CSEE Faculty Direct UMBC Center for Cybersecurity

UMBC has always been ahead of the game when it comes to the burgeoning field of Cybersecurity. In terms of academics, research, and entrepreneurship, there are projects going on across campus. Now, there is a place to house all of UMBC's Cybersecurity efforts. It's called the **UMBC Center for Cybersecurity.**

Announced in October 2012, the UMBC Center for Cybersecurity is a virtual center directed by CSEE professor **Dr. Anupam Joshi** and co-directed by **Dr. Richard Forno**, Graduate Program Director, Cybersecurity. The pair will use their backgrounds in the field to facilitate Cybersecurity collaborations both on and off campus, and to expand the university's research and educational endeavors.

There is already a solid base to start with. In terms of academics, UMBC has a series of graduate programs—both on

UMBC's main campus and through the UMBC Training Centers—that cater to professionals interested in Cybersecurity strategy, policy, and management. Undergraduates with similar aspirations can concentrate in an Information Assurance track.

The Center for Information Security and Assurance (CISA) and the Cyber Defense Lab (CDL)—run by CSEE professor **Alan Sherman**—are the university's primary Cybersecurity research centers. Plus, faculty across disciplines like math, science, and computing, and more are carrying out their own research in the field.

Dr. Sherman also coordinates two of UMBC's scholarship programs: The Federal Cyber Scholarship for Service (SFS) Program and the Information Assurance Scholarship Program. Then there's the UMBC Cyber Scholars Program that will kick-off in fall 2013 and is supported by a grant from Northrop Grumman.

At bwtech@UMBC, the Cyber Incubator and its CYNC Program offers Cybersecurity-related start-ups a place to grow. Its proximity to UMBC offers students convenient and invaluable internship opportunities.

The creation of the UMBC Center for Cybersecurity is one more step towards making the university a leader in research and academics in the quickly growing field of Cybersecurity. In this way, UMBC can contribute to future cyber defenders who will protect our privacy and security in this increasingly digital age. [LEARN MORE]

"Securing Cyberspace is of critical national importance, as it touches almost all parts of our modern life and economy. Maryland is at the center of the Nation's efforts in this area. At UMBC, we have been supportive of this mission in a variety of ways: from educating the next generation of cyber professionals by creating special scholarship programs, to introducing the basics of security in our curriculum, to doing cutting-edge, interdisciplinary research to deal with evolving threats, to helping re-train veterans in this area where they can find new jobs. We do this work in partnership with federal agencies such as the DoD, NSA, and NIST, as well as companies such as Northrop Grumman, Lockheed Martin, Microsoft, and IBM."

—Dr. Anupam Joshi
Director, UMBC Center for Cybersecurity
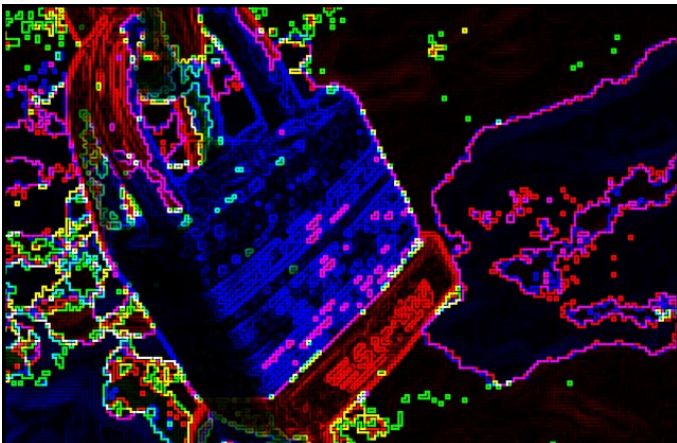
Dr. desJardins and team win Hrabowski Innovation grant for ACTIVE

It was a case of lab envy that inspired professor **Marie desJardins** to dream up ACTIVE, the new dynamic laptop lab that will sprout up in the Engineering/Computer Science building next fall.

The culprit? CASTLE, the Active Science Teaching and Learning Environment created by the College of Natural and Mathematical Sciences in 2010 (pictured below). While teaching in the space for one of her courses, she looked at the low-profile computer screens, wall-mounted monitors, and circular workstations and thought: "Why don't we have one of these?"

When the **Hrabowki Fund for Innovation** was announced, Dr. desJardins and a team of CSEE professors including **Penny Rheingans, Tim Finin,** and **Charles LaBerge** submitted a proposal to make a similar lab space a reality. This February, the team was awarded a Hrabowski Innovation Implementation and Research Grant to create ACTIVE (Active Computing Teaching and InnoVation Environment), a new classroom that will make group work and active learning a priority.

This semester, the future site will be transformed from an abandoned classroom to a "dynamic laptop laboratory". desJardins and co. envision a room with movable furniture and easily-accessible floor power outlets. The idea is to create an open space that will make it easy for students to collaborate and for teachers to interact with students.

Note from the Chair:

This semester we have a departure and arrival to announce. Professor Yung-Jui (Ray) Chen has retired. Ray has been with UMBC for twenty-four years. He taught courses in electronics and circuit theory and initiated research in compound semiconductors here at UMBC. He served as Program Director for the Electrical Engineering program in its early days. We hope to see him often and wish him well.

On the arrival side, Dr. Pedram Sadeghian has joined our department as a computer science lecturer. Pedram comes to us from Howard Community College (HCC), where he spent more than five years as an Assistant Professor and Coordinator of Computer Science and Information Systems. Welcome aboard Pedram!

In October, Professor Anupam Joshi was named director of the new UMBC Center for Cybersecurity. Dr. Joshi and co-director Dr. Richard Forno, Graduate Program Director, Cybersecurity, will work together to advance UMBC's position as a leading research university in the field of Cybersecurity.

The CSEE department continues to do well in its mission. Last Academic Year we recorded approximately $5 million in research expenditures in spite of the very difficult funding environment. We have reached a milestone of producing 238 PhD's since 1986.

On the teaching forefront, the Hrabowski Fund for Innovation has awarded an Implementation and Research Grant to a team led by professor Marie desJardins for "Active Computing Teaching and InnoVation Environment" (ACTIVE). ACTIVE will be a dynamic "laptop laboratory" that will support innovation in computing courses–with a particular focus on improving the retention and success of women, underrepresented minorities, and transfer students. The laboratory will extend active-learning environments, such as CASTLE and the new English writing labs, to a new area of the university.

Looking towards the future, we anticipate searching for a new tenure-track Assistant Professor in Computer Science. Have a great Spring semester. Keep up to date by visiting www.csee.umbc.edu.

Go Ravens

Dr. Gary Carter
Chair, Computer Science and Electrical Engineering

This physical re-design is being supported by a grant from BAE Systems and the Northrop Grumman Foundation.

Instead of filling the space with bulky, expensive desktop computers that will be outdated in a few years, the lab will network students' personal laptops using special software. It will allow for screen and application sharing between computers, an instant messaging tool between teachers and students, the ability to edit and create documents collaboratively, and more. desJardins explains it as a virtual infrastructure laid over the physical space.

"The key innovation is that courses that have traditionally been taught in a primarily lecture-based format will be able to take advantage of the physical space and software support to incorporate group activities, collaborative online problem solving and programming, real-time quizzes, and interactive laboratories that are interspersed with mini-lectures," says Dr. desJardins. These teaching techniques will ultimately help students learn better.

A section of Dr. desJardins' **CMSC 101: Introduction to Computing** is one of four pilot courses that will be taught in ACTIVE come fall 2013. Others include Dr. Rheingans' **CMSC 346: Data Visualization**, Dr. Finin's **CMSC 331: Programming Languages,** and Dr. LaBerge's **CMPE 450: Computer Engineering Capstone.** [READ ON]

Meet Dr. Sadeghian

*Dr. **Pedram Sadeghian,** our new Lecturer of Computer Science, is passionate about computer science education.*

New Computer Science Lecturer, **Pedram Sadeghian**, always knew that teaching was for him. It was figuring out what to teach that was the challenge.

Dr. Sadhegian studied Psychology as an undergraduate. It wasn't until after college, when—out of curiosity—he took a class in C programming, that he fell in love with the subject. "I liked the whole concept of problem solving and algorithm development," says Dr. Sadeghian. "It is a fun challenge to get a program to run and produce the correct output."

He got his Master's in Computer Science and his Ph.D. in Computer Science and Engineering from the University of Louisville. After graduating in 2006, Dr. Sadhegian dove right into a career in teaching.

"It never gets boring," he says. As a teacher, he is always learning something new. Dr. Sadeghian taught briefly in Kentucky until a position at Howard Community College (HCC) lured him to Maryland in 2007. For six years, he coordinated and taught classes in HCC's Computer Science and Information Systems program.

The biggest difference between HCC and UMBC?

"Parking," he laughs. But, also class size. This semester, Dr. Sadeghian has a whopping 190 students—even a few former HCC students—in his two classes. He is teaching **CMSC 104: Problem Solving and Computer Programming**, a non-major course that explores fundamental problem solving and algorithm development, and **CMSC 201: Computer Science I**, an introductory computer programming class for majors. For most students, these classes are their very first encounter with Computer Science.

For Dr. Sadeghian, that's what makes them his favorite classes to teach. He enjoys the responsibility of opening young minds to the field, and ultimately, future careers, in Computer Science. To do that, Dr. Sadeghian knows that he must engage his students.

"I really like to make the class session interactive and dynamic," he says. Dr. Sadeghian demonstrates programming concepts on the computer, rather than stuffing them into slides. He gives live demos, knowing that even when mistakes happen, students are engaged and learning better.

> *"I really like to make the class session interactive and dynamic."*

His goal is to be the best teacher that he can be.

"The qualities of a good teacher are that they are interested in the subject, are prepared for their lecture, explain concepts clearly, give meaningful examples and assignments, and are ready to address questions both in the classroom and during office hours," he says. "I try to demonstrate these qualities in my courses." □

CSEE welcomes Don Engel as Affiliate Assistant Prof

The CSEE department welcomes **Dr. Don Engel** as an Affiliate Assistant Professor. Dr. Engel currently works as UMBC's Assistant Vice President for Research, where he manages prospective internal and external research partnerships.

"I believe this [new appointment] will make me better at my core duties by putting me in the same situations that UMBC students, staff, and faculty face every day," he says. He is eager to draw on his background in Computer Science and Physics through research and teaching.

"Perhaps most importantly, I like the people in the department and am glad to be a member of the departmental community in a formal way."

Currently, Dr. Engel is working with CSEE professor Dr. Tim Finin and Dr. Anupam Joshi on research with NIST, while also exploring research opportunities in Big Data and Bioinformatics. He hopes to eventually teach classes that are at the intersection of computer science with physics, the life sciences, linguistics, and politics.

Dr. Engel has had a passion for Computer Science since elementary school, when he taught himself BASIC. He has written a handful of applications including when2meet.com, a scheduling tool that coordinates busy schedules that was inspired by his stint in student government, and ShowMe3D, an iPhone application that takes and displays 3D photos. "I code to solve problems I've run into firsthand and because it's fun to learn new things and apply them," he says. □

KUDOS

Last December, Professor **Samuel J. Lomonaco** gave an invited talk at the Math/Physics Colloquium at Princeton University. His talk, entitled "Quantum Knots" showed how to reconstruct knot theory in a way that is intimately related to quantum physics. □

Computer Science Ph.D. student **Omar Shehab** attended the 16th Workshop of Quantum Information Processing, 2013 in Beijing China. His trip was one of twenty-three young researchers funded by the National Science Foundation. This March, Shehab will present at the American Physical Society March Meeting 2013. His talk is entitled "Adiabatic quantum computational properties of Hopf link." □

The UMBC chess team—advised by professor **Alan Sherman**—placed 2nd in the 2012 Pan-American Intercollegiate Team Chess Championship last December. UMBC finished with 5 points, only one point behind the Univ. of Texas at Dallas. UMBC has won or tied for first place a record nine times at the Pan-Am. [MORE]

In November, Professor **Tim Oates** was named an Oros Family Professor in Computer Science and Technology. This five-year endowed professorship will fund Dr. Oates' newly proposed research project in the area of mobile healthcare. [MORE]

Professor **Marie desJardins** is the co-chair for the 27th AAAI Conference on Artificial Intelligence (AAAI-13), which will be held July 2013 in Bellevue Washington.

She is also involved in SIGCSE, the 44th ACM Technical Symposium on Computer Science Education. She will host a "birds of a feather" (bof) session on mentoring undergraduate researchers, co-organized by CSEE alumni **Adam Anthony [UMBC CS Ph.D. '09]**, who is currently an Assistant Professor of Computer Science at Baldwin-Wallace University in Ohio.

Professor desJardins will also be giving three presentations during SIGCSE. The first, a joint presentation with professor **Penny Rheingans,** is an NSF Showcase poster presentation on UMBC's new COMP 101 course, a freshman design-oriented course for computing majors. Next is a presentation of a paper entitled "Computation, Complexity, and Emergence: An Interdisciplinary Honors Seminar", describing her honors seminar: **CMSC 491/HONR 300** on complex systems and emergent behavior. Last is a presentation of a paper entitled "CE21-Maryland: The State of Computer Science Education in Maryland High Schools," that describes the NSF-funded CE21 (Computing Education for the 21st Century) effort to build community and improve the state of CS education in Maryland. □

Professor **Tulay Adali** has been busy giving keynote speeches around the world. In September 2012, she discussed "Joint Blind Source Separation: Applications in Medical Image Analysis" at the 11th Symposium on Neural Network Applications (NEUREL 2012) in Belgrade, Serbia. In July 2012, she discussed "Data-driven Analysis and Fusion of Medical Imaging Data" at the 2012 International Conference on Audio, Language and Image Processing in Shanghai, China. She has been continuing to travel as an IEEE Distinguished Lecturer and giving talks at universities and professional organizations around the globe. She speaks about blind source separation, complex-valued signal processing, and medical image analysis and fusion. □

In December, Professor **Hillol Kargupta** received the 10-year Highest- Impact Paper Award during the IEEE International Data Mining Conference. His winning paper— "On the Privacy Preserving Properties of Random Data Perturbation Techniques"— discusses privacy-preserving data mining and is co-authored by CS Ph.D. Alumni **Souptik Datta**. [MORE]

Got News?

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Cyber Scholars Program to Debut Fall 2013

UMBC has scholarships for aspiring actors and artists (Linehan), writers and thinkers (Humanities), women leaders in technology (CWIT), mathematicians and engineers (Meyerhoff), teachers (Sherman), and politicians (Sondheim). Now there's a scholarship for future cybersecurity professionals who will defend our privacy and security in this rapidly digitizing age.

The **UMBC Cyber Scholars Program** is a brand new scholarship program directed by the new **UMBC Center for Cybersecurty** and run by UMBC's **Center for Women in Technology (CWIT).** The program was born out of a $1 million grant from the Northrop Grumman Foundation.

Next fall, the program will support its first batch of 15-20 scholars selected from a pool of new freshmen, transfer students, and current students interested in cybersecurity careers. The program puts special emphasis on women and under-represented minorities.

Like UMBC's other scholarship programs, the UMBC Cyber Scholars Program offers more than scholarship money. Cyber Scholars will be incorporated into a scholarship community based out of a special on-campus Living Learning floor. They will learn from and support one another throughout their college careers, and from core interaction with UMBC faculty and mentors.

"We know from our experience in CWIT that early exposure to cybersecurity challenges and mentoring by faculty helps students develop a deep interest in the field, increases their motivation to persist and improves retention," said **Penny Rheingans**, director of CWIT, in a UMBC press release. "Connections to a supportive peer group and strong mentors are particularly important for students from underrepresented groups who may otherwise lack a sense of belonging in the discipline."

Each Cyber Scholar will be assigned a faculty advisor pursuing cybersecurity-related research of their own. They will have the chance to carry out original research in their field, taking advantage of existing Cybersecurity facilities like the **Center for Information Security and Assurance** and the **Cyber Defense Lab.** In their Junior or Senior

years, scholars will intern at a local company or government organization, like those housed in UMBC's **Cyber Incubator@bwtech.**

"Cybersecurity is of critical national importance, since computer systems are part of the nation's critical infrastructure," said **Anupam Joshi**, director of the UMBC Center for Cybersecurity. "But students often don't understand the field and women are particularly likely to see it as a bad fit for them. The scholars program gives us a chance to change that perception and show how rewarding and socially important this work can be." □

The UMBC Cyber Scholars Program is accepting applications until **February 14, 2013.** *[CLICK TO APPLY]*

The Center for Women in Technology (CWIT) welcomes **Cindy Greenwood** *as its newest Assistant Director. Ms.*

Greenwood will spearhead the new Cyber Scholars Program.

Ms. Greenwood comes to CWIT from UMBC's Office of Institutional Advancement, where she was working as the Alumni Programming Coordinator.

She has over ten years of experience in higher education. She says it's the chance to work with students and make a difference in their lives that drew her to the field. [MORE]

Cybersecurity Grad Program Introduces Innovative Course

By Rick Forno
Graduate Program Director
Cybersecurity

Now entering its third year, the UMBC Graduate Cybersecurity Program is exploring ways of incorporating professional training opportunities into its Masters in Professional Studies (MPS) curriculum to provide additional "value added" to our students. For Spring 2013, the program, via a Special Topics elective, is offering **"Applied Networks Security"** based on the recognized Certified Ethical Hacker (CEH) industry certification. The course is a cooperative and innovative effort between the UMBC Graduate Cybersecurity Program and UMBC Training Centers.

Certainty, it is tempting to simply "teach to the test" when developing courses linked to such in-demand certification examinations—many of which are required to work in the cybersecurity profession. However, we do not believe that approach is appropriate at the graduate level. Therefore, although the framework of **"Applied Network Security"** is based upon the general CEH Knowledge requirements, it incorporates significant hands-on homework, team-based classroom exercises and written research assignments as expected components of a professional master's course.

At the end of the class, students are prepared for, but not required, to take the third-party administered exam if they want to earn their CEH certification, but the course is not 'tied' to that exam. Regardless of their decision to certify or not, **"Applied Network Security"** puts into first-hand, real-world practice many of the concepts and theories students encounter in their other cybersecurity courses taken at UMBC. In doing so, courses like **"Applied Network Security"** more closely link the benefits of "non-credit training" with "for-credit" education...both of which are required to be an effective cybersecurity practitioner.

Although early in the semester, this course is being very well-received according to initial feedback from instructor and students. Provided this continues, we expect to develop similar courses in cooperation with UMBC Training Centers in the future, thereby providing more "professional value" to students enrolled in, or considering, the UMBC Graduate Cybersecurity Program.

From "ACTIVE"

Some classes have been begging for such a set up. CMSC 101 relies on group activities to help students—especially women and underrepresented minorities—feel engaged and incorporated into the Computer Science community. Last year it suffered when taught in a traditional computer lab, where the rows of cumbersome computers made it impossible for students to see the board or to break into teams. ACTIVE will make Dr. LaBerge's Computer Engineering Capstone even more true to working in the industry by emulating state-of-the-art industrial research and development companies like Apple and Microsoft.

This summer, all four professors will re-design their classes to best make use of the space.

Dr. Tim Finin says that adapting his Principles of Programming Languages class will "be a challenge," but, a worthwhile one. Increasing active learning in the class will help transfer students —who typically take it in their first semester—with the often-difficult adjustment. Dr. Finin is considering techniques like "Pair Programming" and having students program in-class.

He sees the new space as a "step in trying to understand how we can teach better by exploiting new technology." Finin thinks that the relationship between technology and education is bound to grow. "[Technology] could potentially have as big an impact on education as online-shopping had on retail sales, or as the web had on the news industry," he says.

desJardins predicts that ACTIVE will help professors learn how to teach better, switching the focus from teaching content to teaching skills. Throughout the semester, the team will evaluate the effectiveness of their classes and share their findings at the Provost's Teaching and Learning Symposium. They hope to share their experiences, and the space, with other professors at UMBC—professors who one day might say to themselves: "Why don't we have one of these?" □

ALUMNI UPDATES
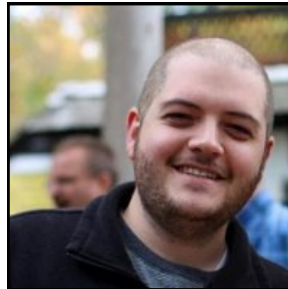
Donald Miner [CS PHD '10] and CS graduate student Adam Shook co-authored a book: *MapReduce Design Patterns Building Effective Algorithms and Analytics for Hadoop and Other Systems.* It was published in December by O'Reilly Media.

Niyati Chhaya [CS PHD '12] has moved back to India to work as a Computer Scientist with Adobe Research Labs.

Ganesh Saiprasad [EE PHD '12] has a postdoc at the National Institute of Standards and Technology (NIST).

Kevin Fisher [CE PHD '12] will continue working at NASA as a software systems engineer. His work deals with ground antenna system for the Geostationary Operational Environmental Satellite, R-series (GOES-R) spacecraft, a new line of weather satellites due to launch in 2015.

Eric Eaton [CS PHD '09], a Visiting Assistant Professor at Bryn Mawr College, will be the Workshops Co-chair for the 27th AAAI Conference on Artificial Intelligence (AAAI-13).

Blazej Bulka [CS PHD '09] has accepted a position at Google – New York.

Ryan Carr [CS BS '07] defended his Ph.D. dissertation at the University of Maryland, College Park.

Kyla McMullen [CS BS '05] is working as an Assistant Professor in the Human-Centered Computing Division of Clemson University's School of Computing.

Dibyajyoti Ghosh [CS MS '12] is working as a software engineer at Rearden Commerce in Foster City, CA.
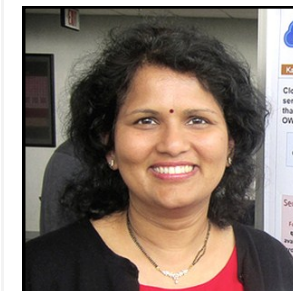
Phuong Nguyen [CS PHD '12] will work on research and development related to building large distributed systems or applications.

David Chapman [CS PHD '12] has applied for a post doc in Climate Modeling at Columbia University.

Gevorg Grigoryan [CS BS '02] is working as an assistant professor of Computer Science and an adjunct assistant professor of Biology at Dartmouth College.

Karuna Joshi [CS PHD '12] has received funding from NIST to continue her research on cloud computing and big data management. As part of this funding, she will be working as a research faculty member in our department. In the spring, she will teach a course on software design and development.