THE UNIVERSITY OF MEMPHIS DEPARTMENT OF
COMPUTER SCIENCE

SPRING 2018

CHAIR'S MESSAGE

Computer science is a dynamic field, and our department continually strives to keep up with the latest developments. In response to student interest and market demands, we introduced a new undergraduate cybersecurity concentration in fall 2017. Many students have already declared this concentration, and a team from our security student organization won a regional cyber defense competition last fall.

Dr. Lan Wang
Department Chair
and Professor

Local interest in computer science has steadily increased. Our annual CS Open House event last December was the largest ever, with more than 350 high school teachers and students visiting us. We will continue to support outreach events such as hosting school visits and summer camps.

Meanwhile, the department's research influence and reputation continue to grow, with a $13.8M contract from the Intelligence Advanced Research Projects Activity awarded to the MD2K Center for Excellence, and a recent study by Temple University placing our doctoral program among peers such as Case Western Reserve University, Drexel University and Tufts University. I look forward to ever improving!

Lan Wang
Professor and Chair

NEW UNDERGRADUATE CONCENTRATION

Cybersecurity is an increasingly important field; U.S. Commerce Secretary Penny Pritzker indicated in 2016 that employers nationwide face a shortfall of over 200,000 cybersecurity specialists. The department has leveraged its research expertise in this area to start a cybersecurity concentration for the B.S. degree in fall 2017. Students who pursue this concentration take four security-oriented electives covering topics such as wireless/mobile security and digital forensics. The new concentration has already received significant interest from students, with 18 undergraduates officially enrolled in it as of spring 2018.

10TH ANNUAL MID-SOUTH CYBERSECURITY SUMMIT

The Center for Information Assurance hosted the 10th annual Mid-South Cybersecurity Summit at the FedEx Institute of Technology Oct. 12. This event attracts professionals from both industry and academia to discuss the latest developments in cybersecurity. This year's speakers included representatives from the FBI, Ernst & Young, ServiceMaster, the UofM, Vanick and Auburn University.

For more information, please visit the event website at *cyberexpo.memphis.edu*

Dr. Dipankar Dasgupta
Director of
Center for Information
Assurance (CfIA)

Dr. Kan Yang
Associate Director of
Center for Information
Assurance (CfIA)

CYBERSECURITY EDUCATION GRANT

The Center for Information Assurance has been awarded a $206,000 CAE Cybersecurity Workforce Education Grant to develop interactive, hands-on exercises to integrate into cybersecurity curricula. Funded through the National Security Agency, the CAE program seeks to expand the national cybersecurity workforce in terms of both growth and workforce readiness. The tools developed by CfIA will contribute to students' ability to apply tactical knowledge to cybersecurity practice.

From the cybersecurity undergraduate program, two courses have been identified to implement these interactive exercises. The interactive tool will be web-based, allowing it to be accessed by both private and public organizations as well as UofM students.

The project is being led by *Prof. Dipankar Dasgupta,* founding director of the Center for Information Assurance. As part of the project, CfIA will also host Cybersecurity Workforce Workshops and community outreach activities to create a cybersecurity pathway that integrates academic and experiential learning. These workshops will be available to the public during the fall of 2018.

THE UNIVERSITY OF MEMPHIS
Department of Computer Science

Participants during the **Software Engineering Showcase**

MD2K ANNUAL MEETING

The fourth annual meeting for the NIH-funded MD2K Center of Excellence *(md2k.org)* was held at the FedEx Institute of Technology Oct. 24-25. This meeting is the only annual event where all MD2K team members are required to attend in person. Attendees included MD2K team members, Center staff, NIH/NSF officials, other BD2K team members, and University of Memphis officials.

The goals of the annual meeting are to interact face-to-face with other team members, share and learn the progress made so far, review/revise the policies and procedures of the Center, and chart the direction for the future of MD2K. Details can be found on the MD2K meeting website: *md2k.org/index.php?option=com_content&view=article&id=134&Itemid=353*

DEPARTMENT RANKED NATIONALLY

The Department was ranked 80th in the nation among 173 doctoral computer science programs, according to a recent study. Conducted by Temple University, the study ranks schools based on citations of tenure-track faculty as of fall 2016. UofM shares rank 80 with several schools including Case Western Reserve University, Drexel University, New Jersey Institute of Technology, Tufts University, University of Houston, University of New Mexico, Wayne State University and Worcester Polytechnic Institute.

The full ranked list can be seen at Temple's website *(www.dabi.temple.edu/~vucetic/CSranking/#/)*, and a study of the data is available on arXiv *(arxiv.org/abs/1708.05435)*

DATA SCIENCE IN PYTHON WORKSHOP

Prof. Vinhthuy Phan ran a Data Science and Analytics in Python workshop Dec. 8-10. This 3-day, hands-on workshop targeted scientists and working professionals who wanted to improve their skills in coding, data science, and analytics.

INDUSTRIAL ADVISORY BOARD

During the fall 2017 Industrial Advisory Board meeting, department faculty discussed various issues with board members including the spring 2018 capstone course, a new course on competitive programming and technical interviews, the undergraduate curriculum and suggestions for recruiting graduate students.

The Advisory Board is comprised of 12 professionals from industry, government, and academia, including Asentinel, Christian Brothers University, Cisco, the City of Memphis, CodeCrew, CoreLogic|FNC, FedEx, Intel, International Paper, Lokion, Methodist LeBonheur Healthcare and the University of Memphis. The Board recently welcomed three new members: **Shiloh Barnat Goodman,** vice president of UX Strategy at Lokion, **Mike Rodriguez,** chief information officer for the City of Memphis, and **James Dutkosky,** senior manager of IT at International Paper.

SOFTWARE ENGINEERING SHOWCASE

Undergraduate students in **Dr. James Yu's** fall 2017 Software Engineering class displayed their semester projects on Dec. 11. The projects included:

HOT SPOTS IN MEMPHIS

Alex Austin (team lead), Nickolas Chastain, Richard DeSaussure, Eric Gladden, Jason Kolwyck, Maxwell Skenandore

This project is a web-based application to display (in real time) the current criminal conditions of areas throughout a map of Memphis. From the map, users can select an area of interest and see the details of crimes in that area.

CYBER SCANNER

Jon Cobb (team lead), Yucheng Zhang, Ousmane Diallo, Naim Hakeem, Umair Ahmed, Derico Walker

Conventional computer system port scanners are usually cluttered with walls of text and hard-to- decipher details around multiple IPs. This project creates a graphical display that visually helps users to identify ports and associated activities. Users can store the scanned data into a database and query the data for further analysis.

DEBATEMATE

Matthew Weihl (team lead), Brianna Frye, Benjamin Brown, Austin Nabors, Semere Tadesse

DebateMate is a website that allows users to participate in a digital debate forum and discuss various topics. Users can view the topic of the day, join one side of the debate, and post arguments in favor of their side. Users can also vote and score the arguments of each side to determine which side has the better argument.

THE GREAT ESCAPE, NORTH PARK

Da Ziang (team lead), Jimmy Vuong, Kendrick Nelson, Samantha Elkouz, Vinh Tran

This project is a prison escape game that focuses on the idea of user choice. The user has control of a prisoner and the goal is to escape. The prisoner must navigate through a floor of the prison and reach the exit door while avoiding being defeated by guards. This project aims to please gamers who enjoy the turn-based genre and reignite general gamer interest in turn-based RPGs.

HEALTHNUTS

Chris Kent (team lead), Kyle Drennen, Glenn Harper, James Craft, Amanda Garner

People often fail to follow their fitness plans and cannot reach their goals due to lack of consistency, difficult to follow plans, and lack of updated status on their current health. This project uses modern mobile technology to consistently update a user with health information to overcome the above issues.

LOSTTRAVELER

Daniel Linn (team lead), Damian Coomes, Chase Cook, Brandon Ellis, Adam Rogers

This project provides travelers a way to optimize their plans when visiting unfamiliar cities or places. It is a web service that allows users to search for types of attractions and indicate which ones they would like to visit. Selected attractions are displayed on a map and can be ordered such that they will take the least amount of time to visit.

TIGER TRAIL

Tyler Miles (team lead), John Britton, Aaron Leonard, Brennan Kersey, Clifford Montjoy, Coby Glass

This project is a web-based application targeted at new or relatively new employees, students, parents, and visitors that provides navigation services for the University of Memphis campus quickly, clearly, and efficiently. Users can select their destinations and have a clear route presented to them. Users can also create accounts and save routes.

VAMPIRE

Miguel Betances-Lee (team lead), Tim Camp, Michael Bowman, Charles Plowman, Alok Shah

This project is an application that allows diabetic patients to log their blood glucose level, walking, carbohydrate intake, and sleep. The software produces valuable recommendations, graphs, and insights to help users improve and maintain in-range blood glucose levels.

CS SOCIAL

The ACM student chapter organized the department's annual Halloween-themed CS Social on Oct. 27, giving students and faculty a chance to mingle and enjoy home-cooked food. The event included a trivia game and plenty of costumes.

FACULTY AND STAFF ACCOLADES
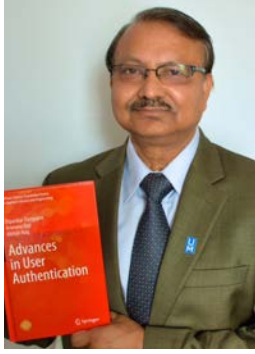
Prof. Dipankar Dasgupta had a new textbook entitled Advances in User Authentication, published through Springer-Verlag. Intended as a graduate-level text, the book covers recent developments in the field, including Prof. Dasgupta's own grant-funded research in the area. The text was co-authored with two of his students, Arunava Roy and Abhijit Nag. The book is available through Springer's website at *link.springer.com/book/10.1007/978-3-319-58808-7*

Prof. Dasgupta had three research papers accepted or published in the *International Journal of Information Security, Information Sciences Journal and IEEE Transactions on Big Data.* He also received a Best Paper (Honorable Mention) award at ICISS 2017 *(www.ee.iitb.ac.in/course/~iciss17),* the 13th International Conference on Information Systems Security held Dec. 16-20 at IIT Bombay. The ICISS paper, "Privacy-Preserving Proxy Re-encryption with Fine-grained Access Control," was joint work with researchers **Payal Chaudhari** and **Manik Lal Das.**

In addition, Prof. Dasgupta gave an invited talk at the International Seminar on Intelligent Computing (ISIC) organized by the Department of Information Technology, Jadavpur University, India on Dec. 16; a plenary talk at the International Conference on Computational Intelligence, Cybersecurity, and Computational Models (ICC3) at PSG College of Technology, Coimbatore, India on Dec. 15; and a presentation and demo of a puzzle-based learning project at the NIST-NICE K-12 Cybersecurity Education Conference, Nashville on Dec. 5. He also helped organize the IEEE Symposium on Computational Intelligence in Cybersecurity (CICS 2017) in Hawaii from Nov. 27-Dec. 1.

Prof. Santosh Kumar published a co-edited book on Mobile Health by Springer that has been downloaded 16,000 times within six months of its publication. He was invited to serve on the advisory board of the $40 million NSF Engineering Research Center, on the independent committee of experts in a $28 million NIH program on Pediatric Research using Integrated Sensor Monitoring Systems (PRISMS), and on the editorial board of Nature Digital Medicine. He also received two NIH grants and an NSF grant, increasing his total number of grants to 13 worth over $33 million.

Prof. Kumar gave keynote speeches at an ACM MobiSys workshop (WearSys), Affective Computing Workshop (Mental Health & Wellbeing), and at Dagstuhl Seminar in Germany (on Computing Challenges in Personalized Medicine). The MD2K Center of Excellence that he leads published its mobile phone software platform (called mCerebrum, consisting of 25+ apps) in ACM SenSys. The platform is being used to collect data in 11 states involving over 2,000 participants, producing 300 terabytes of mobile sensor data.

Prof. Sajjan Shiva gave two invited international talks. He delivered the keynote address, "Cloud Computing: Security and Privacy," at the IEEE International Conference on Computational Systems and Information Technology for Sustainable Solutions held in Bangalore, India from December 21 - 23. He was also an invited speaker on "Cybersecurity: Challenges and Research Opportunities" at the Siddaganga Institute of Technology in Tumkur, India on Jan. 3.

Prof. Deepak Venugopal's lab had a paper and tutorial accepted at AAAI-18 *(aaai.org/Conferences/AAAI-18/),* the 32nd Conference on Artificial Intelligence sponsored by the Association for the Advancement of Artificial Intelligence. Doctoral student **Md Mamimur Islam** is the primary author of the paper "Learning Mixtures of MLNs," which also involved contributions from Adobe Research collaborator **Somdeb Sarkhel.** One of the top conferences in AI, AAAI had a record number of nearly 4,000 paper submissions this year.

Prof. Lan Wang received $1 million DARPA funding for a three-year research project. She published a paper "Geohyperbolic Routing and Addressing Schemes" in ACM SIGCOMM Computer Communication Review, and received US Patent No. 9557413, "Surveillance and tracking system and method," with co-inventors Robert Kozma, Khan M. Iftekharuddin, Ross Deming, Orges Furxhi and Sergi Consul.

Six Computer Science PhD students have been accepted to the 2018 CRA-Women Grad Cohort Workshop. Congratulations to **Eiman Aldhahri, Laqin Fan, Zannatul Firdous, Sambriddhi Mainali, Diem-Trang Pham and Alina Zaman,** who will attend the workshop on April 13-14 in San Francisco. CRA is fully funding two of the students and partially funding the remaining four.

The CRA-Women Grad Cohort aims to increase the ranks of senior women in computing-related studies and research by building and mentoring nationwide communities of women through their graduate studies.

An undergraduate student team named Memphoes placed 5th out of 14 teams at the UT Martin site of the ACM Mid-Central USA Programming Contest 2017 on Nov. 4.

Memphoes consisted of McKittrick Swindle and Ryan Wickman, who were able to solve three of the nine challenging problems in the contest. The full standings can be seen at mcpc17.kattis.com/standings?filter=1079
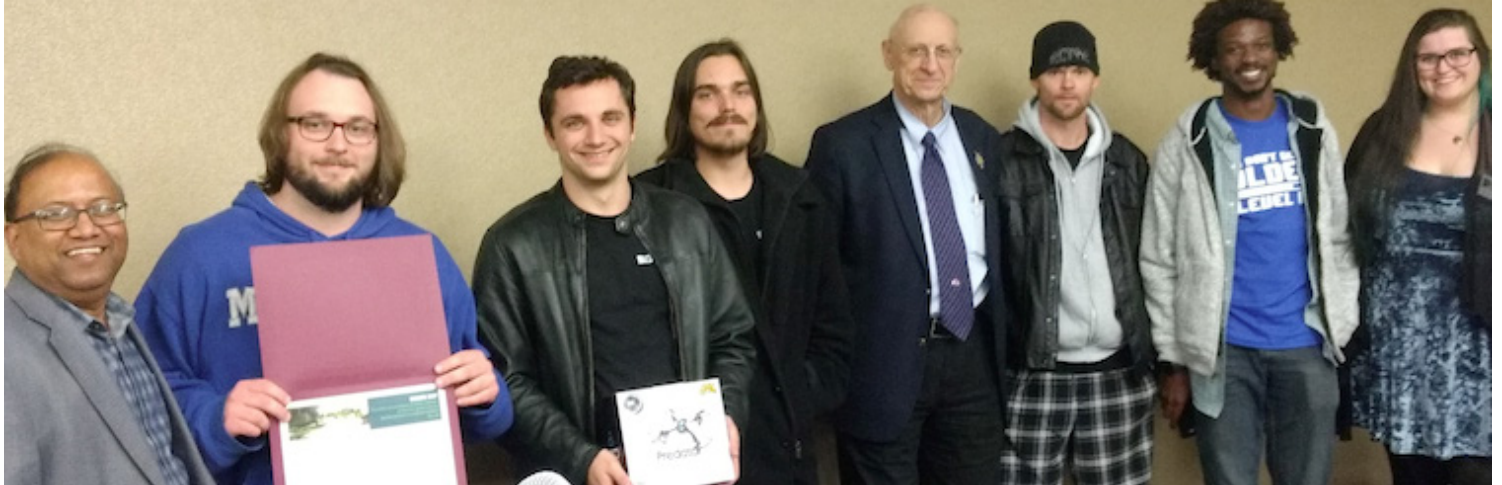
A team of students from the Center for Information Assurance won 1st place in the CANSec Student Cyber-Defense Competition on Oct. 29 at the Missouri University of Science and Technology in Rolla, Missouri.

The team was comprised of six Computer Science majors (Berkeley Willis, McKittrick Swindle, Jon Walter Cobb, Robert Edstrom, Carrie Atkins and Craig Miller). While the core members had participated in several competitions in previous years, this is the first year they competed as the nu1lt3st3rs registered student organization.

This competition focused on cyber defense, and the activities were split into multiple defense/offense stages. By the final round, the UofM team had scored a total of 597 points, leaving their next closest competitor, the Louisiana Hot Snakes, behind with 582.5 points.

"Our student team is very hardworking and knowledgeable in cyber defense; they are continually doing well in such competitions and making us proud," said the director of the center, Prof. Dipankar Dasgupta.

Sambriddhi Mainali's six-hour MS thesis, "Genomic Reconstruction of the Tree of Life," was nominated for the best thesis award in the state of Tennessee. The thesis committee consisted of Prof. Max Garzon (chair), Prof. Vinhthuy Phan and Prof. Ramin Homayouni (director of the Bioinformatics program).

STUDENT HIGHLIGHT

Marshal Hayes is currently a junior in the UofM's Computer Science program. He has a strong interest in machine learning research, particularly deep learning and computer vision. In addition to attending school full-time, he is a research assistant in Prof. Deepak Venugopal's Machine Learning and AI Lab. He is currently working on a project to "score" a large dataset of Yelp user reviews to determine their usefulness in providing new information.

He has also worked on a few individual projects, including training a deep neural network to predict the result of a chess game without needing to calculate any moves. The model essentially looks at one position near the end of a game and learns to classify the result.

Marshal has been selected to attend Google's TensorFlow Developer Summit in Mountain View, Calif., at the end of March. This event will provide opportunities for him to expand his machine learning knowledge and network with researchers in the field. In the future, he hopes to continue his research to solve complex problems in medicine, healthcare, transportation and more.

ALUMNI HIGHLIGHT

Heather Duke graduated from the UofM with honors in the spring of 2017, with a Computer Science major as well as a Spanish minor. As a student, she worked as a tutor for the Computer Science Learning Center and was selected as a scholar to attend the 2016 Grace Hopper Celebration held in Houston. During her senior year, Heather was the founding president of the department's Women in Computing group. Under her leadership, the group organized several career preparation and social events. They also met twice with an Advanced Placement Computer Science Principles class at White Station High School to interact with the students and provide guidance on their projects.

Since graduation, Heather has worked at FedEx Services as an associate project/process analyst. There she primarily does project management, but she is currently working with a team to develop a tool which will renovate and offer scalability to an outdated process. She has continued her connection to the department by participating in outreach events. In her spare time, she enjoys developing games with Unity, and hopes to one day turn this hobby into a career.

OUTREACH EVENTS

The department hosted a dinner reception for incoming fall 2018 freshmen on Dec. 14. Just under 70 newly admitted freshmen and parents gathered, making this our largest new student reception yet. Prof. Vinhthuy Phan welcomed everyone and inspired the newly declared CS majors to dream big with the variety of ways computer science can equip them to bring their ideas to life… and change the world in the process!

The evening featured a discussion panel with Prof. Scott Fleming and instructor Kriangsiri Malasri, along with CS students Berkeley Willis, Kareem Dasilva, Brianna Frye and McKittrick Swindle. The faculty members on the panel were able to demystify computer science and share real-life examples on how a degree in computer science can be very fulfilling - whether it be satisfying a desire to solve problems or providing a way to express creativity. The CS students on the panel left quite an impression as well. Guests were amazed to see how these currently enrolled students were already applying the knowledge and skills they are learning in the CS program to make an impact in the community and jumpstart their careers.

It was a dynamic and interactive evening, and many walked away proud of their CS background or excited to begin their journey into this exciting field.

The Department held its annual CS Open House on Dec. 8, in celebration of the nationwide Computer Science Education Week. Local high school students and teachers were invited to visit campus to learn more about computer science and meet UofM faculty and students. The event was attended by nearly 350 people from 12 schools (Central High School, East High School, Gateway University High School, Houston High School, Lausanne Collegiate School, Memphis Academy of Science and Engineering, Memphis Business Academy High School, Ridgeway High School, Soulsville Charter School, Westwood High School, Whitehaven High School and Wooddale High School), making it the largest Open House ever.

The Open House featured a coding demonstration by instructor Kriangsiri Malasri, a discussion of a student-created game by Ryan Wickman, a presentation on entrepreneurship by student Kareem Dasilva, and a discussion panel with Dr. James Yu and students Carrie Atkins, Kareem Dasilva, Caroline Fentress, Brianna Frye and Ryan Wickman.

SUPPORTING THE DEPARTMENT

The department has been fortunate to receive several generous gifts from donors. Gifts can endow professorships, scholarships, fellowships, classrooms and labs for our students. They can also be used to help defray travel expenses for conferences to present research papers, as well as many other activities that are extremely meaningful to our students and the Memphis community.

If you are interested in making a tax-deductible donation, please visit the University of Memphis Giving site at bit.ly/2wFQwim. Select "All CAS Funds" at the top, then "Computer Science Discretionary Fund."

Your support is greatly appreciated!

SPRING AND SUMMER 2017 GRADUATES

PHD

Abdullah Abu Hussein

MS

Kumar Dahal

Rakshit Choudhary Gangarapu Chinnaswamy Naidu

Sambriddhi Mainali

Lei Pi

Rong Qi

Mohammad Shamim

Jobin Sunny

BS

Carlos Cancino

Tim Doan

Brittany McCaleb

David McKinnie

Lindsey Warren

Alex Ziegenhorn