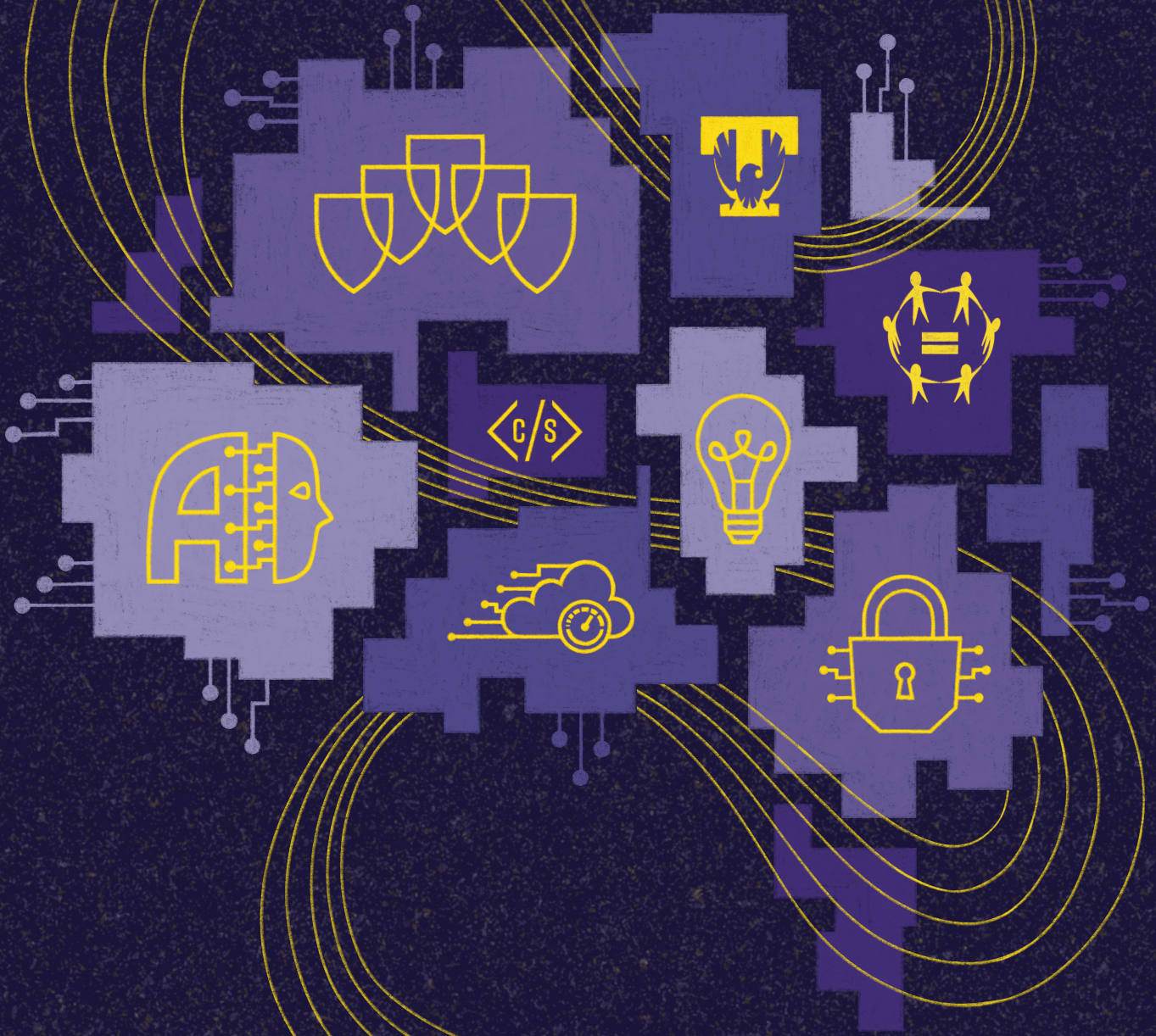
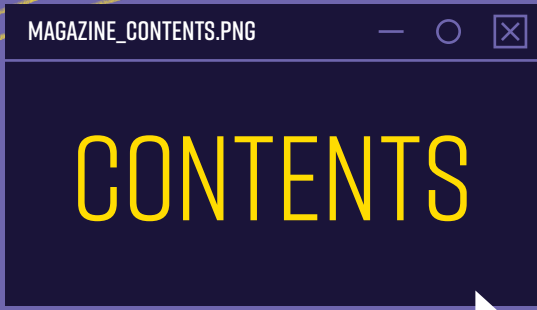


< EAGLE DRIVE / >



DEPARTMENT OF COMPUTER SCIENCE
TENNESSEE TECH 2022



3

WORD FROM THE CHAIR



4-5

WELCOME HOME: HOUSE SYSTEM



6-7

WHERE COMPUTER SCIENTISTS SOAR



8-9

THE BEST START... AND FINISH



10-11

SENIOR CAPSTONE PROJECTS



12-13

FROM TTU TO NSF



14-15

CYBERSECURITY VIDEO CONTEST WINNER



16

WORLD-RANKING SPEED CUBER



17

PHD GRADS



18-19

CISE SUMMER RESEARCH



20-21

EXTENDED REALITY RESEARCH



22-23

6G RESEARCH



24-26

TECH TWOSOMES



27-29

GRADS THROUGH THE DECADES



30

WAYS TO GIVE & STAY CONNECTED



31

EXTERNAL ADVISORY BOARD QUOTES

MAGAZINE_CONTRIBUTORS.PNG


Department Chair: Dr. Gerald Gannod

Outreach Coordinator: Amy Davis

Graphic Designer: Rebecca Hahnert



Tennessee Tech does not condone and will not tolerate discrimination against any individual on the basis of race, religion, color, creed, sex, age, national origin, genetic information, disability, veteran status, and any other basis protected by federal and state civil rights law. Inquiries regarding the nondiscrimination policies should be directed to equity@tntech.edu. CENR60-PRNT-23



HOW MANY YEARS HAS TTU OFFERED A MASTER'S DEGREE IN COMPUTER SCIENCE? SEARCH THIS MAGAZINE AND COUNT THE DUCKS TO FIND OUT...STARTING WITH THIS ONE! FIND THEM ALL AND SCAN THE QR CODE ON PAGE 30 TO BE ENTERED IN A PRIZE DRAWING!



The Department of Computer Science has been through many changes since the last edition of Eagle Drive magazine in 2020, including moving back into Bruner Hall after an 18-month renovation project. Along the way we have reaffirmed our accreditation through ABET (Accreditation Board for Engineering and Technology) and committed to a new strategic plan that focuses our energies toward supporting student success, faculty development and fostering community.

We've continued to experience growth of our programs (see pages 6-7), including solidifying our standing as the second-largest undergraduate program while also growing our master's and Ph.D. programs. To address growth, we have created a new house system (see pages 4-5) for helping to build a sense of community for our students, faculty and staff. I am personally happy with how the year has started, especially with new student kickoffs for undergraduate and graduate students and a duck hunt (we have been hiding rubber ducks on campus!) meant to help students make a fun transition back to campus while also teaching them about rubber duck debugging.

Also in these pages you will read about the many successes of our students and faculty, which include senior capstone projects, undergraduate research, faculty research and new curricular innovations. A new section in the magazine brings alumni into focus as we hear from various graduates through the decades from the 1970s to the 2020s. We also have a feature on "Tech Twosomes" – married couples who met as students in CS, and you'll get a chance to learn about our external advisory board members.

Finally, I'd like to thank SAIC (Science Applications International Corporation) for again sponsoring the production of the magazine. Anyway, I hope you enjoy reading it, and thank all of you for being a part of the Department of Computer Science!

Dr. Gerald C. Gannod
Department of Computer Science Chair



WELCOME HOME

DEPARTMENT OF COMPUTER SCIENCE ESTABLISHES HOUSE SYSTEM TO BUILD LEARNING COMMUNITIES, PROMOTE CONNECTIONS AND FACILITATE MENTORING OPPORTUNITIES



Computer science majors at Tennessee Tech have six new reasons to feel more at home.

Midway through the spring 2022 semester, students received an email notifying them that they had been sorted into one of six houses named after influential computer scientists - Ada Lovelace, Alan Turing, Anita Borg, Edsger Dijkstra, Grace Hopper and John von Neumann.

“Welcome to your house!” the email said.

Soon after, students voted on house crest designs, joined house Discord servers and attended kickoff events to learn more about how a computer science house system could enhance their learning experience within the second-largest program in the university’s College of Engineering.

“The house system is important for people to be able to know others and to be known,” Department Chair Gerald Gannod, Ph.D., said.

Over the summer, nearly 250 new freshmen, transfer students and interdisciplinary students with an interest in computer science were assigned to houses, bringing

total membership close to 800 – or approximately 130 students per house.

GOALS OF THE HOUSE SYSTEM INCLUDE BUILDING LEARNING COMMUNITIES, PROMOTING CONNECTIONS AND FACILITATING MENTORING OPPORTUNITIES.

The idea came about two years ago when the university’s freshman advising structure changed with the creation of the Launchpad Student Success Center.

“What this did was create a situation where our faculty would have fewer touchpoints with students because they would be doing less academic advising,” Gannod said. “Without that vehicle, the only time students and faculty would ever get to know each other would be in classes.”

The lack of that informal connection through advising, along with the growing number of computer science majors, brought about a need for more faculty mentoring opportunities.

Lecturer April Crockett, a faculty

leader in House Lovelace, is excited about the possibilities.

“Since each house comprises faculty, graduate students and all levels of undergraduate students, there will be plenty of mentorship opportunities,” she said. “This will allow students to engage with faculty in a meaningful way. Students and faculty will feel more connected and can learn from each other in a more casual and fun setting outside of the classroom.”

Crockett said the house system will allow students to be part of a family group with people who have similar interests and goals. Friendly competitions between houses offer additional benefits.

“Through competitions, students can improve technical skills, gain a better understanding of how to deal with conflicting ideas and learn how to collaborate with widely differing personalities,” she said.

Sophomores Nate Dunlap and Alyssa Kitchen, two of several students involved in the launching of the house system, were instrumental in the technical setup of the Discord servers for each house.



STUDENT ORGANIZATIONS:

- ASSOCIATION FOR COMPUTING MACHINERY: ACM AND ACM-W STUDENT CHAPTERS
- AUTONOMOUS ROBOTICS CLUB
- CYBEREAGLES
- DATA SCIENCE LEAGUE
- DEFENSIVE & OFFENSIVE CYBER INTEREST GROUPS
- GAME DEVELOPMENT CLUB
- GRADUATE STUDENT CLUB
- WOMEN IN CYBERSECURITY (WICYS) STUDENT CHAPTER



ISAAC BLAND OF HOUSE TURING AND DEANNA KING OF HOUSE LOVELACE CHECK OUT ALL THE CS HOUSE SHIELD CRESTS.

“Discord is a pretty common venue for communication nowadays, especially among computer science majors,” Dunlap said.

When he first heard about the house system, he immediately connected with the vision.

“I saw a really good opportunity to make a very lively and active community,” he said.

He envisioned friend groups within the department getting together to study for classes as well as engaging in activities outside of campus. He also pictured fun events like capture the flag and various cybersecurity and programming challenges.

“I think we’re on track to make that a reality,” he said.

Kitchen said the house system will make it easier to connect with students who have similar interests.

“I look forward to meeting up with housemates and friends in person after spending time with them on Discord,” she said. “I’m hoping we can move this online community into the real world.”

Students can get involved and benefit from the house system in several ways.

“Peer mentoring, I think, is going to be a big deal with this,” Gannod said. “Students who have been here

a while can hand down knowledge gained from courses they’ve taken and professors they’ve had. They can help underclassmen learn the ropes of what it means to be a computer science student. And then there’s going to be the fun piece of having game nights or times when people just get together for whatever reason through the house system.”

Community service and outreach projects are also in the plan.

“There are so many different aspects to this,” Gannod said. “It really is that part of our strategic plan of focusing on community building, focusing on people. This is a way for us to do that.”



WHERE COMPUTER SCIENTISTS SOAR

TENNESSEE TECH'S SECOND-LARGEST PROGRAM COMPUTES GROWTH

CONCENTRATIONS:

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

GRADUATES:

FALL 2021-SUMMER 2022

- UNDERGRADUATE - 118
 - MASTER'S - 22
 - PH.D. - 6
- (TOTAL: 146)

ENROLLMENT:

- FALL 2022 - UNDERGRADUATE & GRADUATE STUDENTS
- (TOTAL: APPROXIMATELY 750)



STUDENTS GATHER OUTSIDE OF BRUNER HALL ON THE CAMPUS OF TENNESSEE TECH.

When Nathanael Newton attended freshman orientation in the summer of 2019, he had a sense that something was budding in Tennessee Tech's Department of Computer Science.

Not that it hadn't already been around since 1986.

Not that it hadn't already had a graduate program since 2002.

Not that it hadn't already provided a firm foundation within the College of

Engineering for thousands of graduates who had gone on to do big things in the field of computing.

It was something else... a feeling, an energy.

By the time Newton, a Knoxville native, started classes that fall, his experiences on campus surpassed his initial impression.

"The department seemed very established, like they had gotten a lot of traction over the summer," he said. "I

felt like things had grown so much in that short amount of time."

What Newton and other students may not have fully comprehended at the time was that the department had been on an upswing since 2016: a spike in enrollment, a surge of new faculty members, millions of dollars in research awards.

Not only that, but renovations had been underway in Bruner Hall, which houses the computer science department office and many

computer science classrooms and faculty offices. By 2021, students were learning about computing in a vibrant, refurbished environment with dynamic classroom features like tables with rising monitors that provide optimal collaboration spaces for students to plug in their laptops for team projects; white boards that encourage even more collaboration; glass walls for a feeling of openness and modernity; and various forms of integrated virtual technology.

"It feels crisp and fresh," Newton said.

Now computer science is the second-largest program in the university, with approximately 750 undergraduate and graduate students – and that's great news for Department Chair Gerald Gannod, Ph.D., who said the growth of the department is part of a national and global trend of growth in computing programs.

"We have been fortunate in that the college and university have recognized the importance of that growth in a time where universities have struggled to maintain enrollments during the COVID era," he said.

"Without their support we would not be able to provide the environment that students need to become practicing software developers, cybersecurity specialists and data scientists."

Gannod noted opportunities at Tech that computer science students may not find elsewhere.

"I believe what differentiates us over other programs is our focus on community," he said. "We've strategically decided, with the help of our board, faculty, staff and students, to be the kind of place where people

can become who they need to be. We know we only have a short time to have an impact on people who choose to join us here in Cookeville. What is important is whether they leave here being better for the experience."

Deanna King, a junior from Knoxville, has felt that impact.

"I came to Tennessee Tech for the community," she said. "Ever since my first campus visit, the students and faculty in the College of Engineering have made Tech feel like home."

King, who has a concentration in data science and artificial intelligence, plans to put her computer science and software engineering skills to work in the field of robotics. She appreciates the faculty who have made "such a difference" among students.

"It is clear they want us to succeed," she said. "I love Tennessee Tech and the computer science department, and I could not picture myself anywhere else."

Newton noted the value of his coursework.

"I enjoy the career-oriented thought that is built into a lot of the classes," he said. "I first experienced that with DevOps and Object-Oriented Programming, where it was all about 'This is what you're going to face in the real world, and we're going to simulate that in the classroom.'"

What is Gannod's vision for continued success in the department?

"While I am a leader, it is too presumptuous to think my vision

should necessarily be the department's vision," he said. "Instead, I believe it is far more important to put this question to the advisory board, alumni, faculty, staff and, of course, the students. We've done that, and they have said we should focus on student success, faculty development and building a great community. Underlying all of that is a focus on sharing the successes of our department with the greater TTU community, state and region."

BY CREATING THE RIGHT ENVIRONMENT, GANNOD SAID THE DEPARTMENT HAS FOUND THAT THE METRICS OF SUCCESS OFTEN ASSOCIATED WITH ACADEMIC UNITS – SUCH AS INCREASED ENROLLMENTS, IMPROVED RETENTION AND GRADUATION RATES, INCREASED RESEARCH GRANT FUNDING AND GRANT EXPENDITURES – ARE ACHIEVED AS "BY-PRODUCTS OF EXCELLENCE."

With such an environment firmly established at Tech, the only thing left for computer science Golden Eagles like Newton and King to do is soar.

"You're only limited by how much you want and how much you invest yourself into it," Newton said. "Dream big, and don't settle for anything less than what you feel comfortable achieving." ➤



THE BEST START... AND FINISH



NEW STUDENT-CENTERED APPROACH TO INTRODUCTORY COMPUTER SCIENCE COURSE OFFERS TWO PATHS BASED ON EXPERIENCE



Same starting line, same destination.

But students in lecturer April Crockett's Introduction to Problem Solving and Computer Programming course at Tennessee Tech have two paths to get there – purple or gold.

Their choice.

It's a new student-centered learning approach that splits one course into two groups based on experience levels.

"The purple group is for students who have very little or no prior programming experience or who prefer a slower pace," Crockett said. "The gold group is for students who have prior

programming experience or are confident they can pick up the material quickly. Students will decide on the group that best fits their background and learning style."

The idea is that both groups will arrive at the same place by the end of the course.

"It's not that one group will know more things than the other," Crockett said. "Both groups will be ready for Data Structures, which is the next class."

Crockett has high hopes for this first-of-its-kind "experiment" within the Department of Computer Science in what is typically the first major-related course taken by Tennessee

Tech's computer science students. Since it is the initial course, students come to it with varied experience. Some have had AP Computer Science in high school, where they used Java, or maybe even another Tennessee Tech computer science class in which they became acquainted with Python. Others have no knowledge at all of programming languages.

Based on Crockett's observations from having taught the course since 2009, that presents some problems.

"Students with more experience report they are bored during the first month of the course," she said. "Sometimes these students quit attending and end up getting behind in class when more difficult topics arise."

STUDENTS IN CSC 1300 MEET FOR LAB (AT LEFT) WHILE LECTURER APRIL CROCKETT AND TEACHING ASSISTANT ANJANA ASHOKKUMA WORK ON COURSE CONTENT.





COMPUTER SCIENCE STUDENTS GATHER FOR CSC 1300. THIS SEMESTER, THEY WERE GIVEN THE OPTION OF BEING PART OF A PURPLE GROUP OR GOLD GROUP BASED ON THEIR COMPUTING EXPERIENCE.

Or those students might ask questions on topics that go beyond the scope of the course. In that case, classmates with less experience often feel intimidated.

“I’ve had students tell me they feel like they’re behind when they’re not behind at all,” Crockett said. “This may cause students to switch majors because they think they aren’t intellectually sufficient for the material.”

The course – better known as CSC 1300 – is required for not only computer science students but those majoring in computer engineering, electrical engineering, mechanical engineering, multidisciplinary studies with a concentration in computer science education, mathematics and physics.

The redesign of the course was

possible through a College of Engineering initiative called Engineering Enhancements for Student-Centered Learning at Tech – or ESCL@Te. Crockett had proposed the experiment to increase learning for students in CSC 1300 and to create a more engaging classroom environment, no matter their entry-level knowledge.

The award included monetary support that allowed Crockett to pursue training and develop content and assessment strategies during the summer prior to the course. She also gained a teaching assistant – graduate student Anjana Ashokkuma.


By giving students more control over their own educational experience, Crockett anticipates increased retention of computer science majors as well as other majors within the

College of Engineering.

“We hope this research will also aid in providing students a more supportive, inclusive environment,” she said.

Along the way, Crockett will collect data. At the end of the academic year, she’ll share the results with the College of Engineering and submit a paper at a professional conference.

If the redesign is successful, the new approach will continue.

Same starting line, same destination... more finishers. 





SENIOR CAPSTONE PROJECTS BRIDGE GAP BETWEEN STUDENT AND PROFESSIONAL

When Tennessee Tech spring graduate Evan Sells began his computer science studies, he didn't know his path would eventually take him back in time.

But that's what happened when he, along with the rest of his senior capstone project team, partnered with Tennessee State Parks to create an augmented reality application that brings Civilian Conservation Corps scenes from the 1930s back to life at Frozen Head State Park.

"When visitors go to the park they can see while on a walking trail what it used to look like," he said. "You'd never know – it's just woods now – that there was a CCC camp there."

The team, which also included Jamison Boyd, Jarrett Tice, Thomas Leisure and Simon Winters, referenced old photographs to create a 3D model of the camp.

The app displays the scene.

Theirs was one of 12 senior capstone projects exhibited by more than 60 computer science majors during the College of Engineering's spring Senior Design Expo Poster Session, held just before commencement. The event gave graduating seniors throughout the College of Engineering an opportunity to showcase and answer questions about their work while interacting with fellow students, faculty members, alumni and industry professionals.

For computer science majors, a capstone project is the culmination of their final two software engineering courses. It is an opportunity for them

to apply all the knowledge and skills they've acquired throughout their college career. Teams partner with different organizations – or "customers" – for several months to complete a "job" that benefits everyone involved.

Autumn Davis was on a team that collaborated with Compassion International, a nonprofit organization, to create a web application called "Opportunity Connector" that connects poverty-stricken people in developing countries with free digital educational resources.

"The first semester, we kind of just learned the rules of the software world and stuff like that, but in the second semester, that's when we actually started writing code and building the website," she said.

Davis, whose team included Alexis

JAMISON BOYD, JARRETT TICE, SIMON WINTERS AND EVAN SELLS, FROM LEFT, PRESENT THEIR TENNESSEE STATE PARKS AUGMENTED REALITY SENIOR CAPSTONE PROJECT.



PARTNERING ORGANIZATIONS OF SENIOR CAPSTONE PROJECTS:

- TENNESSEE STATE PARKS
- COMPASSION INTERNATIONAL
- TRANSCARD
- SAIC
- RURAL REIMAGINED
- PREDISAN
- AVERITT EXPRESS
- NAVSEA
- CRU
- OAK RIDGE NATIONAL LABORATORY
- AO SMITH
- URBAN SCIENCE

Thompson, Jessica Bates, Kase Johnson and William Lewis, was pleased with the outcome of the project and the industry experience it provided.

“It meant a lot because our customer was so involved,” she said. “That made me feel motivated, especially since they are so involved with helping other kids across the world. So, it was great to not just be able to build software, like, for games. It was more than that.”

Sharayah Riedner of Compassion International visited Cookeville from Colorado Springs, Colo., to be part of the Senior Design Expo. She said partnering with Tennessee Tech’s computer science students was an “incredible” experience.

“I loved working with them,” she said. “They brought such fresh energy to the team, and I loved how they thought through the problems. ... They got into the customers’ skin and brain and tried to figure out what they would need and how to prioritize what needed to be built first. I was super impressed with that.”

William Eberle, Ph.D., interim assistant dean of graduate studies and professor of computer science, and Gerald Gannod, Ph.D., chair of the Department of Computer Science, start the capstone project process by making connections with industry professionals to come up with project ideas. Students then submit applications to work on the projects that interest them.

Carli Williams and Keadin Hull were on a team with fellow seniors Bentley Burgess, Mateo Gannod, Ryan



“STUDENTS GET AS CLOSE TO REAL-WORLD EXPERIENCE AS WE CAN GIVE THEM. CUSTOMERS AND ORGANIZATIONS SOMETIMES GET A WORKING PRODUCT OR PROTOTYPE, BUT MOSTLY THEY GET TO BUILD A RELATIONSHIP WITH TENNESSEE TECH AND WORK WITH OUR STUDENTS – WHO MIGHT ALSO EVENTUALLY BE THEIR EMPLOYEES.”

- DR. WILLIAM EBERLE
INTERIM ASSISTANT DEAN OF GRADUATE STUDIES AND PROFESSOR OF COMPUTER SCIENCE

MacGregor and Jordan Myers. Their capstone project – a collaboration with Transcard, a financial technology company based in Chattanooga – was titled “Breadcrumb Fraud Detection.”

They were tasked with creating “a data pipeline that accepts a dataset from an API (application programming interface), formats incoming data, passes the new request to the fraud detection model and returns a verdict based on the model’s results,” as stated on their display board. This would allow Transcard to provide fraud detection as a service feature.

“We worked on a fraud detection API – well, essentially, the pipeline between the API and the AI (artificial intelligence),” Williams said.

Hull said the project was “very illuminating” as to what is expected in the workplace.

“To actually manage something in an industry in an area that we’ve been educated in but hadn’t really gotten to see the guts of – that’s been fantastic,” he said.

Ganesh Krishnamurthy, director of AI at Transcard, joined the team during the Senior Design Expo.

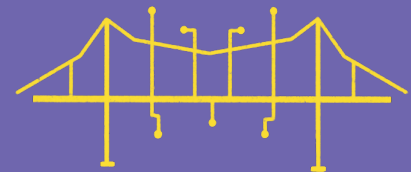
“This is our first time working with Tennessee Tech, so it’s been a good experience on both sides,” he said.

Beneficial too. While students gained real-world, hands-on experience, Transcard gained meaningful improvements to its software system.

“We had an artificial intelligence model built out, but it stayed on the shelf because it was not yet integrated into the overall software system,” Krishnamurthy said. “So, the students designed the piece which integrated the model back with our overall software system. It played a crucial role in making it operational, making it production-worthy.”

Tennessee Tech’s computer science professors gain satisfaction as well, having been involved in each step of the process of bridging the gap between student and professional.

“For me, it is the interaction with the students and watching them learn, struggle and solve real-world problems,” Eberle said. “It is seeing a team succeed and deliver something of value – not unlike what a leader in industry would enjoy.”



FROM TTU TO NSF

DR. AMBAREEN SIRAJ'S
JOURNEY IN CYBERSECURITY
EDUCATION - THEN,
NOW AND NEXT



Ambareen Siraj knows about planting seeds.

The former professor planted quite a few during her 16 years at Tennessee Tech – seeds that established deep roots in the department of computer science and blossomed into various

cybersecurity initiatives, from research projects to student clubs to a global professional organization.

Ultimately, Siraj followed a vine that reached the National Science Foundation in the greater Washington, D.C., area, where she has

been serving as a program director since June 2022.

It's a place, she said, where ideas – like seeds – get resources to grow. The difference for Siraj is that she, like other NSF directors, now tends to seeds sown across the United

States. She channels water so they can bear fruit for those who planted them.

“Having been on the other side, I have seen the impact of NSF at the university level among students, faculty and even people outside the university,” said Siraj, who was a driving force behind numerous NSF-funded projects while at Tennessee Tech. “That’s what motivates me to this day.”

Siraj said she is enjoying settling into her new position at NSF and appreciates the learning opportunities it provides.

“I am a lifelong learner, and wherever I am I’m going to keep on learning,” she said.

She described NSF as a “very enlightened place” that employs individuals from many different backgrounds and facets of science – from renowned scientists to administrators to college professors – all of them working together to ensure competitive research dollars go to worthy projects at the appropriate times “to move the frontiers of science forward.”

“The people who come here are very dedicated and excited about what they’re doing,” she said. “I think one common trait shared by program directors is that they all want to help others with their causes and community.”

Siraj said she is fascinated by the many project proposals that come to NSF from applicants all over the country. In the area of cybersecurity education and workforce development, her team manages and oversees the process that ensures fair merit

review, guidance to applicants before and after a proposal (even if rejected), proper resource allocation for awards and continuous relationship-building across entities.

Siraj may have left the classroom behind, but she is still able to make a difference in students’ lives in the subject she’s most passionate about on a national scale. She never misses a chance to emphasize the importance of cybersecurity – and the increasing need for more cybersecurity professionals.

“**TODAY’S WORLD IS ALL TECHNOLOGY, AND YOU CAN’T HAVE TECHNOLOGY WITHOUT ENSURING THAT TECHNOLOGY WORKS AS YOU EXPECT. THAT’S WHAT CYBERSECURITY DOES FOR US. IT MAKES OUR TECHNOLOGICAL MODERN LIVES POSSIBLE.**”
-DR. AMBAREEN SIRAJ

But more of those skilled people are needed, she said, noting that around 715,000 U.S. cybersecurity jobs are unfilled – and the demand is continually on the rise.

Siraj herself was drawn to cybersecurity as a computer science graduate student at Mississippi State University. Prior to coming to the U.S. to pursue higher studies in 1998, she graduated in applied physics and electronics from the University of Dhaka in her native country,

Bangladesh. After graduation, she worked for two years as a software engineer in Dhaka.


When she began her academic career at Tennessee Tech in 2006, no cybersecurity program existed at the university; however, by 2015, due to her efforts and the increasing demand for more courses, a cybersecurity concentration was added. A year later, she founded and led the College of Engineering’s Cybersecurity Education, Research and Outreach Center.

Siraj also had a major impact on diversity in cybersecurity. Women in Cybersecurity – better known as WiCyS – came about in 2014, having been funded by NSF. Now it’s a global non-profit organization with more than 6,000 members in 70 countries and 180 college student chapters.

While Siraj is no longer involved in projects at Tennessee Tech, she continues to think fondly of the first and only university where she held a faculty position.

Her hopes for the university are continued success and excellence in cybersecurity education.

“I know Tennessee Tech is on a good path with talented and dedicated faculty,” she said. “I can see they are doing wonderful work, and I hope their work continues to impact students’ lives.”

The seed has been planted. 





KAITLYN CARROLL WINS VIDEO CONTEST WITH 'SCARY GOOD CYBER TIPS'



CYBERSECURITY AND ANIMATION SKILLS PAY OFF FOR CS GRAD STUDENT

A tree stands before a full moon, its bare limbs shaky in the night breeze. A dog howls in the distance – and then there’s a message:

“There’s nothing spookier than poor cybersecurity practices.”

It’s the voice of Tennessee Tech University computer science graduate student Kaitlyn Carroll as she narrates the 30-second video that garnered her first-place honors and a \$1,000 cash prize in Temple University’s national Security Awareness Public Service Announcement Contest.

Carroll, who graduated from Tech with a bachelor’s degree in 2021, encourages viewers to “beware of hackers,” “avoid the ghosts of passwords past” and “think before you click on links or download files from unverified sources.”

“People really just need to know general cyber tips for everyday life – things that are easy to implement and easy to put into use to protect yourself,” she said.

The PSA contest offered competitors an opportunity to show off their cyber savviness by producing creative,

informative videos on a variety of topics, including privacy, ransomware, malware, social engineering, phishing and more. Submissions were due in early 2022. Carroll considered a few ideas before deciding on “some scary good tips” to help keep her viewers cyber-safe.

Using her animation skills, she designed spooky characters – including an ax-wielding, hockey-masked “hacker” in a dark forest, a ghost in a graveyard and a group of limbless zombies on a foggy hill – to remind viewers to “carve out time for cybersecurity.” That means doing things



KAITLYN CARROLL USED HER ANIMATION SKILLS TO CREATE HER PRIZE-WINNING VIDEO.



like installing antivirus or malware detection and using a password manager to create unique and complex passwords rather than reusing old ones.

“The contest combined two things I like – cybersecurity and animation,” she said. Carroll animated her cybersecurity video on her iPad, frame by frame, using the digital illustration app Procreate. “The whole trial and error part of putting something together probably took about three days, but the final product took less than 24 hours. I did get pretty hyperfixated on it.”

Cybersecurity competitions are not new to Carroll – nor is winning. Most recently, she was part of a Tennessee Tech team that placed third in the global Collegiate Penetration Testing Competition. She has also participated in the Collegiate Cyber Defense Competition, Department of Energy Cyberforce Competition, and Center for Infrastructure Assurance and Security Hivestorm Competition, among others.

Carroll is a 2018 graduate of Wartburg Central High School. She anticipates graduating from Tennessee Tech with her master’s

degree in computer science in December 2022. Afterward, she plans to work for the government.

“I don’t have anything specific in mind, but I do know that one of the things I want to do is work for the government and do service – that’s a value of mine,” she said. “I’m part of the Cybercorps Scholarship for Service Program, and one of the things they emphasize is service. So, my plan after graduation is to give back to the community and also the country.”

SCAN HERE TO VIEW VIDEO:





💡 CS STUDENT A WORLD-RANKING SPEED CUBER: **ELI PARKER**



A scrambled Rubik's cube won't stay that way long in the hands of Eli Parker.

It'll be solved in less than 10 seconds – and with just one hand.

A colorful blur of twists and spins transpires with rapid clicks as Parker's fingertips direct the action, knowing just where each tiny square of red, blue, yellow, green, white and orange belongs on its respective side of the cube.

"It's something I can relax with because I like getting it solved over and over again," he said. "It's pretty cool."

For Parker – a computer science senior at Tennessee Tech University – speed cubing is also a competitive hobby. Since his first solve back in eighth grade in Jackson, Tenn., he has become heavily involved in the speed cubing community and participated in 45 World Cube Association competitions all over the country.

After winning the Pittsburgh Summer A competition on Aug. 13 with an average solve of 9.73 seconds, his ranking rose to ninth in the world for the 3x3x3 one-handed

event. It was a thrilling feat that led to yet another victory the following week, when he won the Great Lakes Championship one-handed event in Port Huron, Mich. Through all the wins, he was able to scratch a couple of things off his "bucket list" – top 10 status and a regional championship.

"The next move up is going for a podium (top 3) at a larger competition such as the world championship," he said.

Parker described speed cubing as the hobby of solving various puzzles as fast as possible.

"A lot of speed cubing is simply enjoying it and going to comps and having fun," he said. "It has a good community of people who are very supportive."

Parker said he's learned a lot from the hobby – including algorithms, which are helpful in achieving the fastest solves – and has enjoyed the constant challenge of improving his memorization strategies, solve times and WCA ranking.

The one-handed solve is his main event, and he practices hundreds of times a day – even in computer

science class occasionally.

"When I'm in a good streak of cubing, I can do 500 one-handed solves in a day comfortably," he said. "I could probably do an afternoon of 1,000."

Parker noted a connection between his interests in computing and solving the colorful cubed puzzle.

“YOU’RE SOLVING A PROBLEM – GETTING FROM POINT A TO POINT B,” HE SAID. “THAT’S WHAT YOU DO ON A CUBE, AND THAT’S EXACTLY WHAT YOU DO WHEN YOU’RE PROGRAMMING. I FEEL LIKE THERE’S A BIG CORRELATION BETWEEN PEOPLE WHO SOLVE RUBIK’S CUBES AND PEOPLE WHO ARE STEM MAJORS.”
-ELI PARKER

Now it's all about maintaining his top 10 ranking – and possibly attaining a world record.

It's a puzzle he aims to solve. ➤

<C/S> PH.D. GRADS

TENNESSEE TECH'S DEPARTMENT OF COMPUTER SCIENCE HAD A RECORD NUMBER OF PH.D. GRADUATES – A TOTAL OF SIX FROM THE SPRING AND SUMMER 2022 SEMESTERS. FOUR MORE ARE PLANNING TO GRADUATE THIS FALL. HERE ARE CAREER UPDATES AND THOUGHTS FROM OUR GRADUATES ON THEIR EDUCATIONAL JOURNEY:



MD BULBUL SHARIF is a software engineer at Hewlett Packard Enterprise. The Bangladesh native now resides in Washington.

DISSERTATION: AN ADVANCED FRAMEWORK TOWARDS PERFORMANCE PORTABILITY AND PRODUCTIVITY FOR ITERATIVE STENCIL APPLICATIONS IN HPC ENVIRONMENTS

“The curriculum at Tennessee Tech provided me with a solid foundation in my study field. All the professors helped me to complete my research successfully by supporting me in every aspect. I am very thankful to everyone related to my whole graduate studies period, from professors and classmates to office staff.”



FARZANA AHAMED BHUIYAN is a research scientist at Meta. A native of Bangladesh, she now lives in Washington.

DISSERTATION: LEVERAGING VULNERABILITY DISCOVERY STRATEGIES FOR SECURE DEVELOPMENT OF SUPERVISED LEARNING PROJECTS

“I chose Tennessee Tech for its diverse curriculum and international-student-friendly environment. I met different people with admirable goals, including our faculty, who were willing to mentor each other, which made my academic journey an enjoyable one.”



MAHMOUD ABOUYOUSSEF is an assistant professor at the University of Central Arkansas Department of Computer Science and Engineering. He is from Alexandria, Egypt, and resides in Little Rock.

DISSERTATION: S-BAN: SECURE BLOCKCHAIN-BASED ANONYMOUS NETWORKING FOR SMART GRID APPLICATIONS.

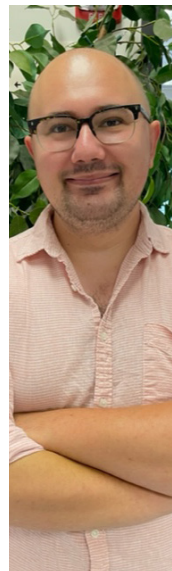
“I had many friends who studied at Tennessee Tech, and they talked about the effort made by all the staff to keep the quality of education as high as possible. Also, the good reputation of the university’s graduate students increases the chances of getting exceptional job offers.”



MD GOLAM MOULA MEHEDI HASAN is an assistant professor of computer science at Iona University in New Rochelle, N.Y. He is from Bangladesh.

DISSERTATION: TARGETED GENERATION OF COUNTERFACTUAL EXAMPLES FOR DATA AUGMENTATION AND TO MITIGATE THE RASHOMON EFFECT

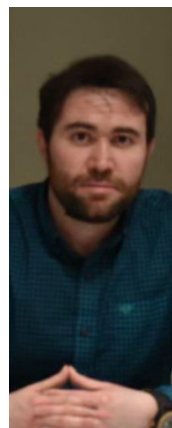
“Tennessee Tech created a fostering environment where I could grow and learn both as a student and as a person. I will always remember the kind of welcoming and friendly behavior I got from every faculty and staff member.”



WILLIAM JOHNSON is a tenure track assistant professor at the Citadel Military College of South Carolina, where he teaches ethical hacking, computer architecture and reverse engineering. He is also the deputy director of academic engagement in the Citadel Department of Defense Cyber Institute. He is from South Pittsburg, Tenn.

DISSERTATION: COMPANION ASSISTED REMOTE ATTESTATION OF EMBEDDED SYSTEMS IN INDUSTRIAL NETWORKS

“My graduate degrees in computer science would not have been possible without my graduate committee and the Cybersecurity Education, Research and Outreach Center. They did a wonderful job of exposing me to a wide variety of security related topics. I firmly believe that Tennessee Tech is a great place to get a graduate degree, and it is only getting better!”



IBRAHIM YILMAZ is a senior data scientist at Optum. He is from Istanbul, Turkey.

DISSERTATION: SECURITY-ENHANCED AUTHENTICATION AND PRIVACY PRESERVING SCHEMES FOR SMART GRID INFRASTRUCTURE

“In my Ph.D. program at Tech, I developed the ability to manage my time while working on several tasks simultaneously and interacted with colleagues, professors and industry professionals, which enabled me to keep abreast of technological advancements. As a result of this special education, I gained high confidence and was able to land my dream job.”



CISE: A SUMMER OF RESEARCH & LEARNING

MAKAYLA HAGGERTY & DR. ULYBYSHEV — SARA OWENS & DR. GANNOD

TENNESSEE TECH COMPUTER SCIENCE SENIOR MAKAYLA HAGGERTY HAS A VISION - ONE THAT WOULD BENEFIT PEOPLE WITH IMPAIRED VISION.

SARA OWENS, A SOPHOMORE IN THE SAME MAJOR, AIMS TO SIMPLIFY A TIME-CONSUMING VERIFICATION TASK FOR PYTHON PROGRAMMERS.

Both students had the opportunity to indulge their interests through summer research projects as recipients of the university's Creative Inquiry Summer Experience grant program.

"It has given me real-life work experience that will help me get a job when I graduate," Haggerty said of the program, which provides monetary assistance up to \$4,000, including a \$3,500 stipend, for summer internships that help undergraduate students develop research and creative inquiry skills.

Haggerty has been working on authentication and access control of a mobile app that aims to improve navigation for visually impaired people on a college campus, while Owens' research has involved creating a virtual assistant that will verify the correctness of programs, mitigating the risks of incomplete testing.

Haggerty said she was eager to get

involved in the project since the focus aligns with her career ambitions.

"It's just something that is very interesting to me," she said. "I want to help those who need the help through technology - primarily the visually impaired because the way they interact with computers is so different, and we don't think about that a lot of times."

Professor Denis Ulybyshev, faculty advisor on the research project, and Vadim Kholodilo, undergraduate student in computer science, started the project in July 2021. The app is designed to help visually impaired people access information about rooms on campus.

"A lot of our buildings aren't properly labeled, and even those that are labeled aren't always accessible to those who are visually impaired," Haggerty said.

Ulybyshev added, "It is a great project

with significant broader impacts and several challenging tasks from computer science."

To help continue the project, Ulybyshev applied for a National Science Foundation grant in collaboration with researchers from Tennessee Tech's Accessible Educational Center; Cybersecurity Education, Research and Outreach Center; and departments of economics, finance and marketing, and mechanical engineering; and from Purdue University.

"If it is funded, we will have more resources to do work and develop our end-user product," he said. "But even now with limited resources we are making progress, in collaboration with the university's ITS team, and the CISE grant helped with that."

Haggerty is pleased with what she has gained from the experience.

"I have learned what is needed to build an app and considerations that need to be taken when making something that is going to be used by the visually impaired," she said.

For Owens, the seed for her CISE experience was planted when she became interested in some research



(LEFT) SARA OWENS SHARES HER CISE RESEARCH PROGRESS WITH PROFESSOR GERALD GANNOD. (RIGHT) MAKAYLA HAGGERTY, LEFT, WORKS ON HER CISE RESEARCH PROJECT WITH PROFESSOR DENIS ULYBYSHEV AND CLASSMATE VADIM KHOLODILO.

that Computer Science Department Chair Gerald Gannod, Ph.D., had posted on the Tennessee Tech website. She emailed him to learn more, and Gannod eventually steered her toward her current project. Then she applied for the CISE grant.

“I started this research during the spring semester as an honors class,” Owens said. “I was just really enjoying what I was learning and didn’t want to have to take a break over the summer.”

Her work has consisted of specification construction for Python programs.

“I’m making a tool,” she said. “Methods of mathematically proving the correctness of these programs already exist, but they’re really complex and long, and most programmers don’t want to do it. So, I’m creating a virtual assistant that is going to generate the proof for you to make sure your program is correct and doing what it’s supposed to do.”

Though Owens has encountered roadblocks along the way, she is happy with the technical knowledge she has gained and is determined to work through challenging issues.

“Up until now the teacher has always had the answers in their back pocket,” she said. “Now I ask a question, and Dr. Gannod and I sit down for two hours and struggle through it together.”

Gannod praised Owens’ skills and enthusiasm.

“The research Sara is conducting is extremely advanced and brings together knowledge of formal semantics of programs, dynamic type checking and theorem proving,” he said. “There are few students with the chops needed to pursue this line of inquiry. The research requires more than just following rote methodologies but rather development of new techniques.”

Owens plans to continue her research throughout her time at Tech.

“OVERALL, THIS EXPERIENCE HAS HELPED ME TO GROW SO MUCH AS A LEARNER, SOLIDIFYING IN MY OWN MIND THAT I DO BELONG – NOT ONLY IN THIS MAJOR BUT IN THIS FIELD AS WELL.”

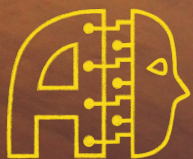
-SARA OWENS

Both Haggerty and Owens are happy with their CISE experience and encourage other computer science students to take advantage of any opportunity to do research.

“Reach out to any professor if you have an idea,” Haggerty said. “You can probably find one who will help you get it off the ground and point you toward grants to fund your research.”

Owens said to “just go for it.”

“It’s about having a curious attitude and a curious outlook – and wanting to learn.”



FACULTY RESEARCH: DR. SHANNIGRAHI EXTENDED REALITY

When Tennessee Tech Assistant Professor Susmit Shannigrahi slips on an extended reality headset, his surroundings become a new immersive experience.

Virtual objects appear, merging with the real world.

He can grab a floating keyboard, adjust the angle and enter letters and numbers. He can view various screens and then swipe them away with the wave of his hand. And so much more.

This emerging technology, known

as XR, encompasses augmented, virtual and mixed realities, and it's the "future of work and school," Shannigrahi said – when the internet is ready for it.

But some barriers remain.

Through his research in networking, Shannigrahi has been focusing on those barriers that pertain to speed and distance.

“We need something that can support low latency,” he said. “Internet things are bound by physical distance, so there’s a limit to how fast you can go. For example, if you’re sending something from here to California, it will take anywhere from 100 to 150 milliseconds.”

That’s too slow, he said, for XR to be useful in applications like remote troubleshooting, surgery and other interactions that must happen in real-time.

“If you’re in a room and everyone’s wearing a headset, it works great,” Shannigrahi said. “But if one person is in New York and another person is in California, the network doesn’t really support it. You cannot break the speed of light – so what are the mechanisms that will make XR headsets usable for people who are collaborating remotely? How can we make the network more suitable for these devices?”

To find answers, Shannigrahi has been collaborating with Colorado State University and the University of Nebraska Omaha, having been awarded an 18-month planning grant from the National Science Foundation. Tennessee Tech students Alex Marti, who has since graduated, and Nathan Melton, along with a couple of CSU students, have also been involved in the project, which was funded through September 2022. Another proposal is in the works.

“Our work looks at how to make extended reality headsets useful for everyday interactions,” Shannigrahi said. “For example, what are the challenges of creating a hybrid classroom where remote students join in the augmented reality space? Through a survey of the AR and VR research community, we found that the current network does not support such use cases well. We are using Microsoft HoloLenses to look at how to make such collaborations a reality.”

WITHIN THE NEXT DECADE, SHANNIGRAHI ENVISIONS REMOTE COLLABORATIONS IN HYBRID ENVIRONMENTS, INCLUDING INDUSTRIAL SETTINGS, USING XR TECHNOLOGY.

“If you’re troubleshooting remotely, you could project something and say, ‘Turn that knob’ or ‘Tighten that screw,’” he said.

Without the lag of course – which can cause additional problems, like cyber sickness.

“If it’s below 30 milliseconds, you’ll be fine,” Shannigrahi said. “But if it’s more than that in a virtual scenario, the lag between what is said to you and when your brain can interpret it can make you physically sick.”

How can the problem be solved? One way, Shannigrahi believes, is by

predicting what’s going to happen.

“Think of playing chess,” he said.

“When one player makes a move, the other can think of the next possible moves. So, in virtual reality, if I’m picking up an object, the computer program might be able to precompute the next moves and send choices to the user.”

As part of their research, Shannigrahi and others on the team used cloud computing to observe and quantify the latency of remote interactions from Tennessee to Colorado and California as well as to Asia and Europe.

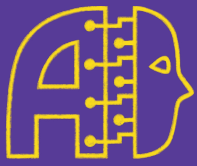
“We ran experiments to see how long it takes, and we’re trying to come up with new networking models that can support the latency needed by the headsets,” he said.

The team also collected data from others in the field through survey questions like, “What’s the biggest hurdle for your research in AR and VR?” “How do you use the network?” “What kind of latency do you see?” and “What kind of infrastructure do you have in your university or organization?”

Shannigrahi is ready for the next stage of the research project.

“The goal now is to propose what we are going to do to fix the headsets,” he said. “That will involve 5G or 6G, Software Defined Networks and Edge Computing.”

It’s just a matter of time... and reality. ▶



FACULTY RESEARCH: DR. ISMAIL KEEPING CONNECTED

RESEARCH PROJECT AIMS TO MAINTAIN 6G CONNECTIVITY DESPITE MOBILITY

The sixth generation of wireless networks promises mobile experiences and applications beyond imagination.

Until something blocks the signal, that is.

And that's the challenge facing today's researchers – people like Tennessee Tech Assistant Professor Muhammad Ismail – who are delving into this futuristic technology and discovering ways to maneuver around the obstacles associated with the smaller, higher-frequency signals to reap benefits like higher speeds and lower lag.

For Ismail, who joined the Department of Computer Science in 2019, that means using machine learning and artificial intelligence to “maintain connectivity despite mobility in indoor scenarios” amid blockages caused by moving people,

furniture – basically anything solid that gets between users and 6G access points.

“6G IS HIGHLY SENSITIVE TO BLOCKAGES. THIS PROJECT AIMS TO MAINTAIN CONNECTIVITY - IF YOU MOVE, YOU WILL REMAIN CONNECTED. THIS IS WHAT WE ARE TRYING TO ACHIEVE.”
-ASSISTANT PROFESSOR MUHAMMAD ISMAIL

Ismail has a plan that, thanks to a \$225,000 grant, he will be working on for the next three years with select Tennessee Tech computer science students.

The grant is one of just five awarded in the United States through a collaborative research program with the National Science Foundation and National Institute of Information and Communications Technology of Japan to “address compelling research challenges associated with programmable networks for next generation core and beyond fifth generation/ sixth generation mobile networks.”

Ismail is anxious to delve into a project that could make a significant impact on future humanity as early as the 2030s.

“I feel super excited for several reasons,” he said. “One is that this is a very competitive opportunity.”

Another reason is that this project will go beyond simulations and theories to a prototype that will be tested.

“We get to implement the solution in Japan and see that it works in reality in actual cases,” Ismail said. “If the solution at some point is viable and effective, it can be used in real networks.”

Ismail noted in his grant proposal that future wireless networks are expected to operate in the 60 GHz WiGig (Wireless Gigabit Alliance) frequency band to support high-rate, low-delay 6G applications such as virtual reality, augmented reality, haptic communication, remote surgery and more.

“However, the wireless links at the WiGig band suffer from frequent outages,” he said. “This in turn degrades the perceived service quality for mobile users.”

Ismail believes stable and



high-quality wireless connectivity in the WiGig band can be achieved through machine-learning techniques.

“This project proposes an intelligence layer that learns the conditions of the wireless links and the network traffic load and makes informative network management decisions,” he said.

The result? Blockages can be predicted and avoided.

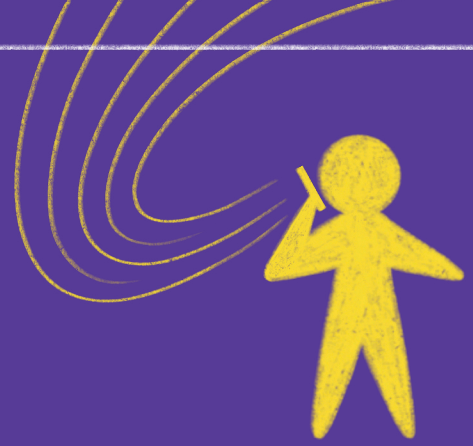
“Eventually, the machine-learning model will know that the channel will probably be blocked soon and


switch to another access point,” Ismail said. “So, you keep switching from one access point to another, but you do that proactively – in advance.”

Which means connectivity is maintained.

During the three-year grant period at Tennessee Tech, interested students may apply for the opportunity to be involved in the research.

“We are recruiting Ph.D. and undergrad students who will work closely with us and the team in Japan to develop these solutions,” Ismail said.



Also collaborating on the project are Mostafa Fouda, Ph.D., of Idaho State University and Nei Kato, Ph.D., of Tohoku University in Japan. ▶ 

ASSISTANT PROFESSOR MUHAMMAD ISMAIL & PH.D. STUDENT ELMAHEDI MAHALAL WORK ON RESEARCH THAT WILL HELP 6G USERS MAINTAIN CONNECTIVITY.



TECH TWOSOMES

STUDENTS FIND THEIR SPOUSE IN TENNESSEE TECH'S DEPARTMENT



The flame was ignited after a particularly long night in the computer lab.

“Kids these days won’t know what that was,” mused Tennessee Tech computer science alum Dawn Murphy (’82). And she’s right – CS majors now bring their own laptops to class.

The year was 1982, and Dawn and future husband Greg Murphy (’83) were both working toward a degree in computer science. Even so, their love connection wasn’t immediate.

“He had a girlfriend at UT, so it wasn’t until a few months before I graduated that we started talking seriously,” Dawn said.

Their first date was a month before Dawn graduated. Then, when Greg graduated a year later, they both went to work as computer scientists at the Naval Surface Warfare Center

in Dahlgren, Va. They were married in 1984 and made their home in Fredericksburg.

“We worked on the computers that run the weapons systems aboard the US Navy Aegis cruisers and destroyers,” Dawn said. “We got to travel to a lot of great ports throughout our careers.”

In 2000, Greg transferred to the Joint Warfare Analysis Center. He retired in 2016, and Dawn retired in 2018. They have two daughters and are expecting their first grandchild in November.

Theirs isn’t the only love story among computer science majors at Tennessee Tech. Perhaps the earliest goes back to 1981 with Andy (’81) and Debbie (’81) Wilkins.

“We met in class,” Debbie said. “The computer science class of ’81 was pretty small, so all of us had most of

our CSC classes together.”

Andy had been in the Air Force four years before going to Tech. Debbie went straight out of high school. After graduation, Andy went to Nashville and Debbie to Huntsville, Ala. They continued dating and were married in 1982. Both started careers in software development and eventually moved into management and technical lead roles.

Today, Debbie works for Leonardo DRS, a defense company, as a director of the test and sustainment division. Andy retired last year from Northrop Grumman, where he was a test manager on a missile program.

“Both of our companies hire a lot of TTU graduates, knowing they have a good education,” Debbie added.

They reside in the Huntsville area and have two children who both became attorneys.



DAWN (’82) AND GREG (’83) MURPHY

“IT WASN’T UNTIL A FEW MONTHS BEFORE I GRADUATED THAT WE STARTED TALKING SERIOUSLY.”
– DAWN MURPHY



DAVID ('90) AND LINDA ('90) RAWLE

"WE WERE MARRIED WHILE TECH STUDENTS IN 1987 AND HAD OUR FIRST CHILD ALSO WHILE STUDENTS." – DAVID RAWLE

"How two computer science majors ended up with attorneys, I don't know!" Debbie said.

David ('90) and Linda ('90) Rawle started dating in high school.

"We were in band and had classes together in high school and most of college," David said. "We were married while Tech students in 1987 and had our first child also while students."

Now, David is a senior software engineer for Amazon Air Science and Technology, and Linda is a senior quality assurance engineer for Alvaria. They have three children,

one of whom followed her parents' footsteps in pursuing computer science.

"Our degree from Tennessee Tech enabled our careers, and the extra experience Linda and I received working for Dr. Frank Hadlock, the department chair at the time, solidified the importance of many CSC fundamentals learned in the classroom," David said.

Matthew ('09) and Julia ('10) Gibbs of Alpharetta, Ga., decided that marriage computed for them as well. They tied the knot in 2009.

"We met in high school, and we both

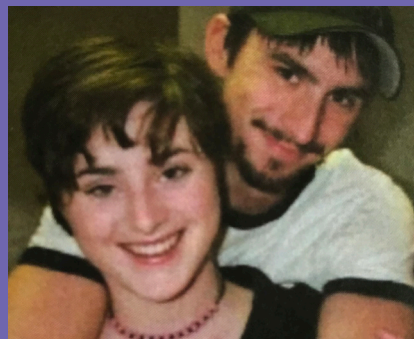
switched to computer science majors after starting college," Julia said.

Matthew is now a senior development manager at DataScan, and Julia is a release operations manager with Mozilla. They have two children, ages 10 and 7.

"The friends we met in school, along with our degrees of course, helped us get our start in the tech industry," Julia said.

"We have gotten internships and jobs from the connections we made at school which set our early careers off to a great start."

"WE MET IN HIGH SCHOOL, AND WE BOTH SWITCHED TO COMPUTER SCIENCE AFTER STARTING COLLEGE." – JULIA GIBBS



MATTHEW ('09) AND JULIA ('10) GIBBS



ANDY ('81) AND DEBBIE ('81) WILKINS

**"WE MET IN CLASS. THE COMPUTER SCIENCE CLASS OF '81 WAS PRETTY SMALL, SO ALL OF US HAD MOST OF OUR CLASSES TOGETHER."
- DEBBIE WILKINS**

All four couples have fond memories from their time at Tech.

Debbie ('81) recalls that computer science (which wasn't officially established as a department until 1986) was much different back in the early 1980s.

"This was pre-PCs, and we worked on the big Burroughs mainframe," she said. "We had to type punch cards and then let the help desk people run them. When we were juniors, we were finally allowed to use the terminals and type and run our code."

The Murphys remember those times as well.

"We started out with one mainframe computer at Tech using punch cards, which were hard to keep up with when it was a big program," Dawn ('82) said. "One of the biggest challenges then was waiting for a punch terminal to become available. By my senior year we had transitioned to remote terminals and were also introduced to Tech's very first desktop computer. Dr. Lessman had to tell us not to worry about the clacking noises the computer would make!"

The Rawles have good memories from their participation in student groups.

"The Tennessee Tech Microcomputer Association was a fantastic group of student personal computing enthusiasts," David ('90) said. "We took on independent projects, presented talks and supported each other in our studies."

"Several of us participated together in ACM (Association for Computing Machinery) regional programming competitions, and over two years we went from 26th to first place in the undergraduate division and placed seventh overall against graduate students – beating Vanderbilt graduate students by one place."

"I am still proud of our senior software engineering team project that myself, Linda and teammate Kevin Pebley delivered. We worked around the clock for weeks to construct an integrated Pascal development environment and interpreter. It was slow but complete, and we poured everything we had into building it. It was far too ambitious for a semester project, but we loved what we were

doing and got it done."

The Gibbs couple enjoyed playing racquetball with the department chair, Hadlock, and professors Sheikh Ghafoor and (emeritus) Mark Boshart.

Martha Kosa's classes were also a treat. "I can't think of an individual more impactful on my future than her," Gibbs said of the emeritus professor. "Her positivity and kindness helped us through some of the toughest parts of our college journey."

And then there were the times spent working for the computer science department with adjunct instructor Eric Brown.

"These are some of our fondest memories," Julia said. "A lot of good life lessons and tech lessons were learned while sitting in his office which we carry with us to this day."

These four couples aren't the only students who found "the one" in the computer science department – and they likely won't be the last.

Love is in the coding. 🐭



GRADS THROUGH THE DECADES

1970s

LEE NIPPER '79 works in embedded systems development for remote management and control of IT infrastructure at Vertiv. He lives in Lacey's Spring, Ala., and plans to move to Paducah, Ky, to be closer to family. He has six grandchildren.

"My TTU computer science degree prepared me for a software development career, and I continued learning as technology changed."

1980s

RAY JENKINS '83 is a judicial magistrate in Knoxville.

"My computer science degree got me started on a long career serving the Navy, Air Force and in private service. That work allowed me to go to law school and have my current career."

Tech memories? "Scheduling computer time on the Burroughs 6700 and coding my COBOL (Common Business Oriented Language) on the IBM 29 card punch."

FRANK DIXON '84 had a long career in healthcare IT and now has his own smart home automation business.



"My degree helped me with my first job out of Tech. I was a COBOL programmer at a hospital in Florida. My studies helped me adapt and learn new skills to be productive in my career."

Tech memories? "I remember utilizing punch cards and standing in line at the computer lab on the Burroughs mainframe as well as working in Pascal and Assembler on the DEC (Digital Equipment Corporation) PDP-11 (Programmed Data Processor). I bought a dumb terminal and modem coupler to work from my room and instantly became best friends with a lot of engineers. Having access after-hours was a huge deal."

What else? "I have kept relationships with a lot of my Tech mates. I recently moved to Soddy Daisy next to Trudy Harper ('83 electrical engineering, '84 M.S.) who helped me get engaged with Tech again. I am now a donor and attend several events each year. I have the fondest memories of my time at Tech."

1990s

CHRISTOPHER AUGUSTUS '90 is a contractor to the U.S. Department of Energy's Office of Scientific and Technical Information in



Oak Ridge. He lives in Knoxville.

"My computer science degree got me employed within a month and a half of graduating. Only having had one class based on the C language and one class on UNIX, my first job involved writing character-based programs in C on System V-based UNIX systems for hospital operating rooms. Eventually, I got to start using a lot of the theory I had learned at Tennessee Tech to write better programs and design better database tables. At that time, the preferred teaching language at Tennessee Tech was Pascal, which I got to reuse when we started writing client server-based programs on Windows 95 using Borland's Delphi later in the 1990s."

Tech memories? "My best memory was taking many classes on the top floor of Bruner Hall. It seemed every quarter/semester I had a class up there from 3-4:30 on Tuesdays and Thursdays. That room back then was boiling hot in the wintertime, and being later in the afternoon, it was easy to get drowsy. Dr. Long one time just stopped class and said he noticed many of us nodding off during class. He said not to worry about it. We were all doing well and learning regardless of whether we were awake or asleep. From then on, I looked forward to his later afternoon classes!"

What else? "My son just graduated from Tech in spring 2022. He

originally wanted to get a computer science degree, but after several changes of major he wound up receiving an English degree with a theater emphasis!"

MARK WELTE '91 is the information systems department manager at IWC Food Service in Cookeville.



"My degree and classes helped me to be able to understand different operating systems and programming languages. My networking and UNIX classes have been a tremendous help as I have been responsible for designing and upgrading computer network infrastructure. I have leaned on my CS classes many times as I have faced different challenges in my career."

Tech memories? "I had some great professors and classmates. I enjoyed the ACM (Association for Computing Machinery) meetings and being a member of the TTMA (Tennessee Tech Microcomputer Association). My experiences working at the computer center help desk prepared me for helping others with computer questions and problems. I'll never forget Drs. Hume, Lessman, Long and Foster."

What else? "It is very difficult to explain how fast and how much technology has changed since I was a student. We didn't have direct internet access when I was a student at Tech. We could download three files a day through our BITNET connection to the internet. Hypertext (HTTP) was a new concept in the

late '80s and early '90s. Now it is part of everything on the web. On a personal note, I met my wife at Tech, and one of our children graduated last year from Tech. Tech will always be a part of my life!"

JASON REIN '92 is a data integration engineer at HCA Healthcare in Nashville. He performs database administration and infrastructure support for his team.

WILLIAM SHANE STORY '93 has been a system administrator at Lawrenceburg Utility Systems for 17 years.



His work has involved programming, database implementation and administration, scripting, web development, and network implementation and administration.

"TTU is a well-respected university. I gained knowledge on operating systems, data structures, the C language, UNIX and more. Although I have had to read countless books and articles to learn and keep up over the years, getting a degree forced me to learn good study habits, note taking, teamwork, better writing and communication skills and many other things I have needed throughout my career."

Tech memories? "(1) Dr. Hume imitating a computer and zooming across the board writing quickly and talking a mile a minute with intense enthusiasm about assembly language.

(2) Being thrilled to get my own 2400 baud modem to be able to dial up to the VAX mainframe and local BBSs (Bulletin Board Systems) from my dorm room. (3) Many hours in the labs. (4) Lifelong friendships developed by meeting in classes. Before the internet, people could dial up to BBSs. The 2400 baud was 2,400 bits per second. That was the rate at which a modem (modulate/demodulate) converted the computer's digital signal of 1's and 0's into screeching sounds that could travel across normal telephone lines, and then from sound via a modem on the other end back into a digital signal for the remote computer. This is how people connected remotely. Tech had Digital Corporation (DEC) VAX mainframe computers at the time. They had modems that we could dial into to remotely do assignments and labs."

What else? "Around the turn of the millennium, I was a Christian missionary to Honduras for over three years. During that time, I used the German and sign language knowledge gained from Tech a few times. (Yes, I should have taken Spanish.) I married a lovely general practitioner from there, and we have two children."

2000s

ALAN MCCORMICK '09 AND '13 is a senior engineer for Amazon in Seattle. He resides in Lynnwood, Wash. He earned



his undergraduate degree in computer engineering in 2009 and master's in computer science in 2013.

"My classes gave me a lot of practical experience and helped me get recruited by Amazon."

Tech memories? "I did well in algorithms, so I was encouraged to join the computer programming team. At a competition in 2005, I met my wife (from the other university's team). We've been married for 13 years now."

What else? "I never thought I would work for a major tech company or that I had a chance. I just want to say that everyone can do it, and there are great opportunities!"

2010s

DANIEL GONZALEZ '11

is a network administrator in Tennessee Tech's ITS department. He resides in Cookeville.



"The CS-IT degree from Tech has plenty of classes where hands-on and real-life assignments are emphasized. This proved to be extremely useful when joining the workforce as an IT employee."

Tech memories: "The quality of the faculty was top-notch. I'll always remember how my professors pushed me to the limit while placing emphasis on actual application of the theory. Martha Kosa, Mark Boshart and Eric Brown will always exist in my

memory as exceptional instructors. I am extremely proud to have gotten my B.S. degree from TTU."

JONAH ABERLE '18

owns two small businesses, one of which he started while a student at Tennessee Tech:



ForYouHR. It provides consulting and other professional services for a niche software platform with considerable market share in the healthcare space. He also moonlights as an emergency medical technician. He resides in Chattanooga.

"My degree has allowed my company to develop certain automation tools that could become incredibly valuable one day."

Tech memories? "I remember studying in the library with my peers; Dr. Boshart's CD collection; never learning how to play the board game Brass; Dr. Rogers' hate for the Windows operating system; and Dr. Elizandro's aphorism about statistics."

2020s 🐣

SUSAN JEZIOROWSKI '18 AND '20

is an applied cybersecurity engineer at MITRE, a federally funded research and development center. Her day-to-day includes agile software development in Python and research in privacy preserving technology. She resides in



Nashville. She earned her bachelor's degree in 2018 and master's in 2020. "My CS degree from Tennessee Tech made a huge impact on my career. Had I never attended Tech, I would have never joined the SFS (Scholarship for Service) CyberCorps program. Because of the opportunities the CS department offered, I was able to land internships and full-time positions in the public sector and live on the east coast – somewhere I had never been nor experienced before."

Tech memories? "I had the best group of friends in the CS department, and they make up many of my special memories from my time in undergraduate studies. Frequently, we'd meet at the library to study, code or just hang out over Cici's pizza and an episode of 'Rick and Morty.' It was awesome to have that kind of group to lean on and go through college together."

Advice for CS students? "Pay extra attention to your core classes and take them seriously. Concepts I learned in databases, algorithms and Unix Lab come up consistently in my day-to-day work."

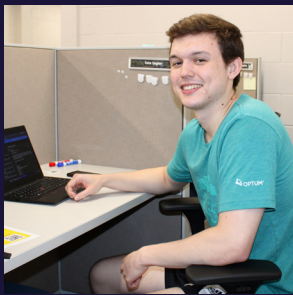
CS ALUMNI: WHERE ARE YOU NOW?

WE WANT TO HEAR FROM YOU! EMAIL THE FOLLOWING TO CSC@TNTECH.EDU FOR POSSIBLE INCLUSION IN THE 2023 EAGLE DRIVE MAGAZINE:

YOUR NAME? YEAR OF GRADUATION? CAREER DETAILS? CITY OF RESIDENCE? HOW DID YOUR CS DEGREE FROM TTU MAKE A DIFFERENCE IN YOUR CAREER? WHAT SPECIAL MEMORIES DO YOU HAVE? SEND US A PHOTO TOO!



MAKE A DIFFERENCE IN THE <C/S> DEPARTMENT!

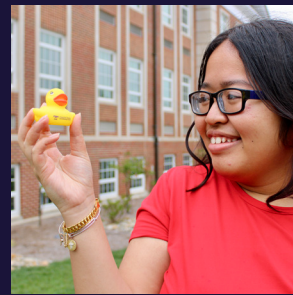


PLEASE CONSIDER A GIFT TO SUPPORT STUDENTS IN THE DEPARTMENT OF COMPUTER SCIENCE BY CONTRIBUTING TO THE BOSHART-KOSA ACADEMIC EXCELLENCE SCHOLARSHIP, SENIOR CAPSTONE PROJECTS AND OTHER WORTHY ENDEAVORS:

SCAN HERE TO GIVE:





WWW.TNTECH.EDU/SUPPORTCSC



... AND STAY CONNECTED

FOLLOW US! TENNESSEE TECH UNIVERSITY DEPARTMENT OF COMPUTER SCIENCE



SHARE YOUR THOUGHTS ABOUT THIS MAGAZINE... AND TELL US HOW MANY DUCKS YOU FOUND!

TENNESSEE TECH UNIVERSITY
 DEPARTMENT OF COMPUTER SCIENCE
 PO BOX 5101
 COOKEVILLE, TN 38505-0001
 931.372.3691
 CSC@TNTECH.EDU





EDWARD SMITH
 SENIOR IT TALENT DEVELOPMENT MANAGER
 EVICORE HEALTHCARE
 TENNESSEE TECH ('93)

"Not only will you learn how to write code and work well in a team, you will learn to problem solve, adapt and become a life-long learner. TTU has continued this tradition of preparing students for success."



JILL MOFFITT
 SOFTWARE ENGINEER
 SENIOR MANAGER
 SAIC

"Don't think of it as failure. Think of it as a learned experience that will lead you to success!"



CHRIS SMITH
 NATIONAL SENIOR CLIENT
 PARTNER DIRECTOR
 COLLABORATIVE SOLUTIONS
 TENNESSEE TECH ('81)

"A Tennessee Tech computer science degree provides the skills and knowledge needed for you to be successful in various career paths (such as developer, consultant, manager, operations, training, customer service and sales) and industries."



BARNEY MACCABE, PH.D.
 EXECUTIVE DIRECTOR
 INSTITUTE FOR THE FUTURE
 OF DATA AND COMPUTATION,
 UNIVERSITY OF ARIZONA

"You're part of a great department. Be an active participant and help to make the department even better."



TONY SKJELLUM, PH.D.
 PROFESSOR OF COMPUTER
 SCIENCE AND CHAIR OF
 EXCELLENCE
 UNIVERSITY OF TENNESSEE AT
 CHATTANOOGA

"Your degree from Tennessee Tech and, more importantly, all the knowledge you've gained, will open doors to a great career. But remember to keep learning, keep up with technology and be sure to share the fun and importance of computer science with others you meet along the way."



ANDREA BRACKETT
 VICE PRESIDENT,
 CYBERSECURITY AND CHIEF
 INFORMATION SECURITY OFFICER
 TENNESSEE VALLEY AUTHORITY
 TENNESSEE TECH ('93)

"When faced with a challenge, jump in and give it your all. You never know what you can accomplish until you reach far."

EXTERNAL ADVISORY BOARD MEMBERS



**& THEIR ADVICE TO TENNESSEE TECH
 COMPUTER SCIENCE STUDENTS**



MARK RIGNEY
 VICE PRESIDENT
 JACOBS ENGINEERING
 TENNESSEE TECH ('86)

"Be courageous to take on or learn new things, even if you feel unqualified. Sometimes it is that moment of asking or trying to figure out 'How?' or 'Why?' that our best innovative thoughts are conceived."



JUSTIN STINSON
 ARCHITECT/SOLUTIONS ENGINEER
 BOSE CORPORATION
 TENNESSEE TECH ('06)

"Academics are important, but don't forget to build relationships. Seek out peers and mentors who will help you throughout your college journey and into your career. Find your community and become an active participant. Never pass up an opportunity to help others."



JANET BURGE, PH.D.
 ASSOCIATE PROFESSOR OF
 COMPUTER SCIENCE
 COLORADO COLLEGE

"Computer science is a fascinating discipline in which to work. The constant changes mean you always need to keep learning, which is part of the fun. It is also unique because there are CS applications everywhere - so you don't need to choose one discipline to work in forever. You can explore how CS is used in many different fields."



MIKE HELMICK, PH.D.
 PRINCIPAL SOFTWARE
 ENGINEER
 GOOGLE

"Look for the problems nobody else is solving - and solve them."



JOHN SEEL, PH.D.
 WEAPONS CONTROL AND INTEGRATION
 DEPARTMENT HEAD
 NAVAL SURFACE WARFARE CENTER - DAHLGREN
 DIVISION
 TENNESSEE TECH ('01)

"To quote Ralph Waldo Emerson: 'Be an opener of doors for such as come after thee, and do not try to make the universe a blind alley.'"

CREATE YOUR FUTURE.

FORWARD THINKERS WANTED.

SAIC is a vibrant, global team of innovative thinkers and passionate problem solvers. We believe diversity and inclusion are key to the success of every mission. Together, we work to overcome the world's toughest challenges and confidently move toward a future that empowers everyone.

jobs.saic.com



SAIC[®]