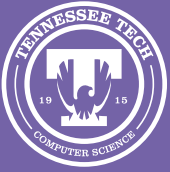


EAGLE DRIVE



DEPARTMENT OF COMPUTER SCIENCE
TENNESSEE TECH UNIVERSITY
2023 - 2024

MINDS: NEW CENTER ADVANCING
ROLE OF AI ON CAMPUS

P. 6

UPLOADING NEW FACULTY

P. 10

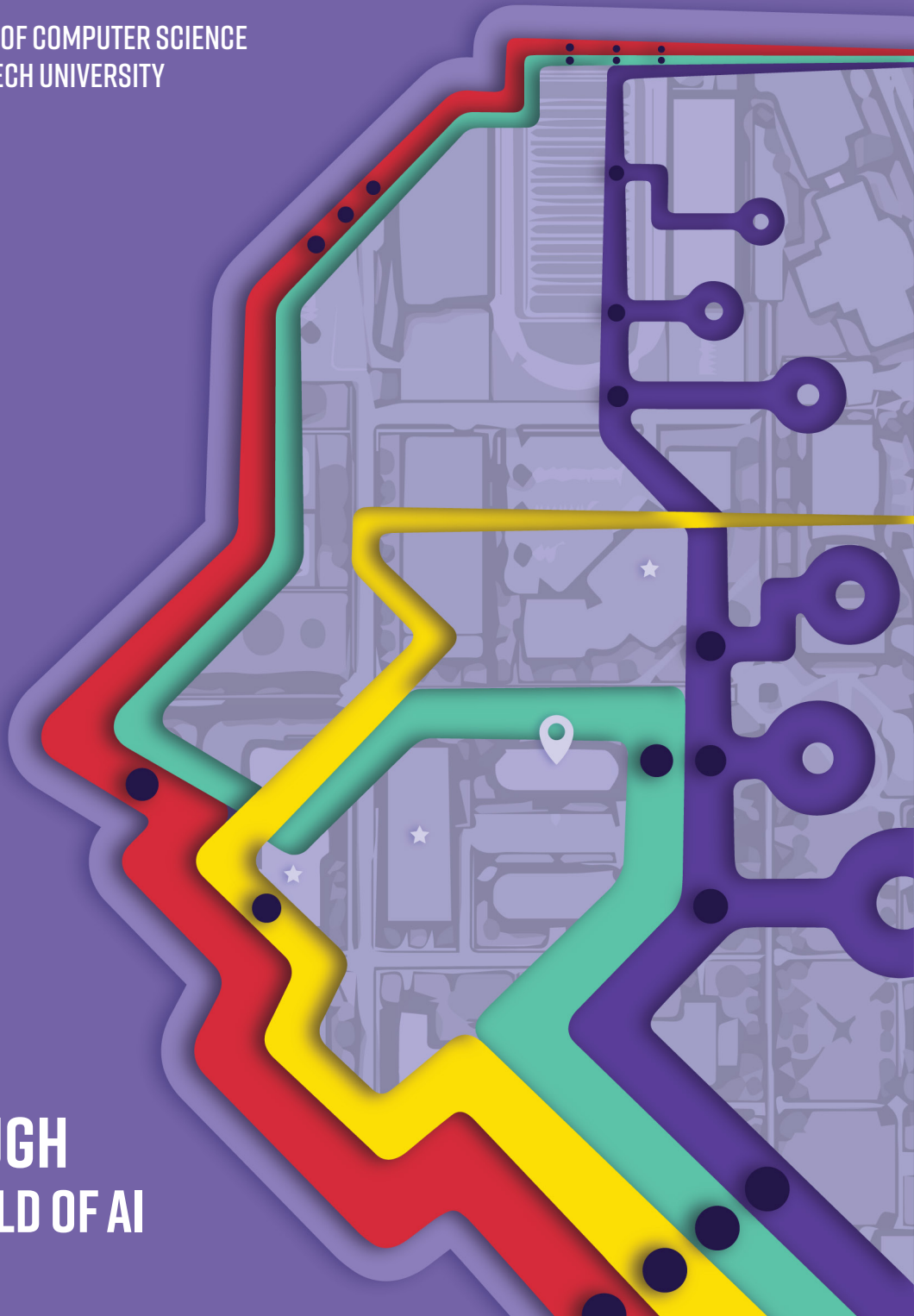
STUDENT Q&A: DEANNA KING

P. 14

LEAD CS

P. 20

TRAVEL THROUGH
⟨C/S⟩ TECH'S WORLD OF AI



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OUR MISSION IS TO BE WIDELY RECOGNIZED FOR ENABLING STUDENTS TO HAVE GLOBAL IMPACT THROUGH INNOVATIVE, QUALITY PROGRAMS AND RESEARCH THAT EMPHASIZES COLLABORATIVE PARTNERSHIPS AND THE SUCCESS OF A DIVERSE STUDENT, FACULTY AND ALUMNI COMMUNITY.

ACKNOWLEDGMENTS

DEPARTMENT CHAIR: DR. GERALD GANNOD

OUTREACH COORDINATOR: AMY DAVIS

GRAPHIC DESIGNER: REBECCA HAHNERT

EAGLE DRIVE 2023

SYSTEM KEY

- STUDENT SUCCESS
- COMMUNITY BUILDING
- FACULTY DEVELOPMENT
- RESEARCH

MAP ICONS

- STORY STATION
- ★ AI JUNCTION
- 📍 HISTORICAL AI ROUTE

TRANSIT NOTES

ABOUT THE COVER

Like a transit system, artificial intelligence is moving through campus and changing the face of Tennessee Tech. *Eagle Drive 2023-2024* explores AI's impact on student success, faculty development, community building and research within the Department of Computer Science as noted by color – purple, gold, green and red – as it circulates beyond our classrooms in Bruner and Prescott halls, new MInDS center in Volpe Library and future home of CEROC in the Ashraf Islam Engineering Building, which is getting closer to completion.

Travel with us through Tech's world of AI.

A WORD FROM THE CHAIR



A handwritten signature in blue ink, appearing to read "Gerald C. Gannod".

Dr. Gerald C. Gannod
Department of Computer Science Chair

TENNESSEE TECH UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
CAMPUS BOX 5101, COOKEVILLE, TN 38505
931.372.3691 | CSC@TNTech.EDU

“LIFE IS A JOURNEY, NOT A DESTINATION” – RALPH WALDO EMERSON

You can often hear me saying, “We aren’t perfect, but we are perfect in our effort to improve.” As a department, we have adopted what I call an “agile mindset” in that we periodically stop, reflect and change what we do while trying to become the best department that we can. Our mission is embodied by a desire to build a great community of learners and educators who support each other while on this shared journey.

In this edition of *Eagle Drive* magazine, we’ve decided to take that metaphor of a journey and visually represent it as a subway transit map. As you flip through the pages, you’ll find stories that highlight the four key areas of focus from our strategic plan: enabling student success, building and celebrating community, developing the faculty into the best and brightest scholars and conducting impactful use-inspired research. The transit lines will guide you throughout the magazine to stories that highlight our students, faculty and alumni.

The theme of this year’s magazine is artificial intelligence, which is apropos given the recent transformations of several industries with the growing popularity of generative AI systems such as ChatGPT. Stories include efforts by students and faculty in the classroom and in research who have been affected in one way or another by AI, including the establishment of a new center for Machine Intelligence and Data Science (MIInDS). You’ll also find among others a story on one of our distinguished alumna, Dr. Lynne Parker (’83), who recently served as an AI advisor for the White House.

Much has happened in the past year in the Department of Computer Science as it progresses on its journey toward fulfilling its mission. At the top of our list is the celebration of becoming the largest undergraduate major on campus (woot!), surpassing mechanical engineering for the first time in the fall of 2023. We are also in the process of elevating the Ph.D. in engineering with a concentration in computer science to a full stand-alone Ph.D. in computer science. The department enjoyed an extremely successful recruiting season for faculty, adding nine new instructors, lecturers and professors.

I would once again like to thank SAIC (Science Applications International Corporation) for their continued sponsorship of the *Eagle Drive* magazine and to Amy Davis (’23, ’00) and Rebecca Hahnert (’23) for their curation and production of the magazine. Enjoy reading and thank you for your continued support of the Department of Computer Science.

SCAN THE QR CODE TO READ A VERSION
OF THIS LETTER WRITTEN BY THE BING
CHAT SYSTEM (POWERED BY CHATGPT)



SOARING TO #1

COMPUTER SCIENCE ASCENDS TO TENNESSEE TECH'S TOP UNDERGRADUATE DEGREE PROGRAM BY ENROLLMENT

ENROLLMENT:



INCREASED MS AND PH.D. STUDENTS TO **83**



INCREASED ENROLLMENT OF FIRST-TIME FRESHMEN TO **173**

ENROLLMENT:

↑ **14%**

INCREASED UNDERGRADUATE MAJORS TO **722**



↑ **4.3%**

INCREASED FIRST-TIME FRESHMEN RETENTION TO **83.2%**



↑ **41%**

INCREASED DATA SCIENCE & ARTIFICIAL INTELLIGENCE CONCENTRATION ENROLLMENT TO **103**

STUDENT ORGANIZATIONS:

[ASSOCIATION FOR COMPUTING MACHINERY: ACM & ACM-W STUDENT CHAPTERS](#) • [DEFENSE & OFFENSE CYBER INTEREST GROUPS](#)
[COMPUTER SCIENCE HOUSE SYSTEM](#) • [GRADUATE STUDENT CLUB](#) • [AUTONOMOUS ROBOTICS CLUB](#) • [GAME DEVELOPMENT CLUB](#)
[WOMEN IN CYBERSECURITY \(WICYS\) STUDENT CHAPTER](#) • [CAPTURE THE FLAG INTEREST GROUP](#) • [CYBEREAGLES](#) • [DATA SCIENCE LEAGUE](#)

GRADUATES:
FALL 2022 - SUMMER 2023

↑ 12%

INCREASED BS, MS AND PH.D.
DEGREES CONFERRED TO **157**

- UNDERGRADUATE: 129
- MASTER'S: 20
- PH.D.: 8



CONCENTRATIONS:

- DATA SCIENCE & ARTIFICIAL INTELLIGENCE
- INFORMATION ASSURANCE & CYBERSECURITY
- HIGH-PERFORMANCE COMPUTING

RESEARCH DOLLARS:
FISCAL YEAR 2023



PROPOSALS: \$8,910,411
AWARDS: \$2,526,227
ACTIVATIONS: \$3,204,367



INCREASED FACULTY BY NINE
MEMBERS (SEE PAGES 10-13)



MINDS COMING TOGETHER

📍 NEW CENTER ADVANCING ROLE OF AI ON CAMPUS

IT HAD BEEN ON THEIR MINDS FOR A WHILE.

But computer science professors Doug Talbert, Ph.D., ('91) and William Eberle, Ph.D., weren't the only faculty members and researchers contemplating the need for conversations and collaborations regarding emerging artificial intelligence technology at Tennessee Tech. Now – with the establishment of a new center called MInDS – departments can work together to advance the role of AI on campus.

"There's already a ton going on in artificial intelligence, but we've been like a bunch of little islands – sometimes we work together, sometimes we don't," Talbert said. "We can be a lot more effective if we coordinate. The center will facilitate those conversations."

Talbert and Eberle serve as co-directors of MInDS, which stands for Machine Intelligence and Data Science. They are also part of a campus task force focused on AI.

"We've talked about an AI center for a while, but the task force gave us a good reason to move forward with it now, along with the AI Tennessee Initiative," Talbert said, referring to a statewide effort led by Tech alumna Lynne Parker, Ph.D., ('83) to position Tennessee as a leader in the data-intensive knowledge economy. (See page 30 to learn more.) "The landscape of large-scale educational and research opportunities in AI is evolving rapidly, so we needed an organization to coordinate resources and responses."

MInDS, which launched in August 2023 and is housed within Volpe Library, operates similarly to the university's Cybersecurity Education, Research and Outreach Center. Both are part of the College of Engineering.

"When you think about cyber at Tennessee Tech, you think about CEROC," Talbert said. "MInDS is the same but on the AI side – not that we're doing it all, but we're sort of the portal into that world here on campus."

— ★ THE MISSION OF MINDS IS TO FOSTER WORKFORCE DEVELOPMENT AND KNOWLEDGE CREATION IN ARTIFICIAL INTELLIGENCE AND DATA SCIENCE THROUGH EDUCATION, RESEARCH AND SERVICE TO DRIVE INNOVATION AND EMPOWER FACULTY AND STUDENTS TO THRIVE IN THE KNOWLEDGE AGE.



Computer science professors Doug Talbert, left, and William Eberle, co-directors of MInDS, stand outside Volpe Library, where the new artificial intelligence center will be housed.



AI Corps members Jamie Boyd, Kashaina Nucum, Jared Scott and Ethan Owens meet with MInDS center co-directors Doug Talbert and William Eberle.

Committees will be formed to promote interdisciplinary communication regarding educational and research activities related to AI and data science. “This will allow for the sharing of knowledge, identification of collaboration and resource-sharing opportunities and better coordination of responses to external opportunities with funding agencies, government organizations or industry partners,” Talbert said.

And, just as CEROC offers CyberCorps service scholarships through the National Science Foundation, MInDS is piloting its own workforce development scholarship program, AI Corps, to address the national demand for highly trained AI professionals. The first cohort of scholarship recipients includes juniors Jamie Boyd, Jared Scott and Kashaina Nucum and graduate student Ethan Owens (‘23).

“AI is the next big technological leap we must make,” Boyd said. “It can streamline many processes, and I want to be able to understand it to utilize it.”

AI Corps is already opening career doors for her: “Companies that probably wouldn’t have noticed me before are noticing me now, and I think it will keep opening doors for me in the future because of any internships, conferences or guidance I receive from being a member. All of these will help me become a stronger data scientist and candidate for the job.”

Boyd is excited about the MInDS center as well since it provides an avenue for Tech students to get more engaged with AI. “AI is an ambiguous entity, and it takes a lot to understand it,” she said. “I believe the center can help students understand AI by connecting them to the resources they need.”

And not just computer science majors.

“Every major is being exposed to AI in one way or another,” Eberle said.

Talbert said MInDS is addressing a national focus on workforce development in the AI space.

“Our AI Corps students are part of that effort,” he said. “We’re

also forming an advisory board to determine what skills students need to be workforce-ready when they graduate and what activities they can do both inside and outside the classroom to accomplish that.”

Plans are already underway for the AI Corps scholars to attend the annual Florida Artificial Intelligence Research Society conference in May 2024.

“It is a great conference for introducing students to AI research,” said Talbert, who also serves as FLAIRS’s program chair and co-chair of tracks on healthcare and XAI (Explainable Artificial Intelligence). Eberle is the treasurer of FLAIRS and co-chair of a special track on AI Workforce Development.

It won’t be the first time Tech students have participated in FLAIRS. In May 2023, graduate student Mateo Gannod (‘22) presented his paper, “Semantic Segmentation with Multispectral Satellite Images of Waterfowl Habitat,” covering research done with Tech biology Ph.D. candidate Nick Masto and biology professor Brad Cohen, Ph.D. The project looked at how to use artificial neural networks to assist in the management of the environment to better support the duck population.

Kate Phillips (‘23), now a graduate student, received the Best Student Paper Award for her research paper titled “The Complexity/Accuracy Tradeoff and Group Bias in Machine Learning-Based Trauma Triage Models,” which she presented at FLAIRS.

Back on campus, MInDS hosted a meeting with Vanderbilt University in October 2023 to kick off a collaborative effort between universities that support the Mid-TN AI for Interdisciplinary Imaging Interpretation Alliance. The joint program also includes departments from Tennessee State University, Fisk University and more who are working on AI-related projects, research and community inquiries.

As minds continue coming together at Tech, AI ideas and opportunities will keep flowing. ■

ASK AI

A LOOK AT ARTIFICIAL INTELLIGENCE & ITS IMPACT AT TECH

CAN MACHINES THINK? Pioneering computer scientist Alan Turing posed this question in 1950, and the concept continues to captivate students and researchers of artificial intelligence and machine learning.

Now AI can answer the question for itself:

“Machines, like computers, can process and analyze data, make decisions based on programmed algorithms and perform complex tasks, but they don’t ‘think’ in the way humans do.” – ChatGPT

ChatGPT, a language model developed by Open AI, also “explained” that machines can simulate human-like behavior and intelligence, but they “lack emotions, self-awareness and true understanding, which are essential aspects of human thinking and consciousness.” The tool has quickly become a common way for people to interact with AI in the 2020s. Users download the application on their smartphone or computer, enter questions or information requests and receive human-like responses. The “GPT” stands for genera-

tive pre-trained transformer.

ChatGPT also has uses in academia. At Tennessee Tech, computer science professor Doug Talbert, Ph.D., ('91) said it can be a problem-solving tool. For example, when his research students have questions about coding and debugging, he may encourage them to try it. “Maybe it gives them a starting point on how to think about it,” he said. “They would be googling it anyway... so why not ask ChatGPT?”

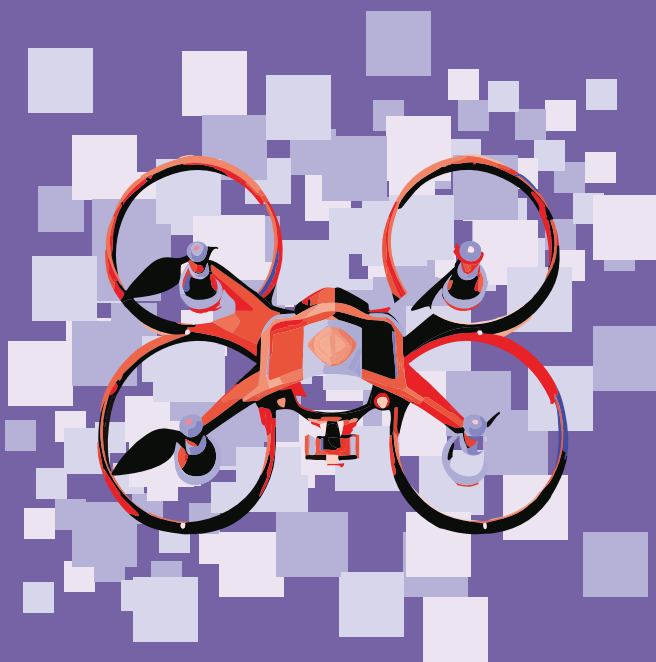
As artificial intelligence continues getting “smarter,” faculty and students alike are considering the opportunities, applications and implications.

Department of Computer Science Chair Gerald Gannod, Ph.D., said students face a future where GPT-based software development tools will be the norm. “As such, we need to provide instruction on how to best employ these tools in everyday software engineering. More so than any other major, computer scientists have the responsibility to know how to use tools like ChatGPT effectively while still leading the way in creating new technologies that impact our industries and communities.”

One way he addressed the innovation was offering a special topics course in the summer of 2023 called “Software Engineering with ChatGPT” in which students explored benefits and challenges related to using an AI assistant to create software. “They were able to gain a deeper understanding of why the concepts they learn in our courses – especially algorithm design, test-driven development and software development – are a necessary foundation for fully understanding how to reap the maximum benefit of using GPT-based software engineering assistants.”

ChatGPT has also caused faculty to consider a crucial question: When is it acceptable to allow students to use generative AI in a course? “We recognize that the technology has the potential to transform our discipline and what we can expect students and graduates of our program to be able to do both while in school and when they move forward in their careers,” Gannod said. “As such, we have to up our game by modifying how we assess student work. This includes making sure we are testing student knowledge that is beyond the capability of what an AI can produce.”

This illustration (left) was partially designed utilizing Adobe Firefly, Adobe's family of creative generative AI models.





Graduate students Umair Mughal, left, and Daniel Richeson use machine learning to develop intrusion detection systems for drones.

Talbert and fellow computer science professor William Eberle, Ph.D., agreed that it's vital to incorporate the tool into computer science education.

"If students don't know how to use it to be more productive more quickly, they're going to be at a disadvantage in the marketplace," Talbert said.

Eberle added, "You can look at it as making life easier. If it can start a process that would have taken longer to figure out – and do it well enough – you can do more things faster."

But students are also faced with an ethical challenge – avoiding AI when instructed not to use it. "Without foundational knowledge of software development, students will be unprepared to step into the workplace," Gannod said. "A cultural change is needed that emphasizes intrinsic-driven learning (wanting to learn) rather than externally motivated learning (driven by grades)."

With rapid advances in the field of AI, students are discovering that it's an exciting time to be a computer science major. For example, Tech's Association for Computing Machinery student chapter presented an artificial intelligence and machine learning demonstration to inspire fellow students. Brett Billingsley, club president, talked about how AI and ML are used in the real world and offered resources, while Garrett Hayes, vice president, demonstrated a facial recognition program he created.

Students are also gaining AI experience through research opportunities alongside professors like Maanak Gupta, Ph.D., (see page 23) and Muhammad Ismail, Ph.D., who serves as principal investigator of numerous grants from the National Science Foundation and Qatar Foundation and leads NSF's CyberCorps Scholarship for Service grant program at Tech.

Ph.D. candidate Umair Mughal has been working with Ismail on a project to defend drones against cyberattacks. "Hackers can attack the autopilot system, so we are developing intrusion detection systems using machine learn-

ing techniques," he said. "We launch cyberattacks on our testbed that consist of drones and hacking tools. Then we collect benign and malicious datasets and develop AI-based intrusion detection systems."

Some of Ismail's other projects include researching the development of AI-based strategies for intrusion detection in cyber-physical critical infrastructure as well as the operation of 5G and beyond wireless networks.

AI research and learning opportunities will continue to grow beyond Bruner and Prescott halls (which house most computer science classrooms) with Tech's new MInDS (Machine Intelligence and Data Science) center (see page 6) and Ashraf Islam Engineering Building, the university's first smart building, which will house the Cybersecurity Education, Research and Outreach Center when complete in 2024.

It's a lot to think about – even for a machine. ■

ASK CHAT GPT: WHAT IS AI?

"Artificial Intelligence refers to the simulation of human intelligence in machines, enabling them to perform tasks that typically require human cognition, such as learning, problem-solving and decision-making. It encompasses various subfields like machine learning, natural language processing and computer vision, allowing AI systems to analyze data, understand language and recognize patterns in images. AI has applications across industries, from healthcare and finance to transportation and entertainment, revolutionizing the way we live and work."

– ChatGPT

UPLOADING...

NEW FACULTY



ANTHONY SKJELLUM, PH.D.
PROFESSOR

HIGH-PERFORMANCE COMPUTING

Anthony Skjellum, Ph.D., collaborated with Tennessee Tech faculty and students for several years and served on the Department of Computer Science's external advisory

board before joining the faculty himself.

"The culture and values of the department, as well as the strength of the faculty and students, drew me to want to be on the faculty," he said.

Skjellum specializes in high-performance computing, primarily middleware for scalable communication, parallel libraries and strategies for performance-portability. He also works on computer security with an emphasis in HPC security. He received all his degrees at Caltech – Ph.D. in chemical engineering in 1990, master's in chemical engineering in 1985 and bachelor's in physics in 1984 – and is a senior member of both IEEE (Institute of Electrical and Electronics Engineers) and ACM (Association for Computing Machinery).

At Tech, he teaches courses in parallel computing, HPC and scientific computing. He has also taught and served in numerous leadership roles at the University of Tennessee at Chattanooga, Auburn University, University of Alabama at Birmingham and Mississippi State University.

TENNESSEE TECH'S DEPARTMENT OF COMPUTER SCIENCE ADDS NINE FACULTY MEMBERS, EACH BRINGING DIVERSE TALENTS AND EXPERTISE TO THE TEAM.



AMR HILAL, PH.D.
ASSOCIATE PROFESSOR

DATA SCIENCE & ARTIFICIAL INTELLIGENCE

Amr Hilal, Ph.D., teaches artificial intelligence in his new role at Tennessee Tech. In addition to AI, his research interests include wireless networks, Internet of Things

(IoT) and machine learning.

"I love to use computer science in general and AI in particular for improving the human condition," he said.

Hilal previously served as an assistant professor at Virginia Tech, where he graduated in 2013 with a Ph.D. in computer engineering. He earned his master's and bachelor's degrees from Alexandria University, Egypt, in 2007 and 2003.

"The CS department at Tennessee Tech is growing strong and has a friendly, enjoyable and supportive atmosphere that encourages collaboration and achievement," he said. "I look forward to collaborating with colleagues and students in teaching and research."



AMANI ALTARAWNEH, PH.D.
ASSISTANT PROFESSOR
INFORMATION ASSURANCE & CYBERSECURITY

Amani Altarawneh, Ph.D., teaches data structures and analysis of algorithms. She was drawn to Tennessee Tech's reputation for strong computer science programs and a vibrant academic community.

"I'm particularly excited about engaging with students, sharing knowledge and contributing to their growth and success in the field of computer science," she said, noting that she is also interested in teaching essential cybersecurity principles such as introduction to blockchain technology, advanced aspects of blockchain and modern cybersecurity concepts.

Altarawneh's primary computer science interests are cybersecurity, Internet of Things (IoT), smart cities, distributed systems and high-performance computing (HPC) security. During her time at Colorado State University and in her Ph.D. studies, she worked on several projects that produced innovative techniques to evaluate security for blockchain systems, IoT and smart-cities applications and HPC.

She earned her doctorate degree in computing engineering/computer science in 2021 from the University of Tennessee at Chattanooga. She holds master's and bachelor's degrees in computer science from Bridgewater State University, Mass., (2010) and Mu'tah University, Jordan, (2005).

As the field of computer science rapidly evolves, Altarawneh looks forward to helping her students master the fundamentals – including algorithms, data structures, programming languages and software engineering principles – so they will have a strong grasp of foundational concepts.



ZULKAR NINE, PH.D.
ASSISTANT PROFESSOR
HIGH-PERFORMANCE COMPUTING

Zulkar Nine, Ph.D., was drawn to Tennessee Tech for its research opportunities and eager learners with whom he can share his passion for computer science.

"Tennessee Tech is a great school to do research," said Nine, who specializes in the intersection of distributed

systems, networking, energy-efficient optimization and machine learning. "As a technological university, it is equipped with wonderful research facilities and many seasoned faculty members to collaborate with. However, the best part is the enthusiastic student body. I want to engage interested students, both undergraduate and graduate, into my research and collaborate with other labs both inside and outside Tech."

Nine earned his Ph.D. in 2020 from the University at Buffalo, New York, where he concentrated in computer systems networking and telecommunications. He received his master's (brain computer interfacing and machine learning) and bachelor's (computer science and engineering) degrees in Bangladesh – from North South University and Military Institute of Science and Technology, respectively. Before coming to Tech, he was a lecturer at Georgia State University.

He is interested in solving problems in Next Generation Internet, augmented reality, virtual reality, Internet of Things (IoT) and networking and computation optimization in autonomous vehicles. "We use many optimization techniques and machine learning to explore many challenging issues in those fields," he said.

Nine began the fall semester teaching operating systems. He is also interested in teaching courses in distributed systems, computer networks, high-performance computing, cloud computing and computer architecture.

📍 AI TIMELINE

1950 —————○
Alan Turing publishes "Computer Machinery and Intelligence," which proposed a test of machine intelligence called the "imitation game."

1952 —————○
Computer scientist Arthur Samuel develops a program to play checkers, which is the first to ever learn the game independently.

1955 —————○
John McCarthy of Massachusetts Institute of Technology coins the term "AI" at the Dartmouth Summer Research Project on Artificial Intelligence. This conference is widely considered to be the founding event of artificial intelligence as a field.



MIR PRITOM, PH.D.
ASSISTANT PROFESSOR
INFORMATION ASSURANCE & CYBERSECURITY

Mir Pritom, Ph.D., is interested in cybersecurity research, particularly in applying interpretable and trustworthy artificial intelligence to enhance trust, transparency and reliability of current and future cyber defense systems. He also enjoys predictive analytics, threat intelligence and

threat-hunting research.

At Tennessee Tech, he teaches software and system security and looks forward to creating other undergraduate and graduate cybersecurity courses to advance the curriculum.

“What stands out for me at Tennessee Tech is the cohesiveness and friendliness between the faculties and staff in the department to create a productive atmosphere,” he said. “I also love the cyber activities at CEROC (Cybersecurity Education, Research and Outreach Center). I want to work with our graduate and undergraduate students and guide them toward creating their success stories through excellence in research and teaching.”

Pritom has also served as an assistant professor at Appalachian State University as well as an instructor at the University of Texas at San Antonio, where he earned his Ph.D. in computer science in 2022. He completed his master’s degree in information technology at the University of North Carolina at Charlotte in 2018 and bachelor’s degree in computer science and engineering at the University of Dhaka, Bangladesh, in 2014.



ERIC BROWN
SENIOR LECTURER
INFORMATION ASSURANCE & CYBERSECURITY

Eric Brown ('06, '93) has long been a familiar face at Tech. Prior to his role as senior lecturer, he served – and continues to serve – at the university’s Cybersecurity Education, Research and Outreach Center, now as associate director for workforce development and outreach.

He teaches Connections to Computing, Introduction to Cybersecurity and Privacy, Introduction to Systems and Networking, IT Security and Software Engineering. His research interests include K20 cyber education, information technology and agile methodologies.

Brown earned both his computer science degrees at Tech – a master’s in 2006 and bachelor’s in 1993. He is also working toward his doctorate.

“I gained a lot professionally from my experience at Tech as a student and returned in 1994 as a staff member,” he said. “I believed, and still believe, that I can make a difference as long as I can serve students, especially in the classroom. This philosophy was a core part of my role as a systems administrator for Computer Science (in the old days), as an associate director in CEROC (in the more recent days) and now as a faculty member in Computer Science.”

SINCE THE 1990S, TENNESSEE TECH'S COMPUTER SCIENCE FACULTY HAVE BEEN VITAL TO THE UNIVERSITY'S AI TIMELINE. THAT JOURNEY CONTINUES AS NEW PROFESSORS AND LECTURERS JOIN THE TEAM TO NOT ONLY PREPARE STUDENTS FOR THE WORLD OF AI BUT ALSO CREATE NEW KNOWLEDGE AND INNOVATIONS THAT ADVANCE THE FIELD.

📍 AI TIMELINE AT TENNESSEE TECH

CIRCA 1990

Tennessee Tech University's first artificial intelligence course is created.

SPRING 2005

First AI-related master's thesis at Tech is given by Sarat Kesiraju: "An Empirical Estimation of the Generalizability of a Wavelet-based Approach to Clustering Time-Series Data". (Advisor Doug Talbert, Ph.D.)

SPRING 2016

First AI-related Ph.D. dissertation at Tech is given by Lenin Mookiah: "Personalized Context Mining of News Streams Using Graph-based Approach." (Advisor Bill Eberle, Ph.D.)

FALL 2016

Data science (DaSc) concentration begins. Its name is later changed to data science and artificial intelligence or DSAI.

FEBRUARY 13, 2018

Data Science League is established at Tech with inaugural meeting.



BENJAMIN BURCHFIELD
LECTURER
SOFTWARE

Benjamin Burchfield ('07, '06) isn't new to Tech. Before joining Computer Science, he worked in Information Technology Services as assistant director of Enterprise Application Systems. Now he teaches DevOps.

Burchfield is a graduate of Tech, having received a master of business administration degree in 2007 and bachelor's in business management with a concentration in management information systems in 2006.

"From the first time I stepped foot on campus as a high school student participating in the science bowl, I was enamored with the atmosphere of possibilities," he said. "As I progressed through my professional career, I often found that I drew upon my experiences at Tech to find solutions. The best part of being here is the ability to engage with students and help share the skills and experiences I have had the opportunity to build through my career."

His research interests include web development, Internet of Things, application of technology in public safety, technology education as a vehicle for economic development in distressed communities, passive capture of organizational knowledge and inventory control.



JACOB STRICKLER
LECTURER
INFORMATION ASSURANCE & CYBERSECURITY

Jacob Strickler ('23, '21) teaches object-oriented programming and design.

A recent graduate of Tennessee Tech, he received his master's degree in 2023 and bachelor's in 2021.

"Tennessee Tech is a renowned engineering school with a strong CS department and a successful security concentration," he said. "I enjoy the Cookeville area and prefer the feeling of a smaller, more personal – and personable – town."

He also has a strong interest in cybersecurity, especially in the area of social engineering.

"I enjoy studying the psychological and sociological mechanisms that attackers exploit to carry out cyber-attacks, which often circumvent – or at least weaken – any technical defenses in place," he said.

While a graduate student, he developed a course on social engineering that is on the roster for spring 2024.



RAJESH MANICAVASAGAM, PH.D.
INSTRUCTOR
SYSTEMS

Rajesh Manicavasagam, Ph.D., ('23) teaches principles of computing and computer architecture. He previously served as an adjunct at Tech and has 13 years of experience in the software industry in Pennsylvania state projects.

His computer science research interests include smart grid, demand response, network protocols and cybersecurity.

What drew him to Tennessee Tech? "Support for research areas that include high-performance computing, smart grid and cybersecurity," he said.

Manicavasagam completed his Ph.D. in engineering (computer science concentration) from Tennessee Tech in fall 2023. He received his master's degree in computer science from Western Kentucky University, Bowling Green, Ky., in 2003 and bachelor of engineering in computer science from Mepco Schlenk Engineering College, India, in 1999.



STUDENT Q&A: DEANNA KING

GRADUATING SENIOR DEANNA KING OF KNOXVILLE REFLECTS ON HER TIME AT TECH - WITH ROBOTICS, ARC, NCWIT & MORE



Senior computer science major Deanna King holds the head of “TALUS,” a robot that resembles a human. She has been working on the TALUS project as part of Tech’s Autonomous Robotics Club.

Q. WHAT LED YOU TO MAJOR IN COMPUTER SCIENCE?

A. I always knew I loved technology and wanted to pursue it as a career. When I started researching colleges, I learned about Tennessee Tech’s computer science program. I came on a campus visit and immediately fell in love with the university and the department. It’s been home ever since!

Q. HOW DID YOUR INTEREST IN ROBOTICS LEAD YOU TO BECOME PRESIDENT OF TECH’S AUTONOMOUS ROBOTICS CLUB?

A. I’ve always had an interest in robotics. Throughout middle and high school, I was a member and mentor of FIRST (For Inspiration and Recognition of Science and Technology) Robotics and Lego league teams. I wanted to continue working on robotics in college, which is why I joined ARC freshman year. I never planned to become president, but I was able to serve two terms starting my sophomore year. It ended up being the best experience!

Q. WHAT IS ARC?

A. ARC is a student organization that allows members to work on various robotics projects based on their personal interests. Some of these projects work toward nationwide competitions, while others aim to benefit the university and its students. As president, I worked hard behind the scenes to make these projects come to life and to provide a sense of community and belonging for club members. Some of the administrative tasks I’ve completed include event planning, budget proposals, media design and project management. I’ve also had the privilege of presenting ARC’s work to local elementary schools, Tech’s Advisory Council for Engineering and at multiple university events and award ceremonies.

Q. WHAT IS THE CONNECTION BETWEEN YOUR WORK IN ROBOTICS AND ARTIFICIAL INTELLIGENCE?

A. Before I became president of ARC, I worked on the TALUS project. TALUS (Totally Autonomous Legless Useful System) is a robot that resembles a human from the waist up. Our goal is to integrate TALUS into campus tours so that prospective students can ask questions about the university and see firsthand what they can accomplish here. Using the Google Assistant SDK (software development kit), I created a baseline voice assistant that allows TALUS to answer basic questions, make small talk and play Mad Libs games. Now, any student who is interested has the opportunity to work on improving TALUS’ ability to process natural language and integrate voice control with robotic motor function.

Q. HOW DO YOU THINK AI WILL IMPACT THE FUTURE?

A. I think AI has many valuable use cases if put in good hands. I hope AI makes healthcare more accessible and provides patients with more accurate diagnoses in less time. I am also curious to see how natural language processing advances and what changes are associated with it. For example, I constantly see “AI covers” of music, where AI learns the voice of an artist and creates a cover of a song. I think this will have a significant impact on intellectual property and copyright laws. Overall, I am optimistic that AI will bring improvements and efficiency to certain aspects of everyday life.

Q. WHAT ELSE HAVE YOU ENJOYED AT TECH?

A. One of the most rewarding experiences was becoming reunited with the NCWIT (National Center for Women and Information Technology) and Aspirations in Computing community. In high school, I received the NCWIT Aspirations Honorable Mention for my work in FIRST robotics. I stayed involved with robotics in college and was a finalist for the NCWIT Collegiate Award in 2022. I was invited to present my work at the award ceremony and watch as the next generation of high school girls received their awards. The next year I was invited again but as a panelist speaker. I remember being in high school and watching the panelist speakers... I was so inspired. It feels so gratifying to become the woman you once looked up to and to hopefully inspire those younger than you. I cannot thank NCWIT and Tennessee Tech enough for these experiences.

Q. HOW ABOUT INTERNSHIP OPPORTUNITIES?

A. I'm grateful to have had an internship with ARCS Aviation in Cookeville, where I assist in the creation of virtual and mixed reality applications used for training and aircraft maintenance and operation. The company has given me the opportunity to apply the skills I have learned throughout my degree completion while also allowing me to experience how a post-graduate work environment functions.

Q. WHAT ARE YOUR PLANS AFTER GRADUATION?

A. I am so excited to say I will be staying at Tennessee Tech to earn my master's in business administration. I loved the administrative side of ARC, so this degree will allow me to combine this passion with my computer science skills in a future career.

Q. HOW WILL YOU CHANGE THE WORLD WITH WHAT YOU LEARN AT TECH?

A. It would be amazing to become a chief technology officer. Less than 10 percent of CTOs in the U.S. are women, so I hope I can use the skills I learn at Tech to inspire other women to pursue technology or leadership and to help increase that percentage.



Q. LOOKING BACK ON YOUR TIME IN TECH'S CS PROGRAM, WHAT ARE YOU MOST PROUD OF?

A. I am so proud of all the accomplishments that ARC has made during my time as president. It was such an honor to watch the club expand and succeed, and it was especially rewarding to watch the club be recognized for our hard work. The organization was awarded Breakout Student Organization of the Year by Tech's Student Government Association, and I am incredibly proud to have received the award of Outstanding Student Organization President of the Year for Academic and Professional Organizations. Both ARC and I have received a lot of love and support from the computer science department, and I am so grateful! It means the world to me to know ARC will continue to be supported as I graduate. ■



(Above) Deanna King and fellow Autonomous Robotics Club member Cole Barrett race their remote-controlled robots.

(Left) Deanna King, center, joins fellow Aspirations in Computing panelists and Tech alumni Shataydrian Marshall ('21) of Lockheed Martin, left, and Andrea Brackett ('93) of Tennessee Valley Authority at the 2023 Aspirations in Computing awards ceremony held at Tech.

Student David Leathers plays a quantum computing game he developed with Associate Professor Muhammad Ismail.

LESSONS IN QUANTUM COMPUTING

TENNESSEE TECH Associate Professor Muhammad Ismail watched with satisfaction as a sleek, shiny android navigated through a dark, foreboding spaceship on the computer monitor. The playable character, controlled by student David Leathers, used quantum computing concepts to unlock doors and communicate with other spacecrafts.

The professor and student had worked together for more than a year – from the time Leathers was in Ismail’s spring 2022 quantum computing class – to develop the video game to help others learn quantum fundamentals.

It’s just one example of how Ismail and fellow computer science professor Anthony Skjellum have been anxious to engage more students in the advancing world of quantum information science. Through their efforts, Tech was one of five universities awarded a three-year grant from the National Science Foundation in fall 2023 to develop quantum computing courses, workshops and research projects through the “Creating and Sustaining a Diverse Community of Expertise in Quantum Information Science Across the Southeastern United States” project, or EQUIS.

“Tennessee Tech is well-positioned to lead the efforts of quantum networking, security, computing and machine learning in the Southeastern U.S.,” Ismail said, adding that three of his quantum-focused master’s students have already graduated, while three Ph.D. candidates are pursuing research. “We aim to compete nationally in these areas, and this award is the first step in that direction as it provides our students with the foundational education and research skills to excel and join the quantum workforce.”

Partnering institutions include the University of Tennessee at Chattanooga, Middle Tennessee State University, Fisk University and Auburn University. Funding between the five schools totaled \$1 million, with Tech’s share the highest at \$270,400.

Skjellum said, “We are preparing for a quantum future in which supercomputing, artificial intelligence and cybersecurity are transformed and enhanced by this emerging technology for computing, communication and security.”

Tech will collaborate with the other EQUIS institutions to develop and deliver quantum education materials at all

five schools. Students will apply for scholarships to cover course tuition and workshops. Oak Ridge National Laboratory and IBM Quantum are lending their support as well by providing speakers, trainings and internship opportunities.


“Quantum information science and engineering is at a formative stage,” Skjellum said. “Many of the advances are taking place in applied physics, physics and electrical engineering labs, but fewer universities are focusing on computer science and computer networking from the application level. We are focused on the practicality of quantum in these areas so that as technologies become feasible, we will have strength in their applications, including algorithms and protocols that advance the state of the field and inform our graduates with state-of-the-art knowledge.”

Ismail said the quantum technology market is projected to be worth \$106 billion by 2040 and generate revenue of \$1,270 billion due to its impact on life science, chemistry, financial services, automotive industry and more. He noted that quantum computing has taken a leap beyond textbook theory: “Now it’s a reality.” ■

ANTHONY SKJELLUM, PH.D.

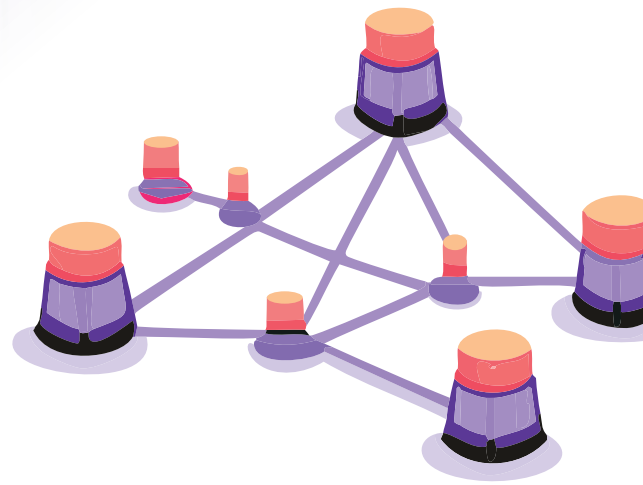
MUHAMMAD ISMAIL, PH.D.



 QUANTUM COMPUTING IS A FORM OF “SUPERCOMPUTING” THAT USES PRINCIPLES OF QUANTUM MECHANICS TO SOLVE COMPLEX PROBLEMS FASTER THAN A CLASSICAL COMPUTER.

NEW SCIENCE DMZ NETWORK

BOOSTS RESEARCH CAPABILITIES



FASTER AND MORE SECURE. That's what every researcher likes to hear when it comes to large data transfers and safe equipment connections – especially at Tennessee Tech, where a new Science DMZ (Demilitarized Zone) network can deliver those benefits and more for all academic and research departments on campus.

Computer Science Assistant Professor Susmit Shannigrahi said the sophisticated network boosts Tech's research and data capabilities and makes collaborations easier since it offers a secure, high-bandwidth pathway.

"It fosters collaborations not only within the university but also with external partners, both nationally and internationally, enabling seamless data sharing and joint research endeavors," he said.

Tech's Science DMZ, launched in July 2023, was funded through a two-year \$276,000 grant from the National Science Foundation. Shannigrahi is the principal investigator alongside co-PI Mike Rogers, associate professor of computer science. Tech's Cybersecurity Education, Research

and Outreach Center helped facilitate the grant, and Information Technology Services implemented the network.

Designed for high-performance applications, the Science DMZ further enhances opportunities for faculty and student researchers and campus centers.

"It provides dedicated systems for data transfers, as well as performance measurement and network testing tools," Shannigrahi said. "It also provides a more flexible infrastructure for research while maintaining robust security measures."

Furthermore, it comes at a record-setting time at Tech. Recognized as an R2 doctoral, high-research activity university by the Carnegie national classification system, it received more than \$36.3 million in externally funded research during the last fiscal year.

The timing was also ideal for CEROC's new associate director of research, Stacy Prowell, Ph.D., who also serves as a distinguished cybersecurity researcher at Oak Ridge National Laboratory.

"The Science DMZ basically connects us to that network," Prowell said. "If we want to collaborate with Oak Ridge or other universities, we can move very large datasets around. You can also set up isolated networks to do the kinds of security testing and experiments I'm interested in. A whole lot of opportunities have opened up."

As for future applications, the Science DMZ will play a vital role in the Ashraf Islam Engineering Building, a forthcoming 100,000-square-foot facility for the College of Engineering.

"As the first 'smart building' on campus, it will leverage the Science DMZ's capabilities to support innovative research, experimentation and data analysis within its premises," Shannigrahi said.

Shannigrahi also noted that the network has the potential to facilitate groundbreaking research across multiple disciplines, including computer science, physics, biology and chemistry.

"As the Science DMZ gains momentum, it will strengthen Tennessee Tech's position as a leading hub for cutting-edge research and innovation, attracting top talent and driving transformative discoveries." ■



Pressing the ceremonial button to open Tech's Science DMZ are, from left, Information Technology Services Assistant Director for Network Operations David Hales, Computer Science Assistant Professor Susmit Shannigrahi and College of Engineering Dean Joseph Slater.

Illustration (upper right) partially designed utilizing Adobe Firefly, Adobe's family of creative generative AI models.

SOARING WITH THEIR PH.D.

Opportunities for exceptional careers in computer science are enhanced when graduate students earn a Ph.D. at Tennessee Tech. Here's what some of the newest recipients had to say about their experiences in the Department of Computer Science – and how they are now distinguishing themselves in the field.



RIMA ASMAR, PH.D., (SUMMER '23) is a cybersecurity researcher at Oak Ridge National Laboratory, where she conducts research to secure the nation's critical infrastructure. She resides in Knoxville.

DISSERTATION: Automated Memory Forensics for Programmable Logic Controllers



KATIE BROWN, PH.D., (SUMMER '23) is a research fellow trainee in Vanderbilt University Medical Center's Department of Biomedical Informatics. A Cookeville native, she plans to continue using and developing artificial intelligence for medical tasks such as clinical decision support.

DISSERTATION: Evaluating, Explaining and Utilizing Model Uncertainty in High-Performing, Opaque Machine Learning Models

RIMA ASMAR, who is from Palestine but was born and lived most of her life in Puerto Rico, said Tech opened doors for her to embark on a challenging journey while juggling the responsibilities of being a single mother and working a full-time job.

"The traditional educational path eluded me as circumstances led me to become a young mother before graduating high school. Despite this, my passion for education propelled me forward. I embarked on my academic journey by obtaining a GED degree, followed by pursuing a fully online bachelor's degree. Later, I seized the opportunity to complete a master's degree. The dream of attaining a Ph.D. seemed distant and improbable. However, today, I stand proud as I have completed the final chapter of my remarkable journey from GED to Ph.D. Along the way, I have set a powerful example for my two daughters, who have consistently been my greatest source of strength and motivation."

Asmar immersed herself in a vibrant community of fellow students and professors. "Every moment spent at Tennessee Tech became a source of joy and fulfillment. Whether it was collaborating on group projects, forging meaningful connections or proudly representing the school at conferences, I cherished every opportunity that made me feel truly connected to the Tennessee Tech community."

KATIE BROWN's greatest research accomplishment at Tech was developing QUEST, a model assessment tool that is guided by uncertainty to find high-performing and low-performing subgroups of data. "Our first paper about QUEST was accepted for publication at one of the top biomedical informatics conferences in the country, and there are interesting ways we can expand QUEST."

Tech made it possible for Brown to remain close to home while pursuing a research-based degree. "Tennessee Tech is special because it provides opportunities for countless people in the Upper Cumberland to receive a high-quality, affordable education." Her best memories at the university are of the people she met, who became some of her closest friends.

Brown plans to remain in the biomedical informatics field. "I'm excited to learn about the opportunities to apply my computer science and AI skills and choose a career path that mixes research and development with doing something that can benefit people."

MD AMINUL ISLAM began his computer science graduate studies at Tennessee Tech in 2019. His research interests are in the field of machine learning applied to smart power grid routing.

He enjoyed many things while a student in Tech's College of Engineering, including Cookeville's nice weather and being part of a technical and specialized university. "The people of Tennessee are very cordial and just awesome."

PRABIN LAMICHHANE chose Tech because of its specialized programs and cutting-edge research in computer science. "Tennessee Tech offers a structured curriculum and diverse courses that provide the required breadth and depth of knowledge, allowing me to explore my interests and develop expertise in my chosen area."

He said those "aha" moments, "like when you suddenly get clicks on research problems that lead you to better ideas," are special memories from his studies at Tech.

M RAYHAN AHMED MITHU chose Tennessee Tech "because of its great academic reputation and diverse research opportunities in computer science. The cultural diversity and support for international students was also very appealing."

Mithu developed independence and resilience at Tech, and the university's state-of-the-art resources were instrumental in enhancing the depth and quality of his research and paving his career path.

"I was privileged to be a part of a vibrant academic community that fostered networking with accomplished faculty. The rigorous curriculum sharpened my analytical and problem-solving abilities, and the array of research opportunities allowed me to make meaningful contributions to the field."

AHSAN AYUB served as a graduate research assistant at Tech's Cybersecurity Education, Research and Outreach Center (CEROC); instructed undergraduate courses (Programming in C++ and Introduction to Problem Solving); was president of the Computer Science Graduate Student Club; and did an internship as a security engineer at AllianceBernstein. He was also a competitive programming coach: "I delivered lectures and organized practice contests to teach mathematics, data structure and algorithms-related problem-solving topics to undergraduate students."

His research interests include computer security, machine learning and malware analysis. ■



MD AMINUL ISLAM, PH.D., (SPRING '23) is an assistant professor in the Department of Computer Science and Engineering at Jagannath University in Dhaka, Bangladesh.

DISSERTATION: Proactive Routing in Smart Power Grids



PRABIN LAMICHHANE, PH.D., (FALL '22) is a senior data scientist at MasterCard. A native of Nepal, he resides in St. Louis, Mo.

DISSERTATION: Anomaly Detection, Clustering and Visualization on Dynamic Graphs



M RAYHAN AHMED MITHU, PH.D., (SUMMER '23) is a lead engineer at GAFFL Inc., where he develops AI-driven solutions to help the company grow. A native of Dhaka, Bangladesh, he resides in Cookeville while his wife pursues her Ph.D. at Tech.

DISSERTATION: Incorporating a Knowledge Base into Machine Learning Techniques for Forensic Analysis of Control Systems



AHSAN AYUB, PH.D., (SPRING '23) is a security data scientist at Enzym AI, based in Seattle, Wash. Working remotely, Ayub, a native of Dhaka, Bangladesh, contributes to the development of an AI co-pilot for cybersecurity operation.

DISSERTATION: A Data-Driven Approach for Early Detection of Cryptographic Windows Ransomware

LEARNING TO LEAD: STUDENTS, FACULTY & STAFF GAIN SKILLS THROUGH LEAD CS

AS TENNESSEE TECH'S SPRING 2023 GRADUATES turned their tassels on commencement day, a group of computer science students celebrated a graduation of their own.

They were among the first cohort to complete a new semester-long program called LEAD CS through which they developed and enhanced their leadership skills and mindsets for when their time comes to make an impression in the computing industry.

"The Department of Computer Science has long understood that to enable the success of our faculty, staff and students that a commitment must be made to develop the whole self and not just focus on academic and scholarly endeavors," Gerald Gannod, Ph.D., department chair and professor, said.

LEAD stands for Leadership in Education to Accelerate Direction. The program launched in January 2023 with character strengths-based personality assessments and team-building activities and progressed through the semester with virtual sessions and challenges focused on self-awareness, environmental awareness, mentorship, values and culture, conversational dialogue, empathy, ethics and relationship building. It concluded in May with a full-day celebration featuring "LEAD blueprint" presentations by participants, who shared their leadership identities, goals and vision statements, and a formal dinner and etiquette session at Walton House led by Tennessee Tech First Lady Kari Oldham.

The first LEAD CS cohort includes, in front from left, Minh-nghi Vu, Alyssa Kitchen, Danyelle Hawkins and, in back, Sierra Osborne, Edward Gannod, Patrick Rhoton, Landon Crabtree, Braxton Westbrook, Mariam Gado, Bobby Bumbalough, Beth Hedge, April Crockett and (not pictured) Mostaq Hossain.





Landon Crabtree, right, engages in a LEAD CS activity with Braxton Westbrook and Alyssa Kitchen.

“

I LEARNED THAT EVERYBODY IS DIFFERENT IN THE WAY THEY THINK ABOUT PROBLEMS. THE PERSONALITY PROFILES GAVE ME INSIGHT INTO HOW OTHER PERSONALITIES GO ABOUT HANDLING STRESS AND CONFRONTATION. KNOWING THAT ALLOWS YOU TO TRULY CONNECT WITH THOSE AROUND YOU AND DO YOUR BEST TO HELP THEM.

-LANDON CRABTREE, JUNIOR

”

Eleven computer science students were selected as participants through an application process: Landon Crabtree, Sierra Osborne, Minh-nghi Vu, Bobby Bumbalough, Braxton Westbrook, Edward Gannod, Alyssa Kitchen, Bethany Hedge, Patrick Rhoton, S M Mostaq Hossain and Mariam Gado. Also taking part were senior lecturer April Crockett ('04,'01) and freshman advisor Danyelle Hawkins ('99), along with Professor Gannod. Several of the department's external advisory board members took part as well by mentoring and sharing their expertise from the computing industry.

To better understand their individual leadership styles and strengths, participants used a personality and behavior awareness platform called Tilt 365®. Gado, a Ph.D. candidate, learned she is a “Master Mind” who thrives on structure.

“I need everything to be organized,” she said. “I was surprised to find out not all leaders are like that. The knowledge that there are other leadership styles was the most

effective thing I learned from this program.”

Other Tilt profiles included “Quiet Genius” (clarity), “Cross Pollinator” (connection) and “Change Catalyst” (impact).

Landon Crabtree, a junior, is a “Quiet Genius.”

He said the skills he gained from LEAD CS came in handy during his summer internship as a security engineer with Microsoft. “That was my first experience working on a large-scale project within a team environment. Even if I didn't necessarily lead the team, leadership skills aren't confined to leadership roles. If you're interacting with others, you can use leadership skills.”

Junior Alyssa Kitchen, a “Quiet Genius” who is interning with SAIC, said LEAD CS allowed her to grow in both her stronger and weaker areas. While she had confidence in her conversational skills going into the program, she had no experience in professional presence and business etiquette. Now she feels more prepared.

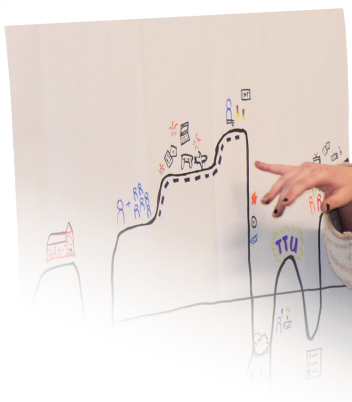
“Knowing how to communicate respectfully and effectively is such an important skill, as well as knowing who is in your network and how to network,” she said. “We also talked about our personal values, which will make choosing a company that aligns with my values so much easier.”

The LEAD CS graduates are now putting their skills to work through the computer science department's house system. When students join the program, they are sorted into one of six “houses” named after pioneering computer scientists Alan Turing, Anita Borg, John von Neumann, Ada Lovelace, Grace Hopper and Edsger Dijkstra. These houses, which serve approximately 880 undergraduate and graduate students, provide an avenue for establishing smaller learning communities and mentorship opportunities within the university's largest undergraduate program.

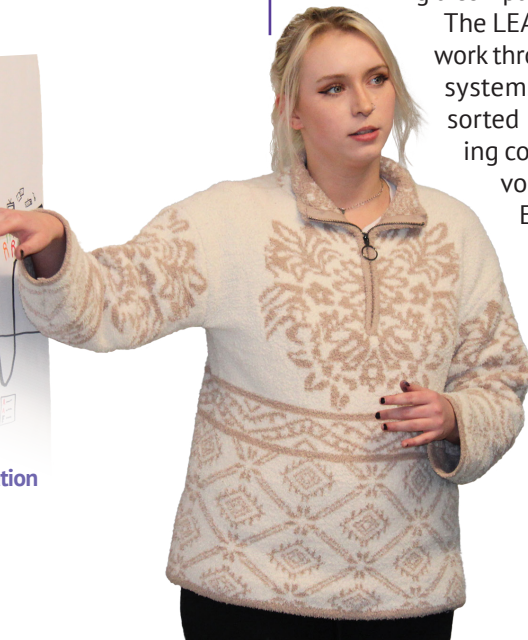
“As new students come in, we are prepared to mentor them during their first year in college,” Kitchen said.

Continued on page 22

SIERRA OSBORNE, SENIOR



Sierra Osborne shares a presentation during a LEAD CS session.



LEAD CS FACULTY & STAFF RETREAT

Gannod said LEAD CS is also beneficial for professional development. That's why the second cohort, which launched in July 2023, consists of computer science faculty and staff members, many of whom are newly hired.



WE WANT TO PREPARE THE NEXT GENERATION OF FACULTY TO COME THROUGH AND LEAD THIS DEPARTMENT – LEAD RESEARCH GROUPS, LEAD COMMITTEES, LEAD WHATEVER IT IS THAT THEY'RE GOING TO LEAD HERE AT THE UNIVERSITY.

–DR. GERALD GANNOD, CHAIR



Like the first session of LEAD CS that was offered to students, the faculty and staff version emphasizes the value of mentorship. Participants, or mentees, include professors Amani Altarawneh, Maanak Gupta, Amr Hilal, Muhammad Ismail, Zulkar Nine, Mir Pritom and Susmit Shannigrahi; lecturers Eric Brown ('06, '93), Travis Brummett and Jacob Strickler ('23, '21); and outreach coordinator Amy Davis ('23, '00).

Crockett and Hawkins from the first cohort now serve as mentors in the second, along with computer science professors William Eberle, Anthony Skjellum, Doug Talbert ('91) and Mike Rogers. Mentors from other campus departments include MacKenzie Allen, associate dean of research and professor of electrical and computer engineering; Michael Allen ('11, '91, '89), interim chair and professor of mathematics; Colin Hill, direc-



Professor William Eberle, center, talks with Assistant Professors Zulkar Nine and Amani Altarawneh during a LEAD CS session for faculty and staff.

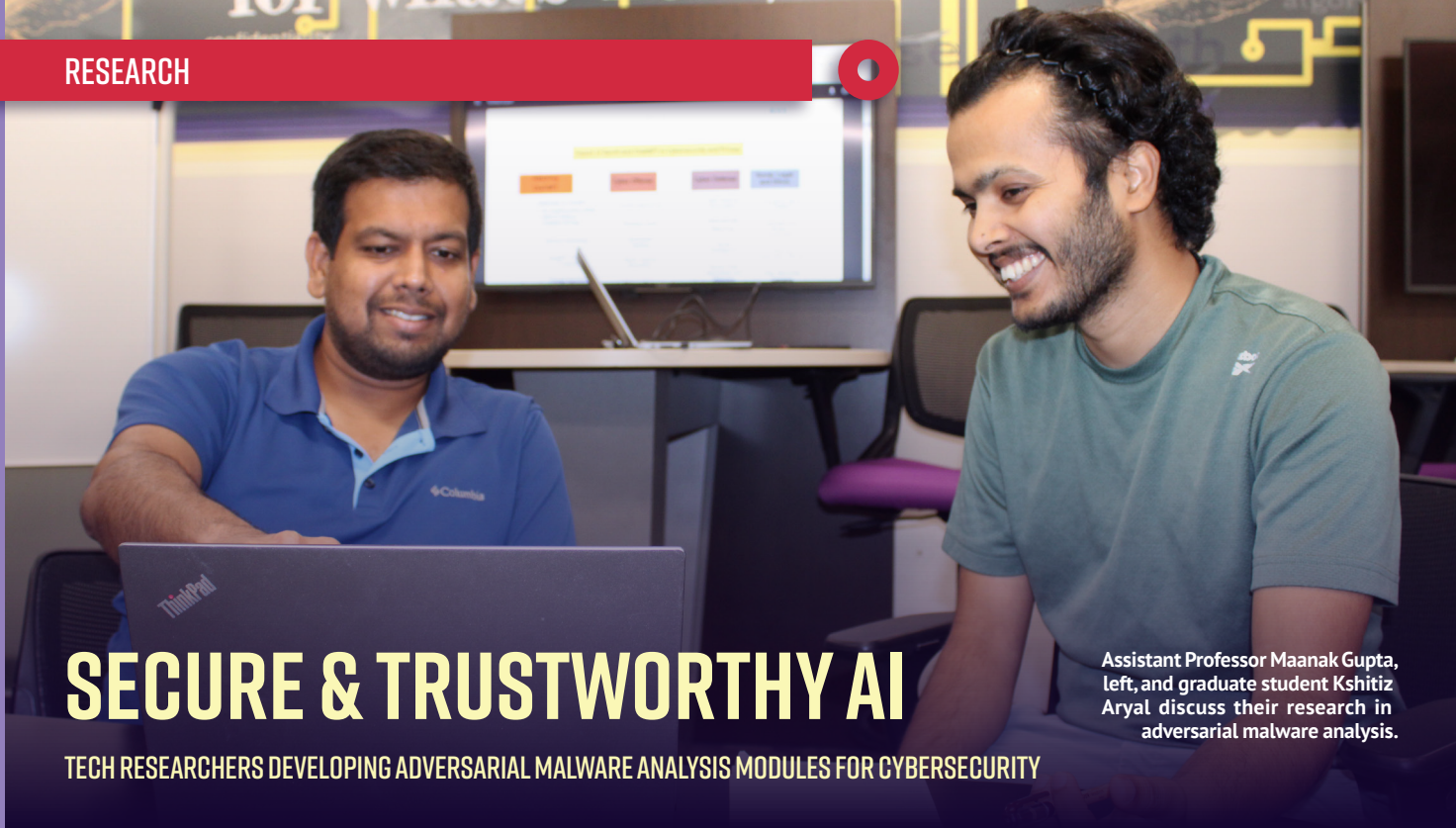


Associate Professors Mike Rogers, left, and Muhammad Ismail, right, engage in a LEAD CS project with Assistant Professor Mir Pritom.

tor of the School of Music; Jeannette Luna, chair and associate professor of earth sciences; and Robby Sanders ('95), interim chair for chemical engineering and associate professor. ■



LEAD CS mentors and mentees gather for a training retreat in July 2023 at Wildwood Resort and Marina.



SECURE & TRUSTWORTHY AI

Assistant Professor Maanak Gupta, left, and graduate student Kshitiz Aryal discuss their research in adversarial malware analysis.

TECH RESEARCHERS DEVELOPING ADVERSARIAL MALWARE ANALYSIS MODULES FOR CYBERSECURITY

ARTIFICIAL INTELLIGENCE IS GETTING SMARTER, but it can be fooled. The bad guys never tire of trying. Neither do the good guys – like Tennessee Tech Assistant Professor Maanak Gupta – when it comes to foiling their plans.

“It’s a great challenge,” said Gupta, who leads a multi-university interdisciplinary team of artificial intelligence, cybersecurity and education experts in researching and developing adversarial malware analysis modules through a National Science Foundation grant. At Tech, he’s been working with Ph.D. student Kshitiz Aryal and assistant professors Cory Gleasman of the College of Education and Indranil Bhattacharya of the Department of Electrical and Computer Engineering.

Tech was awarded \$300,000, while \$200,000 went to collaborator North Carolina Agricultural and Technical State University. For the next three years they’ll be researching the problem and developing curriculum modules that can be integrated into computer science courses.

“While AI performs well on many tasks, it is often vulnerable to corrupt inputs that produce inaccurate responses from learning, reasoning or planning systems,” Gupta said. “Deep learning methods can be fooled by small amounts of input noise crafted by an adversary. Such capabilities allow adversaries to control the systems with little fear of detection.”

Sometimes the bad guys will disguise viruses, making them seem harmless.

“With minor changes, the AI or machine learning system will classify the file as benign rather than malicious,” Gupta said. “Our research is to develop robust and trustworthy AI for cybersecurity.”

Adversaries may even tamper with road signs – which is a big problem for someone in an autonomous car when the AI incorrectly detects “yield” instead of “stop.”

As dependency on AI technology increases, it’s vital to keep it secure.

“Our work aims to test the robustness of existing machine-learning models used in malware detection and classification against adversarial poisoning and adversarial evasion attacks,” Gupta said. “The project includes the entire life cycle of malware analysis, including malware data collection, feature analysis, training machine learning-based malware detectors, carrying out different white-box and black-box adversarial attacks to malware detectors and eventually making the models robust against such attacks.”

Aryal, his student, is happy to be one of the good guys. “It has been a great learning experience for me to work on two of the most cutting-edge topics of the current time: machine learning and malware analysis,” he said. “I am exploring the limitations of machine learning models and the vulnerabilities in the structure of malware files. We are implementing our research findings to devise noble adversarial attacks and defense methods.” ■

SOARING *BEYOND* CAMPUS

THE “CLASSROOM” of some Tennessee Tech computer science students houses the world’s fastest supercomputer. Other learning environments – some close to campus, others farther away – offer a host of other distinctive features and avenues for students to gain skills, build knowledge and connect with industry leaders and mentors.

Experiential learning opportunities through internships and cooperative education can be a highlight in many students’ academic careers. The journey may begin at one of

the numerous career fairs offered at Tech – at least one per semester – where students can meet hundreds of employers looking to fill internship and co-op positions. According to the university’s Center for Career Development, more computer science students attended the fall 2023 Employer Expo than any other major.

Whether students travel for a co-op or internship experience or log in to work remotely, all of them bring something valuable back to Tech – and to their future employers.

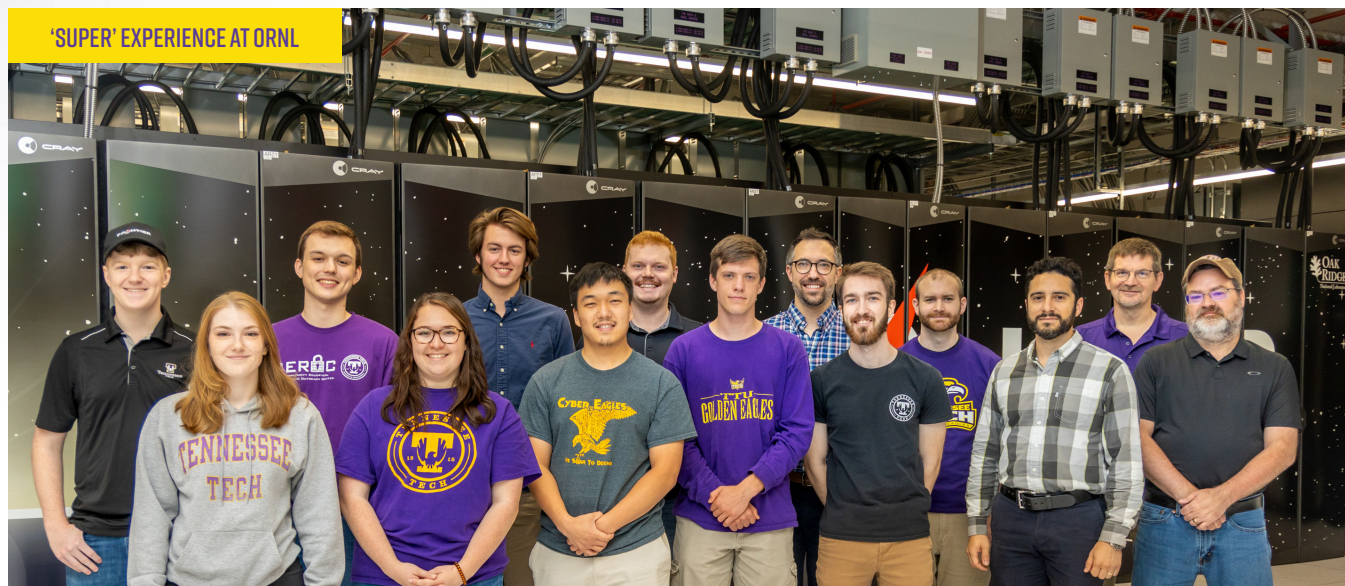


Photo provided by Oak Ridge National Laboratory

Tennessee Tech co-op students, interns and alumni with an interest in high-performance computing gather before the world’s fastest supercomputer – the HPE Cray EX Frontier system – at Oak Ridge National Laboratory’s National Center for Computational Sciences. In front, from left, are interns Callie Stewart ('23) (HPC clusters) and Hallie Sevier ('22) (HPC cybersecurity); co-op student Jacob Latham ('22) (HPC cybersecurity); intern Asa Rentschler (HPC scalable systems); user assistance software engineer Logan Gillum ('22); HPC cybersecurity engineer Hector Suarez ('12); HPC clusters group leader Elton Cranfill; and, in back, co-op student Alex Baker ('23) (HPC cybersecurity); intern Hayden Keller ('23), (HPC cybersecurity); co-op student Ethan Adams (HPC scalable systems); HPC infrastructure systems engineer Blake Breeden ('19); HPC cybersecurity/analytics and monitoring group leader Ryan Adamson; HPC scalable systems engineer Isaac Hall ('20); and HPC scalable systems group leader Don Maxwell ('87).

INTERNSHIP: BETHANIE WILLIAMS

SANDIA NATIONAL LABORATORIES
CYMANLL | CYBERSECURITY MANUFACTURING INNOVATION INSTITUTE



Bethanie Williams ('22), Ph.D. candidate and CyberCorps Scholarship for Service scholar, completed her third summer internship with Sandia National Laboratories (working remotely for the Albuquerque, N.M., location) and the Center for Cyber Defenders program. She also worked with CyManll | Cybersecurity Manufacturing Innovation Institute.

“These past three years have taught me so much, especially in regard to cybersecurity, smart manufacturing and other cyber-physical systems. Being a part of the CCD program has been both challenging and rewarding. At CyManll, I learned more about digital twins in manufacturing environments and utilized various machine learning techniques. I also worked on a project that focused on cyber resilience analysis in industrial control systems, which allowed me to learn more about SCEPTRE’s emulation platform and how to develop surrogate models. Being an intern has allowed me to grow as a professional in the field of cybersecurity with a focus of securing critical infrastructures, such as smart manufacturing. I am so grateful for all my mentors, co-workers and managers who have given me the opportunity to develop new skills and who have pushed me to be the best I can be.”

CO-OP: LOGAN BOLTON

ADTRAN



Logan Bolton, a junior, completed a spring semester co-op with Adtran, a fiber networking and telecommunications company in Huntsville, Ala.

“Adtran is a worldwide internet distribution company. Most of my work there involved distribution on a neighborhood level. The idea is that there is a neighborhood, and everyone needs Wi-Fi. Adtran manufactures the box that takes the input signal and splits it between 50 or so homes. I was on the team writing the firmware for that box. Overall, it was a fantastic learning experience and a great opportunity to work with some truly wonderful people.”

WHAT'S THE DIFFERENCE?

CO-OP:

- Full time, usually involves multiple semesters
- One hour add-on credit each semester shown on transcript

INTERNSHIP:

- Involves one semester or summer
- Credit obtained through academic department

INTERNSHIP: SARA OWENS

NAVAL SURFACE WARFARE CENTER



Sara Owens, a junior, completed a summer internship at the Naval Surface Warfare Center in Dahlgren, Va.

“Internships are such an important part of getting hands-on experience to supplement our education at Tech. At the Naval Surface Warfare Center, I worked on software development on Battle Management Systems supporting the AC-130 and learned so much. They have great peer mentorship pipelines set up, so it was a seamless transition for me from school to working there. I was given freedom to struggle through tickets but also the support to know when I could ask for help. I was excited to take my new skills back into the classroom at Tech to be a more effective student.”

“

TOWARD THE BEGINNING OF THE SUMMER, I STRUGGLED A LOT WITH IMPOSTURE SYNDROME. IT SEEMED LIKE I HAD TO HAVE HELP ON EVERY SINGLE TICKET I ATTEMPTED TO WORK ON. I MENTIONED IT TO ONE OF THE MORE SENIOR EMPLOYEES MENTORING ME. HE ASSURED ME MOST PEOPLE FEEL THAT WAY STARTING OUT AND ENCOURAGED ME THAT I WAS THERE TO LEARN, NOT BE AN EMPLOYEE. THEY DON'T EXPECT YOU TO KNOW EVERYTHING JUST YET, SO ASK THE QUESTIONS YOU WANT TO ASK. IF THEY ARE SMART, THEY WILL ANSWER HAPPILY AS YOUR GREATER UNDERSTANDING OF THE SYSTEM MAKES YOU MORE VALUABLE TO THEM AS AN INTERN AND PROSPECTIVE EMPLOYEE.

- SARA OWENS,
NAVAL SURFACE WARFARE CENTER INTERN

”

CAREER FAIR



More computer science students attended Tennessee Tech's fall 2023 Employer Expo Job and Internship Fair than any other major. This event, which featured 185 employers looking to fill internship positions, drew in 1,571 students – the most ever for a Tech career fair. Of that number, 405 were computer science majors, and out of those 405, freshman students had the highest attendance with 142.

Computer science students like Kaleigh Hooper, Kashaina Nucum and Gary Williams, from left, took the initiative to meet a host of employers and learned how they can apply for internships to gain valuable industry experience.

CS EXTERNAL ADVISORY BOARD & THEIR THOUGHTS ON AI



BARNEY MACCABE, PH.D.
Executive Director
Institute for Computation
and Data-Enabled Insight,
University of Arizona

“The increasing rate of new AI technologies presents great opportunities for computer scientists and engineers. It also represents a great responsibility to ensure that the public is informed and engaged in conversations about the appropriate use of these technologies. Be present in the conversation.”



CHRIS SMITH
National Senior Client
Partner Director
Collaborative Solutions,
Tennessee Tech ('81)

“Our sales forecasting solution utilizes AI technology to analyze data from sales activities such as emails and marketing campaigns/events to provide guidance regarding predictable revenue and results in improved accuracy in forecasting.”



MARK RIGNEY
Vice President and General
Manager, Cyber and Secure
Systems Technology and
Innovative Solutions
Jacobs Engineering,
Tennessee Tech ('86)

“In both IT (Information Technology) and OT (Operational Technology/Critical Infrastructure/Industrial) environments, AI acts as a force multiplier for cybersecurity teams, helping them manage the increasing complexity of cyber threats, automating mundane tasks and freeing up human experts to focus on high-level analysis and strategic decision-making. However, it is essential to remember that AI should be used in conjunction with human expertise, as the synergy between AI and human intelligence is the most potent defense against cyber threats.”



ANDREA BRACKETT
Vice President, Cybersecurity and Chief Information
Security Officer
Tennessee Valley Authority,
Tennessee Tech ('93)

“Artificial intelligence will be both a great opportunity and a great challenge for companies. It will enable businesses to better automate their work and allow their employees to focus on strategy, innovation and employee connections for accomplishing the organization’s goals. Unfortunately, cyber attackers will be using these technologies to improve their efficiency and attack effectiveness. Companies will need to build better defenses and understand their attack surface when incorporating these technologies into their portfolio.”



JANET BURGE, PH.D.

Associate Professor,
Dept. of Mathematics
and Computer Science
Co-Chair,
Colorado College

“AI technology shows a lot of promise, but it comes with significant ethical concerns. It is important to keep those in mind as we figure out how to incorporate it into our work and lives.”



MIKE HELMICK, PH.D.

Senior Technical Director
Roblox

“We should approach the current AI revolution with caution. Much work needs to be done on ethical sourcing of training data to ensure we create fair systems without inherent bias. Our AI systems will only be as good as we train them to be.”



EDWARD SMITH

Manager, Engineering
Talent Management
eviCore Healthcare,
Tennessee Tech ('93)

“AI has the potential to greatly impact how we live, but we need to be realistic and cautious in how we pursue its use. Healthcare is just one example where it can improve our lives: Reduced costs; consistent, appropriate, proactive care; sharing data; creating connections among providers; and reducing the time to approve new drugs and treatments. We still need to focus on ethics, good data and not be overly reliant on its use.”



JILL MOFFITT

Software Engineer Director
SAIC

“Artificial Intelligence is the future of technology, empowering humans to achieve the unimaginable.”



JOHN SEEL, PH. D.

Weapons Control and Integration Department Head
Naval Surface Warfare
Center – Dahlgren Division,
Tennessee Tech ('01)

“AI and ML are disrupting our thinking currently, but the time will come when they are widely understood tools. What is next, I wonder?”



JUSTIN STINSON

Architect/Solutions
Engineer
BOSE Corporation,
Tennessee Tech ('06)

“Artificial intelligence is the new electricity, transforming industries, shaping our lives and redefining the possibilities of human achievement.”
(ChatGPT, 2023)

“Leading the integration of AI into society and people’s lives will likely be the expansion and application of large language models (LLMs). We’re already seeing applications in customer service, shopping, travel and even healthcare that are showing promise. There will be bumps along the road; however, changes of this magnitude are always uneven journeys.”

★ - **CHUCK THACKSTON ('85)**

“I don’t work directly with artificial intelligence, but we are kidding ourselves if we think it is not in use all over the technology we use each day. My biggest fear regarding AI is who is controlling it, be it merchants, activists, politicians or even governments. From a science fiction point of view, I always remember HAL 9000 (the supercomputer from the 1968 film “2001: A Space Odyssey”) attempting to eliminate the crew on its mission because it had conflicting orders. (Although if your eyes don’t get watery when HAL is being deactivated, you must not be a real computer scientist.)

★ - **CHRISTOPHER AUGUSTUS ('90)**

“At TextRequest, we are starting to look at using AI to detect SMS (Short Message Service) messages that are spam or sent by bots.”

★ - **JAMES PETTY ('12)**

“I’ve used ChatGPT several times to help point me in the right direction when I’m stuck in the middle of a project or not sure how to start. This type of AI has been helpful as a brainstorming tool but not so much for serious work.”

★ - **CHRIS SWINDELL ('21)**

ALUMNI THROUGH THE DECADES

& THEIR THOUGHTS ON AI

1980s



DAVID WHALLEY ('81) is a professor of computer science at Florida State University in Tallahassee, where he has been since 1990. In addition to being an E.P. Miles professor, he is a Fulbright Distinguished Chair recipient, FSU Distinguished Research Professor, ACM Distinguished Member and IEEE Fellow. Some of the techniques he developed for compiler optimizations and diagnostic tools are being applied in industrial and academic compilers.



CHUCK THACKSTON ('85) is the managing director of data science and research for Airlines Reporting Corporation. He has been with ARC 15 years and recently relocated to Cookeville. Thackston, who has been involved in the travel technology industry since 1989, is working on several projects to provide better insights for airline industry stakeholders around the world by increasing the overall value of data assets as well as working with his team to create new and innovative ways to extract value from the exponentially expanding scope of available data.

TRACY FARRIS ('86) is a systems analyst with Tennessee Tech University’s Information Technology Services, working in Enterprise Application Systems. She is a Baxter resident.



DAVID RACKLEY ('86) is the owner of Rackley Technologies, LLC, in Pulaski. The company, which he formed in 2003, provides security camera solutions and networking technologies such as wireless, LAN (local area network) and fiberoptic solutions for industries. Rackley and his team are working with their local E911 center to integrate cameras into the computer-aided dispatching to aid first responders. Rackley has also served on the Pulaski City Council, Pulaski/Giles County Economic Development Commission (10 years as chairman), State Election Commission and other voluntary boards. He contributes his success in the computer and technology fields heavily to his education at Tennessee Tech.



SUSAN BURDETTE ('89) is the budget coordinator for the Tennessee Department of Finance and Administration, Division of Budget, in Nashville. She earned her Master of Business Administration from Tech in 1991.

1990s



CHARLIE MCCOY JR. ('90) is a risk management consultant specializing in computer security for The SCE Group, a cybersecurity and data protection firm. A resident of Pleasant View, he performs assessments and policy reviews for customers. He is a certified information systems security professional, information systems auditor and third-party risk professional.



CHRISTOPHER AUGUSTUS ('90) is a data specialist at the Department of Energy’s Office of Scientific and Technical Information in Oak Ridge.

2000s



JEFF RIPPY ('08) is a senior specialist in Tennessee Tech University's Information Technology Services, working in Academic and Client Technologies. He resides in Algood.

2010s



ADA LINDBERG ('11) is a software engineer with CodeHunter, a cybersecurity company, and resides in Knoxville. Lindberg enjoys programming

computer games as a hobby and has fond memories from Tech of participating in ACM (Association for Computing Machinery) programming competitions.



TIMOTHY MYERS ('11) is an advanced software engineer at Adtran, a telecommunications company in Huntsville. Myers, who resides in Harvest, Ala.,

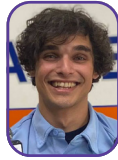
works on microcontroller firmware, the Linux kernel and UEFI (Unified Extensible Firmware Interface) for many of Adtran's current generation aggregation switches and passive optical networking optical line terminal devices.



JAMES PETTY ('12) is an IT director at TextRequest, a business texting platform. Petty, who lives in Chattanooga, is a four-time recipient of the

Microsoft Most Valuable Professional award and author of two books on PowerShell (a Microsoft scripting language used for automating administrative tasks) with Manning Publications.

RADUANUL ISLAM ('16) is a software engineer at Google. He resides in Santa Clara, Calif.



JONAH ABERLE ('18) runs a consulting business, ForYouHR, which he started while a student at Tech. He has continued to expand the company

while also pursuing hobbies and side hustles, including buying and renovating a small apartment building in Chattanooga with his wife, Kathleen. Afterward, they built their own home. Aberle also pursued becoming certified and licensed as an advanced EMT. He volunteers on nights and weekends with his county 911 service.

2020s



CHRIS SWINDELL ('21) anticipates starting his career as an embedded control systems engineer with NAVSEA in Dahlgren, Va., upon receiving

his master's degree in electrical and computer engineering from Tech in December.



ALEX GIBSON ('21) is a full stack software engineer II at Paychex, a human resources and payroll services company. In this position, which he

started shortly after receiving his master's degree in computer science, he creates new client applications and maintains and debugs existing products along with his team. He resides in Nashville.



DEVRAJ CHAUHAN ('22) is an engineering systems analyst at FedEx Express in Memphis. Within its Global Planning, Engineering, Research and

Technology group, he develops and integrates innovative technologies ranging from advanced analytical systems and mobile pickup and delivery solutions to advanced planning and scheduling technology and drones.

"I don't use AI in my current position, but my academic use of AI consisted of multiple courses, research projects and an internship at Oak Ridge National Laboratory. My personal perspective is that we cannot fully comprehend the potential of AI technology. It is still in its infancy, and many experimental (some successful, some not) products are surfacing to consumers. Since our knowledge of this field is developing at a rapid rate, imperfections arise that scare average people. Although complex and seemingly automagical, AI is still a tool like any other and can be a massive benefit to humanity, provided it's not corrupted for evil. I don't believe that sci-fi domination scenarios like 'The Terminator' will be a byproduct of AI experimentation, but I am confident that AI robotic helpers and more will be available within my lifetime. It's unclear the direction AI technology will take us, but I am hopeful it will serve humanity in its next steps in evolution."

★ - ALEX GIBSON ('21)

"AI has seen rapid advancement in the last few years, and with ChatGPT making headlines, it is safe to say we are heading toward an autonomous future. In addition, with breakthroughs in AI technology, there has been a huge shift from home to workplaces, starting with tasks that need minimal supervision. I think that how we live and do things will be changing in the coming years as everything shifts toward AI."

★ - DEVRAJ CHAUHAN ('22)

ALUMNI: WHERE ARE YOU NOW?

SEND THIS INFO TO CSC@TNTECH.EDU

- NAME, GRAD YEAR, CAREER UPDATE, PHOTO
- HOW DID YOUR CS DEGREE FROM TECH MAKE A DIFFERENCE IN YOUR CAREER? WHAT SPECIAL MEMORIES WOULD YOU LIKE TO SHARE?



ALUMNI Q&A: LYNNE PARKER, PH.D. AI TENNESSEE INITIATIVE DIRECTOR

ARTIFICIAL INTELLIGENCE EXPERT Lynne Parker, Ph.D. ('83), hasn't had an idle moment since graduating from Tennessee Tech with a bachelor's degree in computer science in 1983. From her time in Cookeville to her return to her hometown of Knoxville, Parker's career highlights have included distinguished positions at the White House Office of Science and Technology Policy, National Science Foundation, Oak Ridge National Laboratory and University of Tennessee, to name a few.

Parker's footprint is deep in the field of AI. Between 2018 and 2022, she served in various leadership capacities at the nation's capital, including founding director of the National Artificial Intelligence Initiative Office, deputy chief technology officer of the United States and assistant director for artificial intelligence. From 2015 to 2017, she was the NSF's division director of information and intelligent systems.

Most recently, Parker has turned her attention to AI activities at home. She is the associate vice chancellor and director of the AI Tennessee Initiative based at the University of Tennessee, Knoxville, where she has served as a professor and in other leadership roles since 2002. As a researcher, developer and leader, she strives to bring awareness to the field for which she envisions great things.

Q. WHAT WOULD YOU AS A TECH STUDENT IN THE '70S AND '80S HAVE BEEN MOST SURPRISED ABOUT REGARDING THE AI INITIATIVES YOU'VE BEEN PART OF THE PAST FOUR DECADES?

A. When I started out in AI, it seemed rather science fiction. You wondered how you could build software similar to how people think. Fast forward to today, and the field has progressed to the point that it is relevant to almost any discipline or economic sector. Just 10 years ago it seemed like we were still in that science fiction phase, so the degree to which it went to pervasive across everything has been surprising.

Q. WHAT ASPECT OF AI INTERESTS YOU MOST?

A. My research career has focused on AI applied to robotics to help them work together effectively in teams. If

you look at the classic AI textbooks, robotics is typically a chapter. There are aspects of robotics that are not AI – for example, how you build a robot is more mechanical or electrical engineering, but how you control it, some of that is AI. There's an intersection, but my interest has been, "How do we use AI to make a robot smart?"

Q. WHAT IS THE PURPOSE OF THE TENNESSEE AI INITIATIVE?

A. We're working with academic institutions as well as industry and community organizations toward Tennessee becoming a leader in the data-intensive knowledge economy. We have a lot of pockets of excellence across the state, not only in foundational AI but also in AI being applied to various disciplines. What we haven't really had is a big-picture view or leadership that looks at opportunities on how we can all work together and identify areas where we can make strategic investments that help us build not only the research capacity and contributions but also education and workforce training opportunities so students can be prepared for this new era of AI.

Q. WHAT ARE SOME AI CAREER PATHS?

A. There are two broad categories – foundational and use-inspired or discipline-specific. In foundational, you become a deep AI expert, building new AI models and machine learning algorithms. Obviously, there are lots of opportunities in tech companies and research. Then in use-inspired or discipline-specific, you leverage existing AI tools in some discipline. Nearly every job is now touched by AI, so I think everyone will need to understand how to use AI as tools. The more challenging question is, "In what jobs will you not use AI?"

Q. WHAT'S IT LIKE BEING A LEADER IN THE AI FIELD?

A. Thrilling! I enjoy the strategic view as well as the technical aspects. It's been a privilege to combine those and think about policy questions, research investment questions, governance issues, education, workforce development and industry opportunities from a big-picture perspective. I was fortunate to have been in the middle of all the AI activities at the time when artificial intelligence exploded onto the public scene.

Q. WHAT ARE YOU MOST PROUD OF IN YOUR CAREER?

A. It's always been about impact. How can I make an impact for the betterment of students, the research and our nation and state based on my skills and the opportunities presented at a given time? I really enjoy the field. It's not just an intellectual curiosity; it's also, "How can I help society?" That's why it's been so much fun. ■

Photo (left) provided by the University of Tennessee, Knoxville





Computer science professors Martha Kosa and Mark Boshart, who retired in 2021, chat with students Logan Sanders and Nerea Del Olmo Perez.

WANT TO MAKE AN **IMPACT?**

Scholarships are gifts that allow computer science students to dream big and succeed in their academic and career ambitions with less financial burden. That’s why a gift to the Boshart Kosa Academic Excellence Scholarship is so impactful. The scholarship, available to undergraduate computer science majors, was established in honor of the retirement of computer science professors Dr. Mark Boshart and Dr. Martha Kosa, who enjoyed 21 and 28 years, respectively, of service in Tennessee Tech’s Department of Computer Science before retiring in 2021.

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CELEBRATE CS

JOIN US!

We are planning a celebration for all things computer science - our students, faculty, new graduates, alumni, industry leaders and friends.

Please join us for Celebrate CS on the evening of April 23, 2024, at Bruner Hall on the campus of Tennessee Tech. This is an opportunity to meet students, learn about their projects, offer encouragement, enjoy hors d’oeuvres and reconnect with professors and classmates. Interested? Look for an email in early 2024 with more details.

STAY CONNECTED:

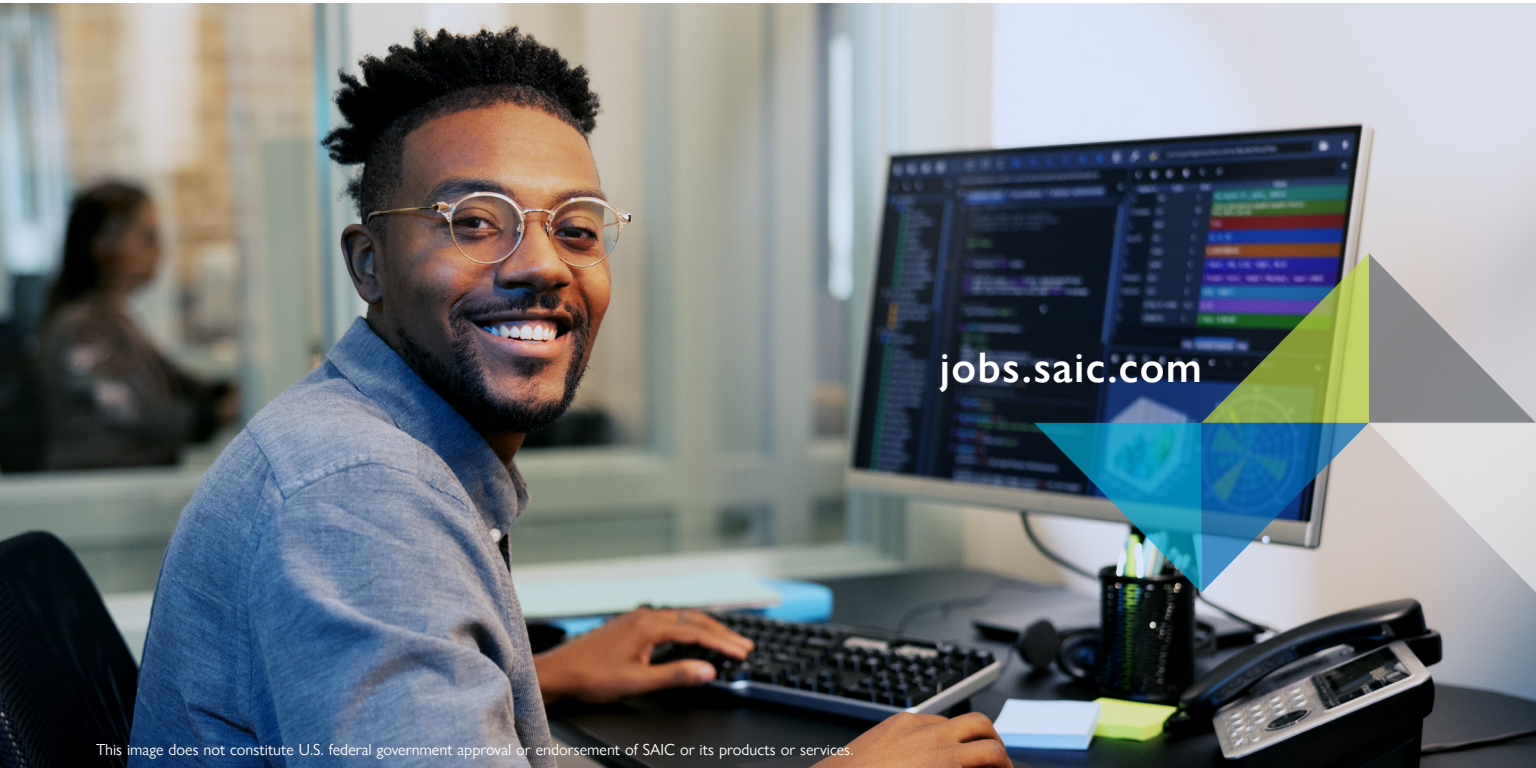




Computer Science

TENNESSEE TECH

Tennessee Technological University
Department of Computer Science
1000 N. Dixie Ave.
Campus Box 5101
Cookeville, TN 38505-0001



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