# THE CSE CORNER

## UNDERGRADUATE NEWSLETTER FOR DEPARTMENT OF
## COMPUTER SCIENCE & ENGINEERING

**WHAT'S IN THIS MONTH'S ISSUE:**

*OUR PATENT LAB'S*

*NEW AI CHATBOT*

**MISSISSIPPI STATE**
UNIVERSITY™

# A WELCOME LETTER FROM OUR DEPARTMENT HEAD,
## DR. SHAHRAM RAHIMI

"Welcome to the Department of Computer Science and Engineering (CSE) at Mississippi State University. CSE is one of the largest and fastest-growing departments in the Bagley College of Engineering and the university. The department strives to train the next generation of computer scientists and engineers who will be prepared to enter a rapidly growing technology field, which currently forms 63% of all STEM jobs in the nation."

"Our department's faculty is globally recognized in interdisciplinary research and development. Our researchers focus on artificial intelligence and machine learning, cyber security, robotics, human computing interaction, big data analytics, augmented and virtual reality, software engineering, visualization and high-performance computing, providing our students with a wide variety of areas in which to research and learn. Many of our researchers have received prestigious awards and control several million dollars in active research funding. Our programs empower graduates to be at the forefront of the current and next waves of innovation. We hope you'll join us in shaping the future of technology."

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# BUTLER HALL



Butler Hall is home to the Department of Computer Science and Engineering. Research efforts concentrate on the areas of artificial intelligence, cyber security and forensics, high performance computing, software engineering, and visualization and computer graphics.

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# CSE TUTORING CENTER

*We offer tutoring sessions taught by our graduate students in Butler 209. Check out the schedule to meet with your respective TA!*



## Tutoring Schedule

| TA | MON | TUE | WED | THU | FRI |
|---|---|---|---|---|---|
| Jacob Adams | 12 - 2 PM | | | 1 - 3 PM | 3 - 5 PM |
| Pranavi Beerrelli | | 1:30 - 3:30 PM | 10 AM - 12 PM | | |
| Claire Carter | 2 - 4 PM | | 2 - 4 PM | | 11 AM - 1 PM |
| Toby Davis | | 10:30 AM - 12:30 PM | | 10 AM - 12 PM | |
| Robert Dilworth | | | | | 8 AM - 12 PM 2 - 4 PM |
| Garrett Fereday | 10:30 AM - 1:30 PM | | 10:30 AM - 1:30 PM | | |
| Tirian Judy | 12 - 2 PM | 11:30 AM - 1:30 PM | | 11:30 AM - 1:30 PM | |
| Abhilash Kanduri | | 1:30 - 3:30 PM | 10 AM - 12 PM | | |
| Brandon Ladner | 10 AM - 12 PM | 3:30 - 5 PM | 10 AM - 12 PM | 3:30 - 5 PM | 1 - 3 PM |
| Litany Lineberry | 12 - 3 PM | 12 - 3 PM | | | |
| Rohini Maram | 9 AM - 12 PM | | | 5 - 6 PM | |
| Deepak Matta | | 9:20 - 11:20 AM | | 9:20 - 11:20 AM | |
| D.J. Molsbarger | 9 - 11 AM | | 9 - 11 AM | | 9:30 - 11 AM |
| Phalguni Morla | | 9 AM - 1 PM | | | |
| Vishnu Nanduri | | 3:30 - 5 PM | | 3:30 - 5 PM | |
| Tamanna Rashme | | 9:30 - 11 AM | 9 AM - 1:30 PM | | |
| Austin Reed | 10 AM - 12 PM | 11 AM - 12 PM | 10 AM - 12 PM | 11 AM - 12 PM | |
| Swayamjit Saha | | 2:15 - 5:15 PM | | 2:15 - 5:15 PM | |
| Derek Willis | | | | | 8 AM - 12 PM |

# STUDENT SPOTLIGHT



**Marquasia Smith,** a freshman in the department, received the Department of Defense Science, Mathematics, and Research for Transformation (SMART) Scholarship. The award includes full tuition, mentorship, summer internships, a stipend and full-time employment with the Department of Defense after graduation.



**Austin Cosby,** a CSE senior and Provost Scholar, successfully defended his undergraduate honors thesis during the Shackouls Honors College's 2023 Spring Thesis Defense Week. His thesis, titled "Simulating Backdrivability in Spring-based Bipedal Robot Design", researched model design of bipedal robots.



**Charles Carson,** a Ph. D student in the department, received the 2023 Department of Defense (DoD) Cyber Scholarship Program (CySP) award. Charles was selected from over 6,000 applicants nationwide.



**Kennedy Keyes,** a software engineering senior, was admitted into the Amazon Summer Undergraduate Research Experience (SURE) Program at the UCLA Samueli School of Engineering.

# CSE Hall of Fame

## DR. TANMAY BHOWMIK

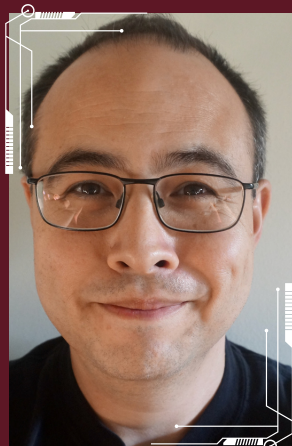### CAREER: MEASURING AND SUPPORTING CREATIVITY IN DEVELOPING SOFTWARE REQUIREMENTS



This project has two objectives:
1) developing a measurement approach to evaluate how creative a feature is for a software system, and 2) developing an automated support system, leveraging AI and NLP tools, to help software engineers find creative software features. The project also involves outreach activities, such as creativity-focused training workshops for K-12 students, teachers, and local software startups, to help them understand the importance of creativity in software engineering.

## DR. MAXWELL YOUNG

### CAREER: MAKE THEM PAY! ALGORITHMS FOR SECURING WIRELESS SYSTEMS



Wireless systems are often populated by energy-constrained devices, and communication occurs over a shared channel. These features make such systems especially vulnerable to jamming, whereby an adversary disrupts the shared channel, forcing devices to expend significant energy in order to mitigate the attack. The goal of this research is to design and analyze novel defenses that are energy-efficient, while still providing performance guarantees against a powerful jamming adversary. The outcomes of this research have the potential to secure systems against these attacks, whose severity is likely to escalate with the continued adoption of wireless technology.

# CSE Hall of Fame



**Ed Swan**, a professor in the CSE department, was awarded the Visualization and Graphics Technical Community (VGTC) Virtual Reality Service Award by the Institute of Electrical and Electronics Engineers (IEEE). Amazingly, this is his second once-in-a-career award just this past academic year.



**Dr. Adam Jones**, assistant professor and Hi5 Lab director, was invited to be a contributor on a computer graphics history exhibit at SIGGRAPH in Los Angeles in August. The conference displayed 9 of Dr. Jones' prototype headset designs, one of which was co-designed with CSE grad student, Zack Garris.



CSE assistant professors **Dr. Sudip Mittal** and **Dr. Jingdao Chen** received the Secure and Trustworthy Cyberspace award from the National Science Foundation. They began work on their project titled "Inculcate a culture of preparedness against AI security threats to pervasive robotic systems" in June.
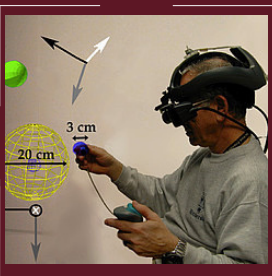
# CSE Speaker Seminar Series

*The CSE department has hosted three successful talks for our ongoing Speaker Series this semester. Our impressive lineup of speakers includes research fellows, scientists, lab directors, and more. Check our social media and keep an eye out for announcements about the upcoming speakers!*



**Dr. Noor Amiri,** postdoctoral research fellow at Boston College.

His talk was titled "CAPTCHA Recognition Using Convolutional Neural Network" and discussed ways for CAPTCHA developers to improve their designs.



**Dr. Stephen R. Ellis,** headed the Advanced Displays and Spatial Perception Laboratory at the NASA Ames Research Center and current Chief Scientist for Pillantas.

His talk, titled "Complexity - Complicated", explored the concept of "orthogonalizing".



**Dr. Karen Renaud, s**cientist at the University of Strathclyde in Glasgow.

Her talk proposed a mindset shift: "Moving from 'Human as Problem' to 'Human as Solution' in Cyber Security."

GET INVOLVED WITH CSF

# STUDENT ORGANIZATIONS

## CSE AMBASSADORS

The CSE Ambassador Team assists the department head and assistant department head with recruiting and retention events. These students represent the department to prospective students and their parents. Leadership skills and reliability are a must for these volunteer positions.

Contact our associate department head Dr. Andy Perkins if interested in joining: perkins@cse.msstate.edu

## ASSOCIATION FOR COMPUTING MACHINERY & ASSOCIATION FOR COMPUTING MACHINERY - WOMEN

The MSU student Chapter of the ACM exists to

- To promote an increased knowledge of the science, design, development, construction, languages, and applications of modern computing machinery.
- To promote a greater interest in computing machinery and its applications.
- To provide a means of communication between persons having interest in computing machinery.

For more information, contact faculty advisor and department head Dr. Shahram Rahimi at rahimi@cse.msstate.edu

## WOMEN IN CYBER SECURITY CHAPTER

Women in Cyber Security (WiCyS) is the premier organization with national reach dedicated to bringing together women in cybersecurity from academia, research and industry to share knowledge, experience, networking and mentoring. Our chapter Advisor is Mrs. Kortni Neal. Our student chapter holds our bi-monthly meetings on 2nd and 4th Tuesdays at 5P.M. in Butler Hall where we do hands-on activities such as how to set up a HomeLab and we explore various cyber security tools. We also have guest speakers in the Cyber Security field come and speak. For students interested in attending meetings, we send out a flyer the week before. We are open to all and welcome our male allies to join. Women In Cyber Security offers professional development and internship opportunities. We encourage members to join the National WiCyS organization for maximum benefits.

Students can join the student chapter through CampusLabs: msstate.campuslabs.com/engage/organization/women-in-cyber-security

# CYBER SECURITY CLUB AT MSU

The Cyber Security Club at MSU's main goal is to further our collective knowledge in the field of Cyber Security. This goal will be reached by studying current exploits, competing in capture-the-flag competitions, and designing and researching our own security challenges.

Faculty Advisor: Dr. Stephen Torri at storri@cse.msstate.edu

# MSU ESPORTS

MSU Esports is committed to cultivating a culture of camaraderie among gamers, competing in collegiate esports at the highest levels of play, instilling exceptional character and developing professional skills in its membership. MSU Esports houses 20+ competitive rosters over 17 different esports titles where they compete nationally in leagues under NACE, NECC, Tespa, CRL, CSL, and AVGL.

If interested, reach out to esports@cse.msstate.edu

# ACM-SIGHPC (SPECIAL INTEREST GROUP HIGH PERFORMANCE COMPUTING)

A special interest group of ACM, SIGHPC that provides hands on learning in high performance computing, access to parallel computing clusters, and invaluable future experience in industry and research. The group also offers travel and conference opportunities off campus:

- Practice and Experience in Advance Research Computing (PEARC). Check out their website at pearc.acm.org/pearc23/
- Super Computing (SC). To learn more, visit: sc23.supercomputing.org/

Membership is open to any MSU student interested in providing equitable access to computing education. CS Student Kourtney Atwell organized the formation of the chapter. You can request Dr. Gudla or Mike Navicky to be put on the mailing list at: cse-acm-sighpc@cse.msstate.edu

# VICEROY

Mississippi State University is honored to lead a partnership of three universities – MSU, Augusta and Clark Atlanta (VICEROY Southeastern Cohort - VSEC) as part of a national level effort to improve our nation's cyber workforce.

VICEROY Scholars Program is made possible through an award from the Air Force Research Laboratory Information Directorate in partnership with Griffiss Institute and the Office of the Undersecretary of Defense.

VICEROY Scholars Program is not a scholarship. VICEROY is an incentive-based program. Students accepted into the program are incentivized to participate in cyber education and experiential learning opportunities.

VICEROY Scholars Program is open to sophomores and juniors who are U.S. Citizens and are interested in service to national security.

If accepted to be a VICEROY scholar, students will sign a commitment agreement stating they will actively participate in the program. However, recipients are NOT obligated to any government service commitment.

Visit cse.msstate.edu/viceroy/ for more information on how to apply.

# THE CSE HAS RECENTLY BEEN REDESIGNATED AS A CENTER OF ACADEMIC EXCELLENCE IN CYBER OPERATION!

The National Security Agency (NSA) and the Department of Homeland Security (DHS) jointly sponsor the National Centers of Academic Excellence in Cyber Defense (CAE-CD) program. The goal of the program is to reduce vulnerability in our national information infrastructure by promoting higher education and research in cyber defense and producing professionals with cyber defense expertise. NSA's CAE in Cyber Operations (CAE-CO) program supports the President's National Initiative for Cybersecurity Education (NICE): Building a Digital Nation, and furthers the goal to broaden the pool of skilled workers capable of supporting a cyber-secure nation. This is one of three CAE designations that MSU holds currently, including a CAE in CD Education (CAE CDE) and a CAE in CD Research (CAE-R).

Institutions that receive a CAE-C designation have met the rigorous requirements set forth by the sponsor of the program, the National Security Agency (NSA). The NSA awards CAE-C designations to institutions that have committed to producing cybersecurity professionals that will reduce vulnerabilities in our national infrastructure. Upon graduation students who successfully complete all requirements for the NSA validated MSU CAE Cyber Operations Program of Study can request a certificate of completion for their records.

For more information, contact Dr. George Trawick at gtrawick@cse.msstate.edu or Dr. Sudip Mittal at mittal@cse.msstate.edu

# MSU TO RECEIVE $4.1 MILLION OVER FIVE YEARS FROM THE NSF TO RENEW ITS CYBERCORPS: SCHOLARSHIP FOR SERVICE PROGRAM



This new NSF funding will help support around 27 students over the grant period. Those who are chosen for the program will receive a stipend, full tuition, and a professional development allowance to pursue cybersecurity certifications, attend conferences, and more.

MSU has been credentialed as a National Center of Academic Excellence in Cybersecurity by the National Security Agency since 2001. It also is one of only a few universities to have all three NSA cyber designations— Cyber Defense, Cyber Research and Cyber Operations.

Andy Perkins, professor and associate department head, will serve as the principal investigator on the five-year NSF grant. Sudip Mittal, assistant professor, and Reed Mosher, director of the MSU Institute for Systems Engineering Research, are serving as co-principal investigators.

# The Social, Therapeutic, and Robotic Systems (STaRS) Lab

STaRS Lab is a multidisciplinary team who performs research on how robots and technology can interact with and help people.



# IMPROVING LIVES THROUGH TECHNOLOGY

# HAVE YOU EVER WISHED YOU COULD HAVE ALL THE ANSWERS AT YOUR FINGERTIPS?



**M STATE | MISSISSIPPI STATE UNIVERSITY™**
Predictive Analytics and Technology Integration (PATENT) Lab

## Bully Assistant

Hello! I am your Bully Assistant!
In order for me to best serve you, please let me know how would you identify yourself?

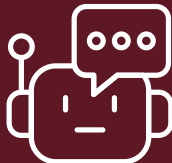☐ Current Student     ☐ Prospective Student     ☐ Faculty/Staff

Please select your role!

New Chat      Type something here      🎤

The CSE's new chatbot created by Dr. Rahimi's team in the PATENT lab is making exactly that and more possible. The chatbot that will allow visitors to the MSU websites to ask any MSU-related question and get answers instantaneously.

# GLORIA AND DOUG ENDOWED DEPARTMENT HEAD CHAIR IN COMPUTER SCIENCE AND ENGINEERING



Congratulations to our department head, Dr. Shahram Rahimi, for receiving the "Gloria and Douglas J. Marchant Endowed Department Head Chair". The CSE department is proud to say this is our 4th faculty endowment.

Dr. Rahimi stated: "I am appreciative of the vision that Doug and Gloria Marchant have in endowing the department head's chair in computer science & engineering," said Jason Keith, Dean of the Bagley College of Engineering. "These positions bring a lot of additional recognition to the department, college and university, but especially to the chairholder."

# CSE GRADUATE PROGRAM

## ARE YOU READY TO TAKE THE NEXT STEP IN YOUR EDUCATION?

There are three degrees in the graduate program for students to pick between:

- Master of Science in Computer Science
- Master of Science in Cybersecurity and Operations
- Doctor of Philosophy in Computer Science

Some graduate degrees are administered through other departments:

- M.S. and Ph.D. in Computer Engineering - Department of Electrical and Computer Engineering
- M.S. and Ph.D. in Computational Engineering - High Performance Computing Collaboratory
- Ph.D. in Engineering Education - College of Engineering.

**Dr. T.J. Jankun-Kelly**
*Associate Professor and Graduate Coordinator*
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tjk@cse.msstate.edu

# CSE DISTANCE EDUCATION

## INTERESTED IN EARNING YOUR GRADUATE DEGREE ONLINE?

Check out the three distance education options that CSE offers:

- Master's in Cyber Security - requires 31 credit hours
- Master's in Computer Science - requires 31 credit hours
- Ph. D in Computer Science - requires 32 credit hours

**Daphne Knox**
*Manager of Graduate and Distance Education*
662.325.5923
knox@bagley.msstate.edu

**TOP 10 BEST ONLINE MASTER'S IN CYBERSECURITY PROGRAMS FOR 2023 BY THE CYBERSECURITY GUIDE**

For more information, visit our website at
www.cse.msstate.edu

**OVER**
# 950
**UNDERGRADUATE AND GRADUATE STUDENTS**

**OVER**
# 150
**UNDERGRADUATE DEGRESS AWARDED**

# 80+
**INTERNATIONAL STUDENTS**

**APPROXIMATELY**
# 120
**MASTERS AND PH.D STUDENTS**

# 24 FACULTY
**MEMBERS INCLUDING 4 ENDOWED PROFESSORS**

# 21
**MASTERS AND PH.D DEGRESS EARNED**

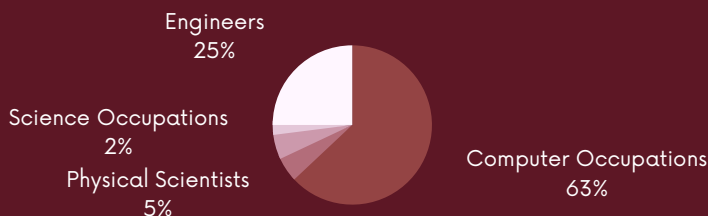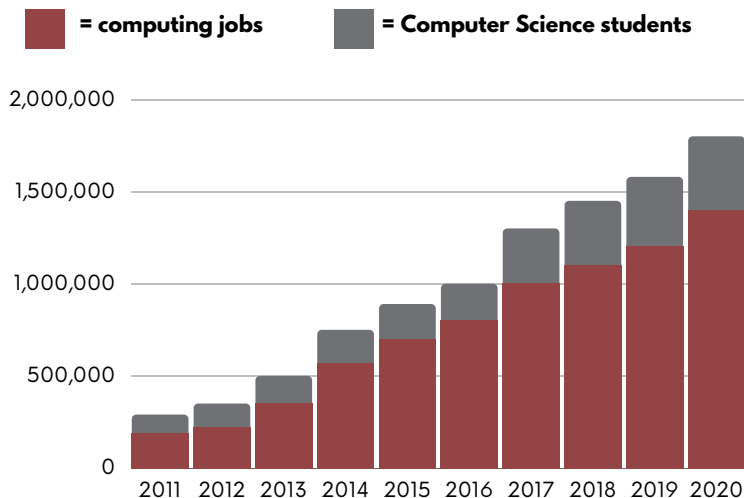# OVER $8 MILLION
**IN RESEARCH EXPENDITURES**

# $60K+
**IN SCHOLARSHIPS**

# CSE STATISTICS

## 63% OF ALL NEW STEM JOBS ARE IN COMPUTER SCIENCE

Engineers
25%

Science Occupations
2%

Physical Scientists
5%

Computer Occupations
63%

## THERE ARE 4 JOBS FOR EVERY COMPUTER SCIENCE GRADUATE, AND THIS NUMBER IS ONLY GROWING

■ = computing jobs ■ = Computer Science students

| | |
|---|---|
| 2,000,000 | |
| 1,500,000 | |
| 1,000,000 | |
| 500,000 | |
| 0 | |

2011  2012  2013  2014  2015  2016  2017  2018  2019  2020

## COMPUTER SCIENCE IS A TOP-PAYING COLLEGE DEGREE AND COMPUTER PROGRAMMING JOBS ARE GROWING AT 2X THE NATIONAL AVERAGE

# GIVE TO CSE

**It is with the generosity of people like you that we are able to make the Department of Computer Science and Engineering the very best it can be.**

To learn more about the positive impact you can make, please visit *www.msufoundation,* scan our QR code, or contact us directly so we can address any questions you may have.

If you would like to make a contribution on the website listed above, simply enter our department in the "Designation" section of your donation.

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follow us on all platforms!



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ENGINEERING**