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## New Kids on the Block

*The CSEE department welcomes three professors starting Fall 2012. Learn what makes them tick.*

### Environmentally Aware

*New CSEE assistant professor Nilanjan Banerjee works on building renewable energy-driven devices.*



Though technology has become an essential resource for many, it's using up more and more of another kind of resource: energy. Not only is energy production costly, but it's not infallible. For a generation that's come to rely on technology, what do we do when we're unexpectedly cut off? That's a question that new Computer Science and Electrical Engineering professor **Nilanjan Banerjee**, 30, is answering with renewable energy-driven devices that keep us connected, especially when we need it the most.

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### Visualize This

*New CSEE assistant professor Jian Chen creates visualizations to represent large data sets.*



Few things are more daunting than an excel spreadsheet full of data. Even scientists can react to massive data sets with blank stares. That's where the work of new CSEE assistant professor **Jian Chen** comes into play. As a designer of visualization and interaction techniques, Chen translates data into symbols that humans are good at interpreting.

"I have been working with biologists, physiologists, neurologists, cognitive scientists, and structural engineers to study cutting edge visualization science," says Chen.

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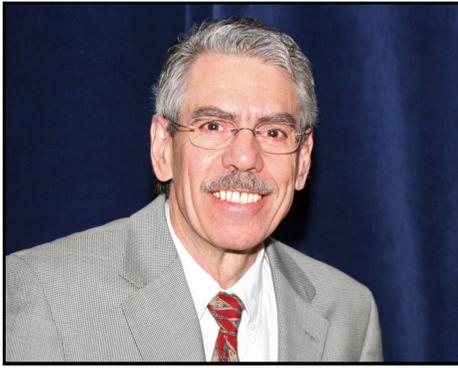
### Ultimately Academic

*New CSEE lecturer John Park shares a little bit about his research and teaching career, and what he loves most about being a professor.*

Even though this will be my first real term as a full-time lecturer at UMBC, I'm actually an old hand here. I have been teaching part-time at UMBC for 4 years, during which I've taken turns at teaching CMSC 104, 202, and 331, in various forms, including developing and teaching CMSC 202H, the new honors section of that course. I've had extensive industry experience in many subfields of Computer Science, including operating systems, real-time control systems, artificial intelligence/machine learning, digital imaging and graphics, and bioinformatics. I'm now eager to apply that experience to a much broader range of courses in the department, combining sound theory with practical considerations and applications. This coming fall, however, I'm easing into the new job by starting with CMSC 104 and 201.

[Read More...](#)





*Our research efforts continue to remain strong and our expenditures were approximately at the \$5 million level for last fiscal year. Our awards starting January 1, 2012 to date exceed \$5.5 million! CSEE Professor Dr. Alan Sherman (PI) and Dr. Rick Forno (Co-PI), Graduate Program Director, Cybersecurity have received an NSF grant of \$2.5 million over five years to fund 22 students studying Information Assurance (IA) and Cybersecurity. The scholarships are part of the Federal Cyber Scholarship for Service (SFS) program. UMBC CSEE Professor Penny Rheingans received an NSF research award, Transforming the Freshman Experience of Computing Majors, to develop and evaluate an innovative first-year seminar for computing majors aimed at increasing retention, completion, and success among students, especially women and those from underrepresented groups. Dr. Rheingans will serve as the principal investigator for this three year project, which will also include Drs. Marie desJardins (CSEE), Carolyn Seaman (IS), and Susan Martin (CWIT).*

*Both the Computer Engineering and Computer Science undergraduate programs were successful in their ABET accreditation.*

*Have a great Fall semester. Keep up to date by visiting [www.csee.umbc.edu](http://www.csee.umbc.edu)*

-Gary

## A Note from the Chair:

Welcome to the 2013 Academic Year. We have a lot to celebrate in our department. We welcome two new Assistant Professors: Nilanjan Banerjee and Jian Chen. Dr. Banerjee directs UMBC's new Mobile, Pervasive, and Sensor Systems Laboratory, which will carry out research that focuses on renewable energy driven devices. Dr. Chen specializes in visualization techniques that help scientists make better sense of their data. We will have a very busy recruiting season this year. We are searching for two lecturers in Computer Science and a third lecturer/Professor of Practice in Computer Science with expertise in CyberSecurity.

## A Fond Farewell

**The CSEE Department says goodbye to three Computer Science lecturers.**

**Dennis Frey** started lecturing for the CSEE Department in 1998. His course repertoire included introductory Computer Science courses (104, 201, 202), Data Structures, Computer Organization and Assembly Language Programming, Software Design and Development, and Principles of Operating Systems.



**Dawn Block** was a lecturer in the CSEE Department for more than a decade. Her course repertoire included introductory Computer Science courses (104 and 201). In addition to teaching, Professor Block oversaw the Computer Science Help Center.



**Ryan Bergeron** started lecturing for the CSEE Department in 2008. His course repertoire included introductory Computer Science courses (104, 201, 202) and Data Structures. In addition to teaching, Professor Bergeron served as the Technical Director for UMBC's Women's Volleyball team.



## Kudos

*Some noteworthy accomplishments of CSEE faculty and students.*

**Dr. Tulay Adali** delivered a keynote speech entitled "Data-Driven Analysis and Fusion of Medical Imaging Data" at the 2012 International Conference on Audio, Language and Image Processing that took place in Shanghai, China, July 16-18.

MSEE student, **Neha Sardesai** (Advisor— Prof. J Morris), won the 2nd Best Presentation Award for her oral presentation, "System Analysis Model for Trace Gas Detection System Using a Pulsed Laser and QEPAS, and Fractional Exhaled Breath Analysis" at the MIRTHE Summer Workshop held at UMBC, on August 5-10, 2012. There were 46 grad and postdoc presenters at the workshop.

**Karuna Joshi's** IBM Ph.D. Fellowship has been renewed for the academic year 2012-13. She interned with IBM, Emerging Technologies group this summer.

**Dr. Yelena Yesha, Dr. Anupam Joshi, and Karuna Joshi** (CS Ph.D.) were invited by NIST to present at the Vth Cloud Computing Forum and Workshop held at Department of Commerce, Washington DC in June.

**Dr. Chuck LaBerge** has been informed by his former employer, Honeywell International, Inc., that he was awarded three US patents in 2011. The patents include:

- 1) 7,937,054 MEMS based multiband receiver architecture (with one other Honeywell employee).
- 2) 7,945,229 Software-definable radio transceiver with MEMS filters.
- 3) 7,983,635 System and method for controlling intermodulation interference.

**Curt Tilmes** (CS Ph.D. '11) recently accepted a two year detail from NASA to the U.S. Global Research Program (USGCRP) to be the technical lead in the development of a new Global Information System (GCIS) to capture and present information about global change from throughout the federal government.

**Xianshu Zhu** (CS Ph.D.) won the best student paper award at the 13<sup>th</sup> IEEE International Conference on Information Reuse and Integration.

**Ahmad Abbas** (CE M.S.) won the DIY/Hacker prize at the Baltimore Hackathon in June.

**Yasaman Haghpanah** (CS Ph.D. '12) received a Dissertation Fellowship from UMBC's Graduate School this summer.

**Shamit Patel** (CS M.S. '12, B.S. '10) won a National Defense Science and Engineering Graduate Fellowship (NDSEG).

**Josiah Dykstra** (CS Ph.D.) and **Han Dong** (CS M.S.) won the CSEE Department's 2011-2012 awards for best research.

**CSEE Lecturer Susan Mitchell** earned her Ph.D. through UMBC's Department of Information Systems last April.

# One of a Kind

## ***A Computer Science alumna becomes the first African-American woman in history to get a Ph.D. in Computer Science from the University of Michigan.***

“Bittersweet.”

That’s how **Kyla McMullen** (CS, B.S. ’05) describes what it feels like to be the first African American woman at the University of Michigan to graduate with a Ph.D. in Computer Science.

“I don’t think there’s anything special about me,” says Kyla with a modest laugh. She explains that while it’s nice to be recognized as a “first,” her accomplishment points out a sad reality: not enough women and minorities are pursuing advanced degrees in Computer Science. Out of the more than 1,400 Americans who received Ph.D.’s in Computer Science from 2010-2011, less than a quarter were female, and a mere 1.2 % (or 16 people) were African American, according to the latest [Computing Research Association \(CRA\) Taulbee Survey](#). It’s a good thing staggering statistics like that didn’t deter Kyla.

Kyla’s passion for Computer Science started early and was nurtured throughout High School. “When I was little, I always liked gadgets,” she says. She remembers being fascinated by her family’s first computer because it seemed like magic. She admits to staying up all night, clicking through file folders, trying to figure out how it worked. Luckily for Kyla, her high school in her hometown of Oxen Hill Maryland had a special Computer Science track. This meant exposure to curriculum that



***Out of the more than 1,400 Americans who received Ph.D.’s in Computer Science from 2010-2011, less than a quarter were female, and a mere 1.2 % (or 16 people) were African American.***

Invested in one another’s success—an atmosphere that mirrored that of UMBC, she says. That, coupled with the school’s high reputation for Computer Science, made her decision to study there a no-brainer. “My time at UMBC prepared me very well for Michigan.”

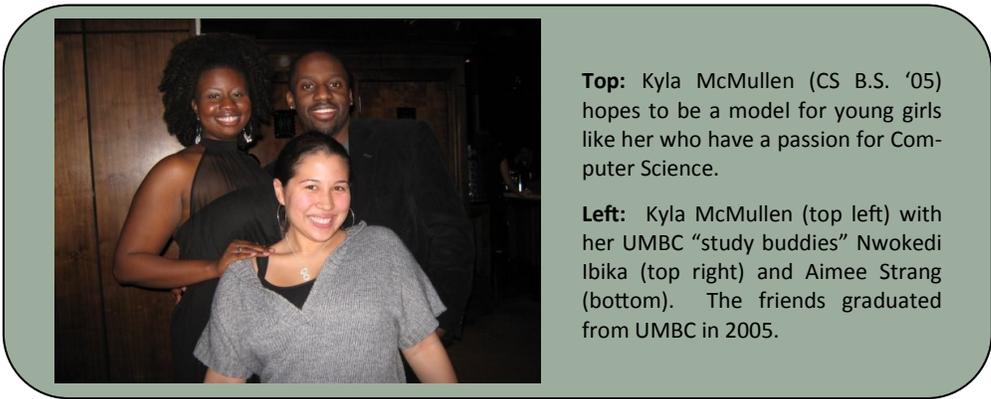
At Michigan, Kyla explored a little before finding her niche. Drawn to the human aspect of artificial intelligence, she joined the intelligence systems group. Then, in 2007, while pursuing her Master’s, she began working on educational software that taught kids how to make relationships to objects. One of her favorite parts, she admits, was getting to know the kids in the classroom before testing out the software.

After that, Kyla discovered Spatial Audio. Her research involved constructing simulated environments navigable by sound alone. “It’s like searching for a cell phone in the dark,” explains Kyla, who has worked with the Naval Submarine Medical Research Lab on her research. The concept, which can be applied to any domain with a spatial component, is especially being considered for workers in dangerous environments.

Another of Kyla’s passions while at Michigan was promoting the sciences within minorities. She was the Vice President of The Society of Minority Engineers and Scientists and part of the Movement of Underrepresented Sisters in Engineering and Science (MUSES). Though, she recognizes the benefit of the groups, she talks about their limited capacity to help. “You can only influence the people who make it in the doors, but not the people who aren’t in the doors yet.”

That’s why Kyla stresses the importance of relatable role models early on. In High School, hers was Computer Science teacher Mr. Randy Ware, a young and “normal” teacher who challenged the stereotype of what Computer Scientists are *supposed* to look like. It was at that point that she realized she didn’t have to look a certain way to study Computer Science. She could just be herself.

Kyla hopes she can help others comes to this realization, too. She’s happy to be an example for young girls like her. Even now—with a Ph.D. under her belt, pursuing a job where she can continue to do her research (whether that ends up being in academia, the industry, or a research lab)—Kyla hopes to be a resource for girls like her. Girls who just need to talk to someone that looks like them. You can reach Kyla at: [kyla.mcmullen@gmail.com](mailto:kyla.mcmullen@gmail.com).



**Top:** Kyla McMullen (CS B.S. ’05) hopes to be a model for young girls like her who have a passion for Computer Science.

**Left:** Kyla McMullen (top left) with her UMBC “study buddies” Nwokedi Ibika (top right) and Aimee Strang (bottom). The friends graduated from UMBC in 2005.

most high schools lack, and the opportunity to take courses in Computer Programming and Engineering early on.

It paid off. One day, Kyla was sitting in Calculus class when the guidance counselor called her to his office. She thought she was in trouble, but he actually wanted to recommend that she apply for UMBC’s Meyerhoff Scholarship program.

“It was an excellent opportunity,” says Kyla of the program. Though tough, Kyla credits the program’s sense of community and her mentors as crucial ingredients of her success. She remembers her time at UMBC fondly; especial-

ly the hours spent burning the midnight oil with her two study buddies, Aimee Strang and Nwokedi Ibika (who is now, coincidentally, the first African American to get a Ph.D. in Computer Science from Perdue University).

As graduation neared, Kyla knew that she was bound for graduate school. She also knew that Michigan was the last place she wanted to live. But, at the insistence of Keith Harmon, the Assistant Director of the Meyerhoff Scholars Program, she reluctantly made the trip to tour the University of Michigan, where she promptly fell in love.

Here, the graduate students were happy and

# Fashion Forward

**Chic Engine, a website and iPhone app created by Computer Science Ph.D. student Adrian Rosebrock helps you find clothes you see on friends, strangers, or online. Just snap a photo, and let Chic Engine do the rest.**

**CSEE: Tell us about your “ah-ha” moment with Chic Engine. What inspired you to start it?**

Adrian: It is really interesting how common, everyday conversation illuminates problems that many of us encounter in day-to-day life. I always try to pay attention to these types of problems because if you can provide a solution to them, your product could be adopted by a widespread community of users.

The inspiration for Chic Engine came from these types of everyday conversations. I always see people turn to their friends and say “I love your dress, where did you get it?” Normally, their friend can provide an answer. However, what happens if this person is not your friend and is instead a stranger walking down the street? What if you aren’t looking at a person, but instead a magazine ad or a poster of the latest GQ outside the subway? How do you find your answer?

Chic Engine, in short, is an answer to the question “Where did you get that dress?” or “Where can I find more dresses such as this one?” Given a picture, Chic Engine analyzes it, extracts the piece of clothing from it, and then returns similar results.

**CSEE: What does Chic Engine do?**

Adrian: Chic Engine is a visual fashion search engine. You can either upload a picture to the website or use the iPhone app to take a picture of a piece of clothing that you are interested in. Chic Engine automatically analyzes the image and then returns results with similar clothing items.

The most important facet of Chic Engine is that it does not use “keywords” as you do with other search engines such as Google or Bing. We are no longer describing clothing in terms of words, we are describing them in terms of images. All you need is an example image of clothing that you are interested in—Chic Engine will do the rest.

**CSEE: Can you explain how the website works in a technical sense?**

The first thing Chic Engine needs is a query image that contains clothing that you are interested in. Once you give it that image (either by uploading it or using the iPhone app), it first extracts the clothing from the image. This process is called background subtraction. We only want to describe the clothing contained in the image, not the surrounding area.

After the clothing is extracted, it is described. In essence, the “description” is just a list of numbers used to represent the clothing in the image.



However, these lists of numbers can be quite large, making the search process slow. We want to make our search process as fast as possible to satisfy our users so we must then apply some dimensionality reduction techniques to make the list of numbers more compact.

Lastly, using the compacted list of numbers, we can search against our database of images and find the most similar items.

**CSEE: Which online stores does Chic Engine search within?**

Adrian: Chic Engine searches many different stores. A sample of the stores include Armani, Neiman Marcus, Banana Republic, Alexander Wang, and Piperlime, to name a few. Almost all major stores are included.

**CSEE: Would you consider yourself a fashion junkie? Where do you like to shop?**

I am not going to lie. It is pretty rare that I miss an episode of *Project Runway*, so I guess that does make me a fashion junkie. I enjoy fashion, I enjoy shopping, I enjoy the entire process. Similar to architecture, fashion can be considered art, both of which intrigue me.

As for where I shop, my two go-to places as of late have been Armani and Express. But, at the same time, you can find some real gems in a thrift store while paying next to nothing.

**CSEE: Have you ever used Chic Engine to find new clothes?**

Of course. I am a big believer in using your own product. Someone who builds a product and does not use it themselves likely does not understand the intimate details of the problem they are solving.

Furthermore, if you never use your product you cannot find its shortcomings and find ways to improve it. So yes, I use Chic Engine all the time.

**CSEE: How is the iPhone application different from the website?**

The iPhone app is essentially a mobile version of the website. In fact, I think the app is better than the website. Having the ability to snap a picture of a piece of clothing, whether it is someone walking past you on the street or in a retail store, and then immediately have similar search results is huge.

Using the iPhone app also relieves some of the user education related problems of the website. The average website user might not understand how to upload an image from their computer or copy and paste the URL of an image they like. The app solves all these problems because all they need to know how to do is take a photo. After the photo is taken, the app can handle the upload and return similar results.

The iPhone app has been downloaded 400+ times at this point\*, showing that people are interested in the product. I would also like to make a version for Android users. There is no reason why they should be left out.

**CSEE: Do you have any upcoming plans for the website and app? What would your ideal product do?**

We recently pushed an update online that allows user to create accounts and save their searches. With search engines such as Google and Bing, it is simple enough to reenter our search query whenever we want to see the results again, but when you are dealing with images, it is more tedious. This functionality is not included in the app, so we plan to update it so users can save their mobile searches for viewing at a later date. The next version of the app will also continue to improve on user-friendliness.

The ideal app would include as many stores as possible and it would learn from what the user uploads. It would be able to model the taste of the user, and then based on the model, it would return even more relevant search results.

At this point, Chic Engine has been online four months\*. It has come a long way since it was first published online, but there are still a lot of challenging problems to overcome. Overall, I think it shows great promise and I love working on it.

\*Adrian was interviewed in July 2012.

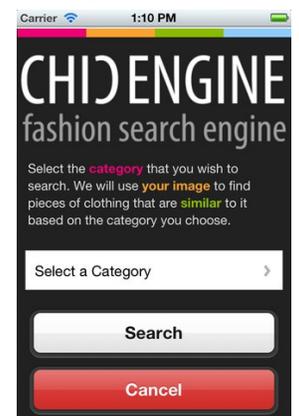
## How It Works



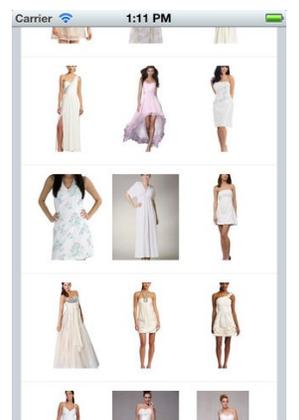
### Step One: Take a picture



### Step Two: Search



### Step Three: Shop!



Photos: Chic Engine

# Filling the Black Hole

**On August 8, Computer Education for the 21<sup>st</sup> Century's Computer Science Education Mini-Summit revealed the problem with high school Computer Science curricula, and, more importantly, what's being done to fix it.**

Photos: Shelby Clarke

"High School is a black hole for most students with respect to Computer Science," says Jan Cuny, the National Science Foundation's (NSF) Program Director for Computing Education. In August, Cuny spoke about the scarcity of Computer Science in High Schools and what's being done to encourage students—especially women and minorities—to pursue the field.

This was music to the ears of the roughly fifty high school and middle school teachers, university professors, and administrators that attended Computer Education for the 21<sup>st</sup> Century (CE21)'s **Computer Science Education Mini-Summit** at UMBC. The brainchild of CSEE professors **Marie desJardins**, **Penny Rheingans**, and CWIT's Associate Director, **Susan Martin**, the day-long summit was a way for Computer Science teachers to network, share best teaching practices, and get involved in fixing a problem close to their hearts.

Probably more telling than any facts or figures on the subject was the testimony of four high school and middle school Computer Science teachers, which told how widely the high school Computer Science experience varies across our state. Dianne O'Grady-Cunniff, who teaches classes like Web Design, Keyboarding, and Introduction to Engineering Design, says that the success of her Computer Science program at Westlake High School is largely due to her school administration's outpouring of support.



The four panelists came from middle and high schools around the state. From left to right, they included Peter O'Connor (Boonsboro High), Dianne O'Grady-Cunniff (Westlake High School), Femi Ajimatan-rareje (DuVal High School) and Nancy Ale (Earle B Wood Middle School).

But, support and resources must go hand in hand for success. Femi Ajimatanrareje of Prince Georges County's DuVal High School knows this first-hand. While the administration supports his vision, resources have been hard to come by. In order to teach courses like Introduction to Engineering Design and Foundation to Technology, Ajimatanrareje had to pick up a class supply of computers and then network them himself.

Then there are schools that have the resources but lack support. Nancy Ale, who teaches courses like Software Applications, Information Communication Technology, Robotics, and Internet Safety to Sixth graders, is facing resistance from an administration



Jan Cuny, the program director of NSF's new Computing Education for the 21st Century program, spoke to attendees of the mini-summit about the declining enrollment of students in Computer Science courses, and the new CS Principles AP course that has been proposed to help reverse this trend.

that wants her to backpedal by teaching Keyboarding instead.

Most troubling are Computer Science programs that are desperate for both resources and support. Peter O'Connor, who teaches Intro to Computer Science and AP Computer Science at Boonsboro High School in Western Maryland, has to teach Computer Science in the school's Chemistry lab. Not only are resources stretched, but O'Connor attributes a lack of understanding of the discipline on the part of guidance counselors, the administration, parents, and even students, to low enrollment. That coupled with the courses' distinctions as electives, means that few students are willing to take his courses when familiar offerings like Art or Tech Ed would suffice. Out of the few students who do pursue Computer Science are even fewer women. In a course of 20 students, says O'Connor, he might only have two girls.

One thing that the four teachers did have in common was the conviction that demystifying Computer Science to the masses is the first step in reversing the trend in waning enrollment levels. People hear Computer Science and think Microsoft Power Point or word processing. Or, if programming does come to mind, the concept is, at best, ambiguous, or, at worst, terrifying.

Also crucial is the regulation of the subject at the state level. In her keynote speech, Jan Cuny shared staggering stats that reinforced the teachers' testimony: Twenty years ago 25% of high schoolers took Computer Science, and now the figure is down to 19%. A mere 1% of students enter college claiming a Computer Science major. Out of that 1%, 0.3% are women.

So what's the solution? A good first step is Computer Science: Principles, a future Advanced Placement (AP) Computer Science course being developed by the Collegeboard and NSF to help broaden participation in the field. As of now, there are more than 25 pilot sites in Berkeley, CA, Los Angeles, and Chicago that offer the class, but the goal is much broader. The CS 10K project strives to reach 10,000

# Oh, the Places They'll Go

*What some recent graduates are up to now*

## B.S.

**Jasmine Jones (CS B.S. '12)** is working toward her Ph.D. in Human-Centered computing at the University of Michigan.

**Amy Ciavolino (CS B.S. '12)** is working at the New-York based e-commerce arts and crafts website, Etsy.

## M.S.

**Pramod Jagtap (CS M.S. '11), Mohit Kewalramani (CS M.S. '11), Akshaya Iyengar (CS M.S. '11), and Pradeep Chinnam (CS M.S. '11)** are working at Amazon.com.

**Ahmad Abbas (CE M.S. '12)** has been accepted into UMBC's Computer Engineering Ph.D. program.

**David Riley (CS M.S., '12)** is working for Manatro in Philadelphia.

**Jerome Lourdu Vikram Stanislaus (CE M.S. '12)** is working for Qualcomm in Colorado.

## Ph.D.

**Justin Martineau (CS Ph.D. '11)** is working as a researcher at Samsung.

**Wenjia Li (CS Ph.D. '11)** is working as an assistant professor at Georgia Southern University.

**Curt Tilmes (CS Ph.D. '11)** is working as a Computer Scientist at NASA Goddard Space Flight Center.

**Niels Kasch (CS Ph.D. '12)** is working as a Senior Data Scientist at Greenplum (a division of EMC).

**Palani Kodeswaran (CS Ph.D. '11)** is working as a researcher at IBM Research, Bangalore.

**Patti Ordonez Roza (CS Ph.D. '12)** worked for UMBC Training Centers in Columbia, MD developing curriculum for their online courses in C and Security. In August, she started as an Assistant Professor in Computer Science at the University of Puerto Rico Rio Piedras.

**Jaewook Kim (CS Ph.D. '11)** is working as a Senior Application Engineer at Oracle.

**Fuesane Cheng (CS Ph.D. '11)** is working as an IT Sr. Director, Architecture at Travelers Insurances.

**Fatih Senel (CS Ph.D. '12)** will be joining Antalya International University, Turkey as an Assistant Professor.

teachers, and 10,000 schools by the fall of 2016. NSF has backed the program with \$38 million in funds.

The proposed course will introduce high schoolers to programming and teach them the fundamental concepts of computing, how this knowledge can be applied, and how computing has the potential to change the world. As an AP course, it will act as a bridge to the study of Computer Science in college. The hope is that the course may help fill the widening Computer Science "black hole" and help foster future analytic minds capable of creating the technologies of tomorrow.

## From **Environmentally Aware** *It's kind of like Google Maps, except it could save your life.*

Consider the following: a natural disaster strikes and you need to find a path to safety. Cell phone towers are down and there's no wireless internet signal for miles. That's where Dr. Banerjee's self-sustainable solar-powered emergency mesh comes in. It's kind of like Google Maps, except it could save your life.

Made up of ultra-low power solar nodes that can be charged with solar panels, the mesh's goal is to provide natural disaster survivors with a risk-free path to an emergency shelter. Risk-free means that you'll be guided around burning buildings, car accidents, and other hazards, even if it means taking a bit of a detour. Just pull out your iPhone, or android, or other smartphone, and connect to the mesh when all other wireless networks are down. A digital map will appear and lead you to safety.

The medical and military worlds are two other areas where lives literally count on dependable technology. Here, Banerjee has tied his interest in renewable-energy driven devices to things like EKG data collection and communication between military busses and tanks.

Green homes are another area of interest for Banerjee, who has been installing monitoring systems in both on and off-grid homes to try and gauge energy consumption. The way it works is they collect instantaneous residual battery voltage and the energy consumed by the house. "Our goal is to make it easier for off-grid and grid-tied home residents to make smart choices about managing energy," explains the project website. In fact, he's got a smartphone application in the works that would use this information to tell homeowners when they should use highly consumptive devices like a clothes dryer, and that could send warnings about critical battery situations in the home.

Banerjee discovered renewable energy-driven devices as a Computer Science Ph.D. student at the University of Massachusetts Amherst. He was drawn to the challenge of making these highly efficient devices, and in light of growing global environmental concerns, he thought the field was especially relevant.

After graduate school, Banerjee took a position as an Assistant Professor in the Computer Science and Computer Engi-

neering Department at the University of Arkansas. He started a lab, Mobile, Pervasive, and Sensor Systems Laboratory, which focused on three key areas: renewable energy driven systems, healthcare systems, and mobile phone based systems. As a professor, his course repertoire included subjects like programming paradigms, mobile and pervasive computing, and mobile phone application development.

During his inaugural Fall semester at UMBC, Banerjee will teach Principles of Operating Systems. He describes his teaching method as "hands on." Students in his class will see lots of demonstrations, and have the chance to learn how to build real systems. Because, while the research is important to him, so is the teaching. After all, it was UMBC's mix of strength in both research and undergraduate teaching, explains Banerjee, that drew him to the university in the first place.

## From **Visualize This** *"I have been working with biologists, physiologists, neurologists, cognitive scientists, and structural engineers to study cutting edge visualization science."*

Take her work with bats. Chen has been helping biologists analyze bat flight kinematics among species. She looks at how their wings morph during flight, and expresses the information with colorful representations that are easier to grasp than numbers.

Chen's most recent research grant supports a project that works on expressing massive biology datasets in a simple way. The method is called "PathBubbles." This interactive pathway visualization tool displays gene products as dots, and the connections between those genes as lines. The color of those dots varies depending on importance, and different colored lines can suggest things like binding between gene products or the sharing of a small molecule.

When a user clicks on a particular dot, it opens up a database of information about each gene product and each interaction. Scientists can even add dots and lines to the database, as well as information about how the new genes should interact with genes already present in the database. With this

new information, the system will be able to predict the effect of the newly-introduced gene product on the biological pathways.

Though PathBubbles is being developed to represent data from gene studies, its ability to graphically test different hypotheses has the potential to be applied to other fields like Chemistry, Engineering, Physics, and Computer Science.

For Chen, who says she was born to be a designer, creating visualizations is about allowing us to understand more, better, and faster. "It may lead to significantly better approaches to human knowledge discovery and decision making in many disciplines where visualizations have found successful application, including Neuroscience, Biomedicine, Bioinformatics, Biology, Chemistry, Geosciences, Business, Economics, and Education."

Chen fell in love with visualizations as a Master's student at Tsinghua University and Tianjin University in China, where she was working towards a Mechanical Engineering degree.

After that, Chen got her Master's in Computer Science from the University of Houston, followed by her Ph.D. from Virginia Polytechnic Institute and State University. Her first experience with visualizations was as a research associate at Brown University, where she spent three years. Her time in academia convinced Chen that it was where she wanted to stay.

So, despite offers from labs, she took a teaching job at the University of Southern Mississippi. During her three years as an assistant professor, Chen taught both undergraduate and graduate courses like Software Engineering, C Programming, Game Design, 3D Interaction, and Visualization. She started a lab, the Interactive Visual Computing Lab (IVCL), which she hopes to one day bring to UMBC.

"It is an honor for me to join UMBC," says Chen, who will be teaching Data Structures this fall. Her advice for students who take her class in the fall is to use the knowledge you learn in the classroom to solve real-world problems—not surprising, considering this is what Chen's research is all about.

## From **Ultimately Academic** *"I want to leverage my years of practical experience in building software systems to help mold the next generation of computer scientists and software engineers."*

A thumbnail autobiography: I received an A.B. in Biochemistry from Harvard University, with every intention of going on to medical school. However, I got completely sidetracked by an accidental introduction to computers late in college--back in the early days when most computers still had dozens of toggle switches on the front panel. Medical school was postponed.

Since then, I've been on an extended professional and academic arc, which has included working at a variety of software and hardware companies, universities, research firms, and startups, including my own. Along the way, I helped develop a fault-tolerant parallel computer, a next-generation MRI scanner, one of

the earliest autonomous land vehicles, and drugs that may one day help you breathe easier. I was also a PhD candidate in the Biomedical Informatics program at Stanford Medical School, but left ABD ("all but dissertation") to start up a bioinformatics company with some colleagues.

Most recently, I've been doing research at UM College Park, but that project was coming to an end, and I was ready to try something different. I decided to teach, for three reasons: First, in my part-time teaching here, I found that I was becoming quite attached to the fate of my students, despite my very limited involvement in the program. Now, I'd like to do it more seri-

ously: get more involved with the students, the department, and the university. Second, I want to leverage my years of practical experience in building software systems to help mold the next generation of computer scientists and software engineers. Third, and most important, I'm annoyed that my cellphone, my TV, and even my blender, keep crashing. Although I could hack it myself, I'm too lazy to. So, I want to train more good programmers, so that my stuff will just work, and I won't have to.

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