ever wrote was a Midi-style fill-in-the-blank game.

“Language has always excited me,” added Jacob, who studied Spanish in high school and Mandarin here. “Computational linguistics really gets to the heart of some of the most interesting problems in artifical intelligence and machine learning that exist today.”

Jacob began working in McKeown’s lab as a sophomore. He is interested in semantic parsing and generation—transforming text into language-independent representations of meaning and back again. When he attends Cambridge this fall, he plans to build a better semantic parser under the supervision of Professor Stephen Clark.

“Jacob is one of those amazing students who knew since he arrived what he wanted to work on,” said McKeown. “He has published two papers with my group and just had a third accepted. That’s in addition to another paper on machine translation that came out of his course work. This is absolutely amazing for an undergraduate. Not only is Jacob creative and thoughtful, he’s also a great communicator and a nice guy.”

As if there is more that can be squeezed into his day, Jacob also teaches; he has taught as a T.A. in the computer science department’s Emerging Scholars Program and for Computer Science Theory, as a tutor, and as a coach on the robotics team at the Engineering School.

He held a software engineering internship at Google’s New York offices last year, and in 2010, at Microsoft in Bellevue, WA, where he developed several Windows Phone 7 applications using Live Labs technologies.

Thinking ahead to life after Cambridge, Jacob said he definitely wants to return to the U.S. for a Ph.D., and after that, intends to pursue a professorship. Indeed, his parents were very pleased to hear of the Churchill news; and perhaps even more so since they both attended Cambridge. Said Jacob, “Perhaps unsurprisingly, most of our discussion so far has taken the form of dating advice.”

JACOB ANDRUS Wins Facebook Fellowship

Jeremy Andrus has been named a Facebook Fellow. Jeremy is one of only 12 fellows tapped nationwide from a field of more than 300 applicants.

“JACOB ANDRUS Wins Facebook Fellowship”

Ph.D. Student Jeremy Andrus Wins Facebook Fellowship

Computer Science Ph.D. student Jeremy Andrus has been named a Facebook Fellow. Jeremy is one of only 12 fellows tapped nationwide from a field of more than 300 applicants.

This exciting news for Jeremy comes on the heels of winning a best paper prize with his advisor, Associate Professor Jason Nieh. As a Facebook Fellow, Jeremy will receive a $30,000 stipend to cover study expenses, $5,000 for conference travel, and $2,500 for a personal computer. In addition, the Facebook Fellowship comes with an invitation to visit Facebook headquarters in Palo Alto, CA, later this year to meet one-on-one with engineers working on problems relevant to his research.

“It’s an honor to be chosen, and would hope the recognition can fuel more productive collaboration,” he says. Jeremy is developing an app that would allow two separate personas—say, one for work and one for home—on a single smartphone.

“I would like to refine and unify the mobile computing experience using a system-level approach,” he says. “Of course, I’m also interested in fun, exciting, and relevant research.”

In its announcement, Facebook posted the following description of Jeremy and his research:

“When Jeremy sees many people carrying multiple smartphones, he also sees a challenge: How can we unify all those phones and their functionalities so we need to carry only one device? His goal is to revitalize the mobile market with virtualization solutions that will allow us to use multiple virtual devices on a single physical device.

Jeremy will work to unify the mobile user experience by investigating efficient and secure ways to virtualize whole platforms like Android. His work will help facilitate the next generation of mobile applications and services, and clear our cluttered pockets of excess devices.

Jeremy anticipates leaving academia after completing his Ph.D. and hopes to return to industry to work at a startup or an established organization.

“I really enjoy creating new technologies that people can use,” he says.

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Roxana Geambasu Joins CS Faculty

Roxana Geambasu received a Ph.D. in computer science from the University of Washington in 2011 and a B.S. in Computer Science from the Polytechnic University of Bucharest in 2005. Her research interests span broad areas of systems research, including cloud and mobile computing, operating systems, file systems, and databases, with a focus on security and privacy. She works on identifying and addressing the critical challenges and untapped opportunities created by today’s emerging technologies, such as the Web, cloud computing, and powerful mobile devices. She has won two best paper awards at USENIX Security, Simulation World Cup 2011 and was the recipient of the first Google Fellowship in Cloud Computing in 2009.

CUCS: Tell us about your field of research.

Broadly speaking, my research area is systems, with a focus on security and privacy issues. In my research, I design, implement, evaluate, and sometimes deploy systems that help address some of the critical challenges raised by today’s emerging technologies, such as cloud computing, mobile devices. Despite enormous advantages, these technologies threaten users’ ability to control the use of their data, its lifetime, accessibility, privacy, management properties, etc. My research focuses on restoring to users control they’ve ceded to the cloud and mobile devices. As part of my Ph.D., I designed and implemented several systems aimed at re-empowering users with various aspects of control over their data, an effort which on an operating system design overhaul for mobile devices with security in mind. Today’s mobile operating systems—including Android and iOS—are descendants of traditional desktop OSes, such as Linux and OSX, and as such lack the appropriate mechanisms to cope with a whole new range of mobile-specific threats, including the pervasive threat of theft. For example, current mobile OSes and applications mismanage sensitive data—such as passwords, credit card numbers, emails, and others—by accumulating it in enormous quantities on the device’s RAM or persistent storage. This places it in danger if the device is stolen or lost. To secure mobile data against theft, we are now designing and implementing ClearOS, an Android-based OS that maintains itself “clean” at any point in time, keeping sensitive data away from the theft-prone device as much as possible. I chose to work on this problem because it is important. As more personal or corporate users adopt mobile devices and as the military deploys mobile devices to troops on the ground, we need to ensure that these devices are equipped with the necessary mechanisms to deal with the new threats they present.

What attracted you most to a faculty position at Columbia?

Three aspects attracted me to my faculty position at Columbia. First, the undergraduate and Ph.D. students are amazing. I met with some of the systems/security students during my visit at the Columbia campus and was very impressed by their sharpness, research ideas, and commitment to great work. Second, the broad systems group at Columbia is simply amazing. It includes some of the most respected, productive, and fun individuals in operating systems, software reliability, hardware, and security in the country. Apart from the top-notch research they produce, many of these researchers are determined to build systems that are as close to reality as possible, a notion I deeply believe in (please see below). Third, NYC is a really fun place to live.

Do you have a method or approach that you like to use in your research?

The innovative use of cross-field ideas, large-scale design and deployment, and collaborative synergy characterize my research approach. First, my research creatively applies ideas taken from different domains to solve complex problems. For example, I integrated ideas from cryptography and databases to address challenges in cloud and mobile computing. Second, my research focuses on building, deploying, and measuring real systems at large scale to help uncover important hidden problems and reveal new opportunities with broad system applicability. For example, my large-scale experience with building the Vanish self-destructing data system yielded insights into the design of a new type of extensible storage system relevant for cloud storage environments like Amazon S3. Finally, my research is invigorated by collaborations with others from diverse backgrounds: professors, industrial researchers and engineers, and students. In the past, I led projects that engaged and leveraged my collaborators’ special skills to best meet our research objectives.

I’m now continuing in my current work. As one example, I designed Kaypad, an auditing file system for mobile devices that permits users to track and control accesses on their mobile data, even after a device has been stolen. As another example, I designed Vanish, a global-scale distributed trust system that allows users to cause all copies of desired Web data objects, online or offline, to simultaneously self-destruct at a specified time.

What are some of your ongoing research projects and what motivated you to work on them?

My current work extends my previous efforts on restoring control and transparency over users’ data in the cloud and on mobile devices. As one example, I am now working on building a cloud computing system design overhaul for mobile devices with security in mind.
Professor Grinspun

one of “Brilliant 10”

Popular Science has named Eitan Grinspun among its “Brilliant 10,” the magazine’s annual list of the top 10 researchers in the U.S.

Eitan Grinspun, an Associate Professor of Computer Science, studies the basic rules of motion and turns them into computer programs that are animating Hollywood movies and creating new tools for graphic designers. The programs are now claimed for medical research, and to study problems involving rubber sheets, fluids, and even icicles. These could have applications for the laying down of transoceanic communications cables, design of nanoscale wiring for stretchable electronics, and faster more compact bottling of shampoo and other thick liquids.

“I am honored that the work conducted by my group at Columbia Engineering has received this unique recognition,” says Grinspun, who also won a Sloan Research Fellowship. “Tangled” and Weta Digital’s “Rise of the Planet of the Apes,” which use his technology to make animated objects move more realistically and to animate grand, complex scenes that would be very expensive to film using real objects. Adobe Systems Inc. included a new paintbrush tool based on his work as part of its most recent editions of Adobe Photoshop and Adobe Illustrator. “For all of these applications,” he says, “you need to understand the motion of materials and how they behave. We’re bringing to it our knowledge of computers.”

Grinspun, who was born in Israel to Chilean parents and grew up in Ann Arbor, MI, and Toronto, partners with physicists and mathematicians to determine the best formulas to use as a starting point for his work. From there, his research team refines and customizes the formulas they use in programs.

His approach to computing the motion of materials is radically different from those of his peers and predecessors. He and his collaborators have pioneered the use of a new kind of mathematics—discrete differential geometry (DDG)—as a new mathematical “language” in which the behavior of physical materials can be described simply and succintly and directly translated into fast computer codes. By using DDG, Grinspun is able to produce simpler, faster algorithms that “get the physics right” with fewer computer cycles.

For over a decade, the editors of Popular Science have been seeking out promising young researchers at labs across the nation. This year’s “Brilliant 10” represent the best of what science can achieve and demonstrate America’s continuing cutting-edge research. From diagnosing diseases in developing countries to inventing a new kind of geometry, each of these brilliant scientists and researchers are under 40 and offer everyone reason to be optimistic about the future.

Professor Shree K. Nayar

has been elected to

American Academy of Arts & Sciences

As the TC. Chang Professor and chair of Computer Science, co-director of Columbia Vision and Graphics Center, and head of the Computer Vision Laboratory, Shree Nayar can now claim membership in the American Academy of Arts and Sciences (AAAS).

“I feel greatly honored to be included among such an august group of individuals from the sciences, the humanities, and the arts,” Nayar says. “It is a particular thrill for me to be in the same entering class as Bob Dylan, of whom I have been a fan for many years.”

Shree’s work has had significant impact on the practice of digital imaging, computer graphics, and robotics. “Shree’s interests make him a Renaissance man,” said Columbia Engineering Dean Feniosky Peña-Mora. “It is fitting that he has been elected into such an esteemed academy whose members represent the full range of human intellectual endeavors. We are all proud of his accomplishment.”

The AAAS was founded in 1876, to “cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people.” Among the Academy’s founders are Benjamin Franklin, Thomas Jefferson, and George Washington. Its current members include many of the nation’s most prominent scientists, more than 250 Nobel and Pulitzer Prize winners, as well as Columbia University President Lee Bollinger.

The 2011 elected class includes astronomer Paul Butler, discoverer of over 330 planets; cancer researcher Gara Bloomfield, who proved that adult acute leukemia can be cured; David Page, whose genome sequencing work has advanced understanding of human reproduction; former Congressional Budget Office Director Robert Reischauer; University of Cambridge classicist Mary Beard; Nobel laureate writer Mario Vargas Llosa; actors Daniel Day-Lewis, Helen Mirren, and Sam Waterston; singer-songwriter Paul Simon; jazz icon Dave Brubeck; and documentary filmmaker Ken Burns.

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FCC Names Professor Schulzrinne Chief Technology Officer

“Prof. Henning Schulzrinne received his undergraduate degree in economics and electrical engineering from the Darmstadt University of Technology, Germany; his M.S.E.E. degree as a Fulbright Scholar from the University of Cincinnati, Ohio; and his Ph.D. from the University of Massachusetts in Amherst. He was a member of technical staff at AT&T Bell Laboratories, Murray Hill, and an associate department head at GMD-Fokus (Berlin), before joining the computer science and electrical engineering departments in 1996 at The Fu Foundation School of Engineering at Columbia University, New York.

Schulzrinne has been an Engineering Fellow at the FCC since 2010. He has published more than 250 journal and conference papers, and more than 77 Internet Requests for Comment (RFCs). He is widely known for the development of key protocols that enable voice-over-IP (VoIP) and other multimedia applications that are now Internet standards, including the Session Initiation Protocol (SIP). His research interests include Internet multimedia systems, applied network engineering, quality of service, and performance evaluation.

As Chief Technology Officer, Schulzrinne will guide the FCC’s work on technology and engineering issues, together with the FCC’s Office of Engineering and Technology. He will advise on matters across the agency to ensure that FCC policies are driving technological innovation, including serving as a resource to FCC Commissioners.

Schulzrinne will also help the FCC engage with technology experts outside the agency and promote technical excellence among agency staff. He will be based in the FCC’s Office of Strategic Planning and Policy Analysis.

“We are extremely pleased that Henning has been named to such a prominent post,” said Feniosky Peña-Mora, Dean of The Fu Foundation School of Engineering at Columbia University. “Not only has he been a leader for many years in the field of computer science and has had a strong academic impact here at Columbia Engineering, he will now play a major role in helping to effect technology policy for both our nation and the world. He exemplifies Columbia Engineering’s far-reaching faculty and we are honored to have him as a colleague.”

The communications technology revolution is key to our economy and broad opportunity. With the appointment of Henning—a world-class technologist—we extend our commitment to technology excellence at the FCC and to strong engagement with outside technology experts.”

-- FCC CHAIRMAN JULIUS GENACHOWSKI

Columbia Engineering School Professor Henning Schulzrinne has been appointed as Chief Technology Officer by FCC Chairman Julius Genachowski.

“The FCC is engaged in helping bridge the digital divide, increase public safety, protect consumers, and help foster new innovative mobile networks,” said Schulzrinne, who is the Julian Clarence Levi Professor of Mathematical Methods and Computer Science, and Professor of Electrical Engineering. “I look forward to participating in these and other activities. I also hope to better connect the engineering community and the FCC, so that we can jointly tackle those important challenges.”

“I’m delighted that Henning will be joining us,” said FCC Chairman Genachowski. “The communications technology revolution is key to our economy and broad opportunity. With the appointment of Henning—a world-class technologist—we extend our commitment to technology excellence at the FCC and to strong engagement with outside technology experts.”

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Three Computer Science Department professors are among the 17 founding fellows of the Association for Computational Linguistics (ACL). They are Kathleen McKeown, Henry and Gertrude Rothschild Professor of Computer Science and Vice Dean of Research, Julia Hirschberg, and Michael Collins, Vikram S. Pandit Professor of Computer Science. The ACL Fellows Program was created last fall to recognize members whose contributions to the field have been most extraordinary.

“It’s truly gratifying to be honored by your peers in this way,” Hirschberg says.

Each fellow was nominated for their specific contributions, as noted by the ACL: McKeown, for her significant contributions to natural language generation and multi-document summarization; Hirschberg, for her significant contributions to intonation, discourse, text-to-speech systems, and labeling standards for speech corpora; and Collins, for his significant contributions to natural language parsing and discriminative training.

McKeown notes that Columbia had the largest number of founding fellows of any university.

“This is an indication of the comparative strength of the natural language processing team at Columbia, which includes four strong researchers at the Center for Computational Learning Systems as well,” she says.

The Association for Computational Linguistics is the international scientific and professional society for people working on problems involving natural language and computation. Its journal, Computational Linguistics, is considered the primary forum for research on computational linguistics and natural language processing.

Three CS Professors Named Founding Fellows of Association for Computational Linguistics

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Professor Yang’s Peregrine System Improves Software Reliability & Security

Anyone who uses multithreaded computer programs—and that’s all of us, as these are the programs that power nearly all software applications including Office, Windows, MacOS, and Google Chrome Browser—and web services like Google Search, Microsoft Bing, and iCloud—knows well the frustration of computer crashes, bugs, and other aggravating problems. The most widely used method to harness the power we receive from multicore processors, multithreaded programs can be difficult for programmers to get right and they often contain elusive bugs called races. Data races can cause very serious problems, like the software bug that set off the 2003 power blackout in the Northeast. Now there is a new system that will combat this problem.

Peregrine, a new software system developed by a team of researchers led by Assistant Professor of Computer Science Junfeng Yang, will improve the reliability and security of multithreaded programs, benefiting virtually every computer user across the globe. Peregrine can be used by software vendors like Microsoft and Apple and web service providers like Google and Facebook, to provide reliable services to computer users. This new research was published in the 23rd ACM Symposium on Operating Systems Principles, considered to be the most prestigious systems conference held each year, and presented by Yang’s graduate student Hengming Cui.

“Multithreaded programs are becoming more and more critical and pervasive,” says Professor Yang. “But these programs are nondeterministic, so running them is like tossing a coin or rolling dice—sometimes you get correct results, and sometimes you get wrong results or the program crashes. Our main finding in developing Peregrine is that we can make threads deterministic in an efficient and stable way: Peregrine can compute a plan for allowing when and where a thread can “change lanes” and then place barriers between the lanes, allowing threads to change lanes only at fixed locations, following a fixed order. This prevents the random collisions that can occur in a nondeterministic system.

“Once Peregrine computes a good plan without collisions for one group of threads,” adds Yang, “it can reuse the plan on subsequent groups to avoid the cost of computing a new plan for each new group. This approach matches our natural tendency to follow familiar routes so we can avoid both potential hazards in unknown routes and efforts to find a new route.”

Yang notes that in contrast to many earlier systems that address only resulting problems but not the root cause, Peregrine addresses nondeterminism—a system that is unpredictable as each input has multiple potential outcomes—and thus simultaneously addresses all the problems that are caused by nondeterminism.

Peregrine also deals with data races or bugs, unlike most previous efforts that do not provide such fine-grained control over the execution of a program. And it’s very fast—many earlier systems may slow down the execution of a program by up to ten times. Peregrine is also a practical system that works with current hardware and programming languages—it does not require new hardware or new languages, all of which can take years to develop. It reuses execution plans, whereas some previous work makes a different plan for each group of threads as Yang points out, “The more plans one makes, the more likely some plans have errors and will lead to collisions.”

“Today’s software systems are large, complex, and plagued with errors, some of which have caused critical system failures and expulsions,” adds Yang. “My research is focused on creating effective tools to improve the reliability and security of real software systems. I’m excited about this area because it has the potential to make cyberspace a better place and benefit every government, business, and individual who uses computers.” —JUNFENG YANG

Professor Vapnik Wins Pair of Major Honors

Computer Science Professor Vladimir Vapnik has won two significant awards for his career contributions to his field.

Computer Science Professor Vladimir Vapnik won the 2012 Benjamin Franklin Medal in Computer and Cognitive Science from the Franklin Institute. The award citation is “for his fundamental contributions to our understanding of machine learning, which allows computers to classify new data based on statistical models derived from earlier examples, and for his invention of widely used machine learning techniques.” In recognition of this award Professor Vapnik was honored with a one-day symposium on “Statistical Machine Learning: Theory and Applications” held at the University of Pennsylvania in April.

Professor Vapnik is also the 2012 winner of the Frank Rosenblatt Award, a technical field award from the Institute of Electrical and Electronics Engineers (IEEE). The award is presented for outstanding contributions to the advancement of the design, practice, techniques, or theory in biologically and linguistically motivated computational paradigms, including but not limited to neural networks, connectionist systems, evolutionary computation, fuzzy systems, and hybrid intelligent systems in which these paradigms are contained.

Vapnik is widely recognized as one of the main developers of the Vapnik-Chervonenkis Theory, which is a major component of statistical learning theory, and as one of the originators of the Support Vector Machine, a highly successful and widely used approach in machine learning. Previous awards for Professor Vapnik include the 2005 Gabor Award, induction into the National Academy of Engineering in 2006, the 2008 Paro Kanellakis Award, and the 2010 Neural Networks Pioneer Award.

Vapnik joined the Columbia faculty in 2003, and also serves as a senior research scientist at Columbia Engineering’s Center for Computational Learning Systems. He received his master’s degree in mathematics from Uzbek State University, Samarkand, USSR and joined the Institute of Control Sciences, Moscow, where he worked from 1961 to 1990, becoming head of the Computer Science Research Department. He then joined AT&T Bell Laboratories in Holmdel, N.J., where he continues as a consultant. He is also a Fellow of NEC Laboratories in Princeton.
Professor Hirschberg Receives Pair of Speech Research Awards

Professor Julia Hirschberg has received two awards recognizing her outstanding research contributions in speech and audio processing.

Professor Julia Hirschberg received the International Speech Communication Association (ISCA) Medal for Scientific Achievement for 2011 at the annual Interspeech Conference, held in Florence. The award citation reads: “She has made outstanding contributions to text-to-speech synthesis, prosody research, and many other topics in spoken language processing.”

Professor Hirschberg was also honored by the Institute of Electrical and Electronics Engineers with its James L. Flanagan Speech and Audio Processing Award. The IEEE has given the James L. Flanagan award annually since 2002 to an individual or team for outstanding contribution to the advancement of speech and/or audio signal processing. The group honored Hirschberg for her “pioneering contributions to speech synthesis and prosody research.”

“I am particularly honored to receive this award since Jim Flanagan was my first center director when I arrived at Bell Labs,” Hirschberg says.

The award citation calls Hirschberg an innovator in building viable computational models of human prosody for use in speech synthesis. “Her goal,” the citation continues, “has been to make human-computer interaction in spoken dialog systems more natural and effective. She was one of the architects of the Tone and Break Indices (ToBI) system for labeling human prosodic contours that is used in many text to speech systems and is widely used in prosody research. Initially used for international description of standard American English, ToBI has been extended to model other languages. Professor Hirschberg has also pioneered work in emotional and deceptive speech and on audio browsing and retrieval research, both in techniques to improve audio search and to make audio search engines more usable.”


Professor Belhumeur Receives Edward O. Wilson Biodiversity Technology Pioneer Award

This free mobile app uses visual recognition software to help identify tree species from photographs of their leaves. LeafSnap, an electronic field guide for iPhones and iPads that identifies trees.

“The idea of building classifiers that say, ‘Is this person in the photo a man or a woman?’ or ‘Is that leaf a sugar maple or a silver maple?’ uses a lot of the same sort of math and technology,” he said.

The award, which honors individuals who have significantly contributed to the preservation of biodiversity on Earth, was presented in October by Dr. Edward O. Wilson, Professor Emeritus, Harvard University, a biologist recognized worldwide as the Father of Biodiversity, in a public forum of 2,500 individuals in Bozeman, Montana. The co-recipients are Belhumeur’s collaborators, John Kress, a research botanist and curator with the Smithsonian Museum of Natural History, and David Jacobs, computer science professor at the University of Maryland.
results demonstrate that Cells imposes only modest runtime and memory overhead, works seamlessly across Android hardware devices including Google Nexus 1 and Nexus 5 phones, and transparently runs Android applications at native speed without any modifications.

Computer Science Ph.D. student Jiajun Zeng and his advisor, Associate Professor Jason Nieh, co-authored a paper that won the Best Paper Award at the Association for Computing Machinery’s Technical Symposium on Computer Science Education. The paper, “Teaching Operating Systems Using Android,” was selected from a pool of 289 papers submitted to the symposium and provides a forum for sharing new ideas for courses, laboratories, and other elements of teaching and pedagogy. The paper describes their experience in the fall of 2011, during which they taught a class as a teaching assistant in the Columbia University Operating Systems course (COMS W4118).

Aaron Bernstein has been awarded the Best Student Paper Award at SODA 2012, the 23rd ACM-SIAM Symposium on Discrete Algorithms and the top algorithms conference, for his single-authored work on “Approximation for Restricted Shortest Paths in Undirected Graphs.” Bernstein is the co-winner of this award at SODA 2012.

Associate Professor Luca Carloni was among 85 engineering faculty nationwide selected to take part in the National Academy of Engineering’s (NAE) 17th annual U.S. Frontiers of Engineering Education and Practice Symposium, which took place at Google’s headquarters in Mountain View, CA, and examined additive manufacturing, engineering sustainable buildings, neuropsychotic, and semantic processing. The selection marks Carloni as being among the nation’s brightest young engineers between 30 and 45 years old who working performing exceptional engineering research and technical work, industry, academia, or government. Carloni is working to develop smaller, faster, and more energy efficient computing chips by reimagining chip architectures and the tools used to research them.

A demo presented by members of the Energy Harvesting Active Networked Tags (EnHANTs) Project received the Best Student Demo Award in the ACM Conference on Embedded Networked Sensor Systems (ACM SenSys 2011), which is the premier conference of the sensor networking community. The demo, titled “Organic Solar Cells Integrate Energy and Data for Active Network Tag (EnHANT) Prototypes” was developed by 10 students: Gerald Stanje, Paw Miller, Jianyun Zhu, Alexander Smith, Olivia Winn, Robert Margolis, Maria-Garota Vlachou, John Sark, Marcin Szczodrak, and Baradwaj Vigraham) from the groups of Associate Professor Luca Carloni (Computer Science), Professor Peter Key (Electrical Engineering), Associate Professor Ioannis Kymissis (Electrical Engineering) and Assistant Professor Gil Zussman.

The EnHANTs Project is an interdisciplinary project that focuses on developing small, flexible, and energetically self-reliant devices. These devices can be attached to objects. There are a number of networked (e.g., books, furniture, walls, doors, toys, keys, clothing) objects, and products, thereby providing the infrastructure for various novel networking applications. Examples of these applications include locating misplaced items, continuously monitored objects (e.g., items in a store and boxes in transit), and determining locations of disaster survivors.

In 2009, the project won first place in the Vodafone Americas Foundation Wireless Innovation Competition, and in 2011 it received the IEEE Communications Society Award for Outstanding Paper on New Wireless Technology Topics. The project has been supported by the Henry Ford Health System Foundation, the Department of Energy, the Department of Homeland Security, Google, and Vodafone.

Shih-Fu Chang, a Joint Professor with the Electrical Engineering Department, was named the Richard and Patricia Farber Professor of Telecommunication Systems at Columbia University. Chang also received the 2011 ACM SIGMM Technical Achievement Award. The award cites Chang’s significant contributions that shape directions in many key areas of multimedia search, video content analysis and understanding, multimedia simulation, video transcoding, video content-based manipulation, domain management, and trustworthy media.

Professor Xi Fan received an NSF CAREER Award for on-going research project on hardware security. Hardware components can contain logical weaknesses in design specifications that can slip past manual reviews, rigorous testing, and security champions. These weaknesses are not insignificant. They can be exploited by attackers to steal private data and create vulnerabilities. The goal of this proposal is to bridge the gap between research and industry by developing robust methods to identify and defend against attacks.

Assistant Professor Steve Feiner has won a Best Paper Award at ACM SIGMOD 2012, the 37th Symposium on 3D User Interfaces, which took place in Costa Rica, CA, in March. Their paper demonstrates advantages of overlays virtual graphics on both floor and overhead in 3D interactive 3D, and a focus on designing the design and development of user interface for interaction techniques. The award-winning poster is titled Manipulating Virtual Objects in Handheld Augmented Reality Using Stored Snapshots.

Their work is an example of augmented reality, in which users can interact with virtual and real objects. Their work uses three-dimensional graphics to allow a user to first take snapshots of a scene using a tablet computer, and then jump back and forth between the snapshots, to revisit them virtually for interaction. This makes it possible for the user to move and rotate virtual 3D objects from the vantage points of different locations, without the overhead of physically traveling between those locations.

In 2009, the project won first place in the Vodafone Americas Foundation Wireless Innovation Competition, and in 2011 it received the IEEE Communications Society Award for Outstanding Paper on New Wireless Technology Topics. The project has been supported by the Henry Ford Health System Foundation, the Department of Energy, the Department of Homeland Security, Google, and Vodafone.

Ph.D. student Steve Henderson won a Best Student Paper Award at IEEE ISMAR (IEEE International Symposium on Mixed and Augmented Reality), the premier conference in the area of Mixed and Augmented Reality.

Presented in Basel, Switzerland “Augmented Reality in the Psychomotor Phase of a Procedural Task,” reports on a key part of Steve Henderson’s spring 2011 dissertation was coauthored by Dr. Henderson and his advisor, Professor Steve Feiner. It presents an evaluation of a prototype augmented reality user interface designed to assist users in performing an aircraft maintenance assembly task. The prototype tracks the user and multiple physical tasks objects, and provides dynamic, prescriptive, overlaid instructions on a tracked, see-through headworn display in response to the user’s ongoing activity.

A user study showed that users were able to complete all aspects of the assembly task, which physically manipulated task objects significantly faster and with significantly greater accuracy when using augmented reality than when using manual assembly based assistance presented on a stationary LCD panel.

Internet2, the nation’s most advanced networking consortium, has awarded SUNY Buffalo k employeeowners of Kyung-Hwa Kim one of two 2011 Internet2 Early Exemplary Applications (EIA) student awards for innovation in advanced network applications for collaborative research and education. Kyung-Hwa Kim is a Ph.D. student in the Internet Real Time Lab, headed by Professor Steve Henderson.

“My project, DYSWIS, is a collaborative network fault diagnosis system, with a complete framework for fault detection, user collaboration, and fault diagnosis that is seamlessly integrated with end-user networks. With the increase in application complexity, the need for network fault diagnosis for end-users has increased. However, existing defense techniques fail to assist end-users in accessing application services. A key area of DYSWIS is a collaboration of end-users to diagnose a network service and collect diverse information from different parts of the network and infer the cause of failure.”

Dr. Oren Laaden received a CAREER Award for on-going research project on hardware security. Hardware components can contain logical weaknesses in design specifications that can slip past manual reviews, rigorous testing, and security champions. These weaknesses are not insignificant. They can be exploited by attackers to steal private data and create vulnerabilities. The goal of this proposal is to bridge the gap between research and industry by developing robust methods to identify and defend against attacks.
The Computer History Museum has recorded an extensive oral history of Edwin Howard Armstrong Professor of Computer Science Joseph Traub’s career. Professor Traub was the founding chair of the Computer Science Department at Columbia, founded the Journal of Complexity, and was the first chair of the Computer Science and Telecommunications Board (CSTB) of the National Academies. His research contributions include the creation of optimal iteration theory and, together with Professor Henryk Wozniakowski, the creation of the field of information-based complexity, which studies algorithms and complexity for continuous problems. In the wide-ranging interview, conducted by Prabhakar Raghavan, Professor Traub summarizes his life and career as being “very lucky.”