

THE COLLEGE OF COMPUTING AT MICHIGAN TECHNOLOGICAL UNIVERSITY

# GATEWAY

MAGAZINE



## Data Science for a Changing Planet, Pg. 6

NRT DataSENSE, a five year \$700,000 National Science Foundation funded project, represents the growing importance of computing centered efforts to forward Michigan Tech's research mission. Encompassing several programs, it's one example of the College of Computing's transdisciplinary work targeting education, research, service, and outreach to meet the world's most pressing challenges.

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50 YEARS OF CS, PG. 4 | HEALTHCARE TRANSFORMED, PG. 10 | MECHATRONICS MATTERS, PG. 14  
POWERED BY MICHIGAN TECH TALENT, PG. 18



## On the Cover

An AI generated digital illustration featured in the 2023 *Art in Silico Computational Art Show and Event Series*, sponsored annually by the Institute of Computing and Cybersystems (ICC) and the College of Computing. *Art in Silico* examines the expressive world of creative



computation and the confluence of technology and art, connecting circuit board to canvas. This image of a raven was created by Amanda Stump using the AI text to image generator Midjourney. To generate the image, Stump first created

a reference drawing in ProCreate (at left), then used text prompts related to the image to guide Midjourney in the creation of a similar image. Stump trained in scientific illustration at the University of Michigan and is now the ICC's associate director for research development and a PhD student in forestry at MTU.

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## Message from the Dean

While computing and innovation are not synonymous, they are inextricably intertwined. The computing disciplines are evolving at an unprecedented rate with far-reaching impacts, and technology innovations are fueling broad changes in industry and society. This is particularly true in AI, but also in edge computing, connectivity, cybersecurity, and more.

The pace of these external changes is at odds with the thoughtful (read: slow) way that curricular updates typically occur in higher ed. In the College of Computing, we are working vigorously to bring the two into alignment. In fact, one of the main reasons for creating the College was to better support and grow the disciplines of computing. This is happening both via the knowledge we create through research and the workforce we train through our degree programs.

In this issue of *Gateway*, we highlight three success stories from our mechatronics, data science, and health informatics degree programs. Our mechatronics programs are a true partnership between the College of Engineering and the College of Computing, representing the convergence of mechanical, electrical, and computational systems. Data science has grown out of the overlap of applied statistics and computing, often as applied within some domain. Our data science programs reflect this throughout, and our new data science BS degree makes it easy for students to earn minors in statistics and pursue an in-depth focus area. One of the fastest-growing programs at Michigan Tech is our master's in health informatics, which has grown more than eightfold in the past five years. Underlying this growth is a set of significant curriculum updates that focus on AI and have created multiple opportunities for credentialing on the way to the degree.

We are also celebrating a pair of anniversaries this year. This is the fifth anniversary of the College of Computing. Since 2019, we have grown dramatically in terms of students, programs, and research, and we are working hard to continue that pace of innovation and growth over the next five years. This year is also the 50th anniversary of the Department of Computer Science. Computer science started as part of the math department, spinning off as its own department in 1973. It is now the second-largest major at Michigan Tech and has driven Michigan Tech's recent enrollment gains.

Exciting times for sure. Thanks for reading about our continued innovation.

Dennis R. Livesay, PhD  
Dave House Dean of Computing

**PS**—Please help us continue our upward trajectory! Your gifts make an essential and immediate impact on our students and programs.



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**Michigan Technological University**

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*(Above) An analog computer in use at Michigan Tech in the 1970s. (Below) Professor John Lowther with a student. Hired in 1974, Lowther was the first computer science faculty member. He retired in 2009.*



## 50 Years of Computer Science at Michigan Tech

At its first meeting of the 1973 winter quarter, the Michigan Tech Faculty Senate approved the University's first undergraduate computer science (CS) curriculum, and in 1974 the first Bachelor of Science in Computer Science degrees were awarded.

At that time, students used an IBM System/360 mainframe computer. Computer science majors prepared their class programming assignments on noisy keypunch machines, turned in their decks at batch stations, and waited eagerly for minutes or hours to get back the listing containing the results of their runs—from a machine with less computing power than the average smartphone today.

Today's computing methods and technologies are radically different, but the value of an MTU computer science degree remains constant. To help celebrate 50 years of computer science at Michigan Tech, all CS alumni are invited to a gathering at this year's 2024 Alumni Reunion, August 1-3. Details will be shared soon.

CS alumni are also invited to share their memories and thoughts on the impact of their education at [mtu.edu/cs/history](https://mtu.edu/cs/history). Check out some of the alumni comments we have received so far!

## Not Quite 50 Years of Memories

By Linda Ott, Professor and Emerita Chair,  
Department of Computer Science

It was spring 1978 when I interviewed for a faculty position here at Michigan Tech. To be honest, I thought of the interview as a “practice interview.” My dream was to move to the Northwest. But the people I met on that visit and the beauty of the area convinced me that it was actually in the UP that I wanted to begin my career.

I’ll never forget being picked up at the airport and then taken to the old College Motel, which was next to campus. It was around midnight and the office was closed, but there was an envelope taped to the door with my name on it and a key and room number inside. Clearly, I was not in a big city! The next day, as I was being given a tour of the area, the running commentary was something about it being a shame that it was the “ugly” time of year, with dirty snow piles and bare trees—and all I could think was how beautiful and peaceful it was here.



Things were quite different when I started at Tech. Students submitted programs on punched cards, exams were run off on a “ditto” or mimeograph machine, and the secretaries in the office would type exams and papers using an IBM Selectric typewriter. It was nice not having to be the person

responsible for making things look neat and pretty. One of my favorite pieces of equipment in the early days was a modem in my office that I used to connect my terminal over the phone line to a computer. My favorite feature was the ability to switch that modem to data when I didn’t want to be interrupted by a phone call. Callers would simply get a busy signal, and I could grade programs (which were printed out on paper) or do whatever I needed to do interruption-free.

In the early days, we didn’t have a learning center or teaching assistants, so I spent a lot of my time answering student questions. Particularly when I was teaching CS110, the introductory programming course using Fortran, the line for my office hours would be quite long. It was great getting to know so many students, and the students showed their appreciation in unique ways—most memorably a jack-o’-lantern with aluminum foil braces at the batch station where they submitted their Fortran programs. Do I need to mention that I had braces at the time?

So much has changed since those early days. I’m now surrounded by computer scientists, not mathematicians, who are examining research questions we couldn’t conceive of in the ‘70s. Our department has added master’s and PhD programs, and our degree programs have expanded to include software engineering, data science, and cybersecurity along with computer science. Our undergraduate computer science program is now the second-largest undergraduate degree program on campus.

All this growth means that we’re outgrowing Rekhi Hall, the “new building” built for computer science less than two decades ago. Our alumni are impacting our society in a wide range of industries. And, of course, there is the ever-increasing pace of change in our technology. But some things haven’t changed. The area and campus are still beautiful (perhaps even more beautiful than when I came), and the people, both on and off campus, are amazing.

Sometimes while walking across campus, I am reminded how lucky I have been to be at Tech. As I often tell students, it’s great to have a goal, but sometimes taking a path in a different direction can put you in a place that you didn’t even know existed—and sometimes that’s just the right place for you.

## Timeline: Department of Computer Science History

- 1973: Faculty Senate approves Michigan Tech’s first undergraduate computer science (CS) curriculum. First Bachelor of Science (BS) in CS awarded a year later.
- 1977: Department of Mathematics becomes Department of Mathematical and Computer Sciences.
- 1981: Master of Science (MS) in CS is established. First MS in CS awarded a year later.
- 1984: CS becomes a separate department within College of Sciences and Arts.
- 1994: Michigan Tech’s first computing-focused doctoral program, a PhD in Computational Science and Engineering, is approved.
- 2001: PhD in Computer Science is established.
- 2003: BS in Software Engineering is established. Construction of Kanwal and Ann Rekhi Hall begins in July.
- 2005: CS department moves into Rekhi Hall in January, with an official dedication held April 29.
- 2015: MS in Data Science is established.
- 2016: MS in Cybersecurity is launched.
- 2019: Michigan Tech Board of Trustees approves College of Computing in April, comprising the Department of Computer Science and the new Department of Applied Computing. The two departments launch a BS in Cybersecurity as a shared program in fall 2019-20.
- 2021: MS in Data Science moves to Department of Computer Science.
- 2023: BS in Data Science is launched and MS in Applied Computer Science is established.

## Data Science for a Changing Planet

Advanced sensor technologies, growth in the amount and availability of sensor data, new computational methods, and greater computational power offer fresh approaches to understand and address the complex environmental challenges posed by climate change.

To help prepare tomorrow's data scientists to effectively employ these tools, Michigan Tech has been awarded a prestigious National Science Foundation (NSF) Research Traineeship (NRT) grant titled "Integrative Training in Data Science-Enabled Sensing of the Environment for Climate Adaptation (DataSENSE)."

The five-year, \$700,000 NRT DataSENSE project will deliver training, research, and mentoring experiences to as many as 15 Michigan Tech doctoral students from academic departments across campus, preparing them to analyze and interpret climate-adaptation-related problems using cutting-edge, data-science-intensive tools. Participating students receive support covering the first five semesters of their doctoral studies: one full year plus fall and spring of the next year.

"The NRT grant recognizes that Michigan Tech has all of the required pieces to provide students with this type of training," says Laura Brown, associate professor of computer science and the project's principal investigator. "It allows us to connect these pieces into a holistic student experience. Future leaders will need transdisciplinary training like this."

# 94.9%

increase in students seeking an MS in Data Science from 2022 to 2023

Faculty from three colleges and six PhD programs will mentor DataSENSE trainees, sharing their expertise in data science, machine learning, computer vision, geological engineering, environmental engineering, sensing technology, atmospheric science, and forestry science.

"We want to engage doctoral students in fantastic research opportunities and mentor them so they can become self-confident experts with a portfolio of essential computational skills and sensors and application knowledge," says Brown.

The NRT project began in March 2023. During its first year, the faculty investigators have focused on student recruitment to build a diverse PhD trainee pool. They are also developing courses and activities that support professional development and student retention. NRT activities will include seminar series, symposia, workshops, faculty and peer mentoring, and career development training. Many of these opportunities will also be available to students who are not part of the NRT program.

Dennis Livesay, Dave House Dean of Computing, says the award represents the growing importance of computing-centered efforts to Michigan Tech's research mission.

"Doctoral education in today's world is about providing students with opportunities to contribute to society, wherever they see fit—in the academy, in industry, as entrepreneurs, in government," says Will Cantrell, associate provost for graduate education and dean of the Graduate School. "The NRT experience enhances Michigan Tech's ability to do just that."

Prospective, new, and current Michigan Tech doctoral students are invited to apply for the NRT traineeship.

Learn more at [mtu.edu/datasense](https://mtu.edu/datasense)

## BS in Data Science Welcomes First Cohort

Organizations of all sizes and types are using data to drive decision-making, improve business processes, design and develop new products, and market their products. And the volume, availability, and potential uses for data are increasing exponentially.

As a result, data science is a rapidly growing occupational opportunity. The US Bureau of Labor Statistics identifies data science as one of the fastest-growing job sectors in the US, projecting 35 percent growth and the creation of nearly 60,000 new jobs through 2023. The 2022 median pay of data scientists was \$103,500.

In response to these growing employment opportunities, the College of Computing has launched a Bachelor of Science in Data Science, which began accepting students in fall 2023. Laura Brown is the director of the new program.

The program delivers a broad-based education in data science fundamentals, data mining, predictive analytics, communication, and ethics. Students gain a competitive edge through a technical focus area in software engineering, cybersecurity, statistics, or business technology. Students also have the freedom to explore and develop their own interests in one or more domains. Graduates of the program are well-positioned to pursue master's degrees.

"Our first cohort of students is really excited to be learning about data science. There's such a need for these skills," says Brown. "I'm looking forward to creating new classes and degree pathways so we can deliver the knowledge and experience our students will need as they begin their data science careers."

### Participating PhD Programs

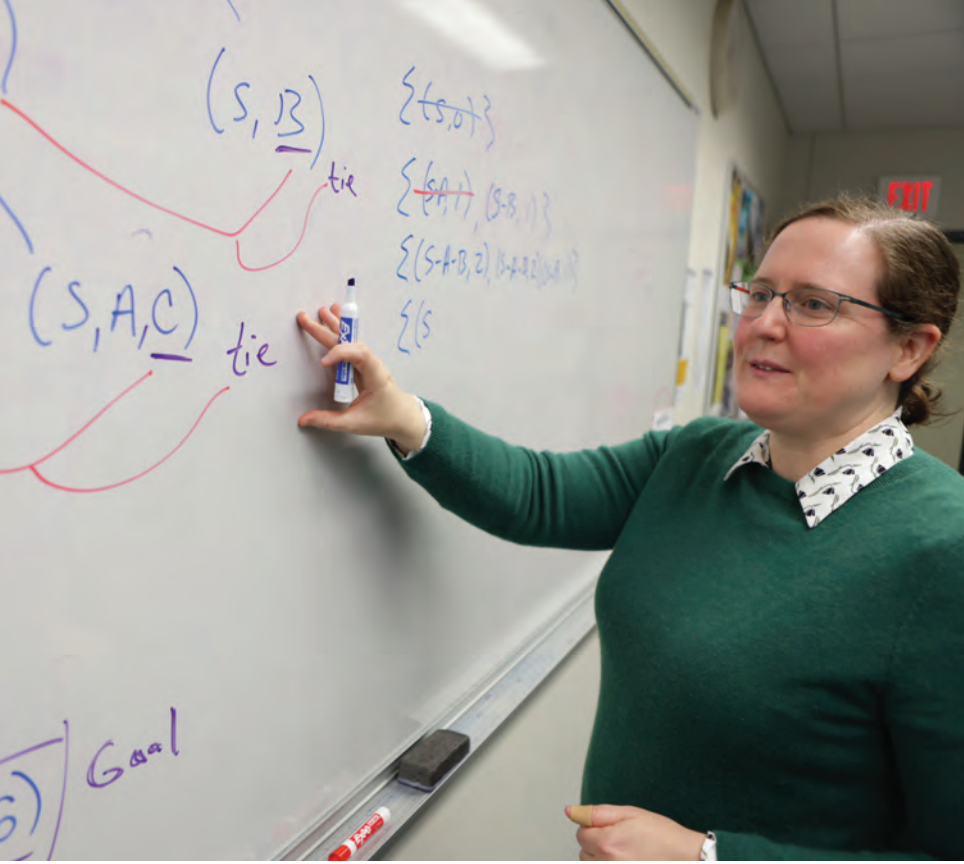
- Atmospheric Sciences
- Computational Science and Engineering
- Computer Science
- Environmental Engineering
- Forest Science
- Geological Engineering
- Geology

### Co-PIs

- Dukka KC, Professor, Department of Computer Science
- Thomas Oommen, Professor, Department of Geological and Mining Engineering and Sciences
- Shiliang Wu, Professor, Department of Geological and Mining Engineering and Sciences

### Senior Personnel

- Tao Liu, Assistant Professor, College of Forest Resources and Environmental Science
- Sidike Paheding, Fairfield University
- Ashraf Saleem, Assistant Professor, Department of Applied Computing



## Laura Brown: Always Learning and Collaborating

When Laura Brown was a graduate student, data science wasn't yet a separate discipline; it was spread throughout many areas. As data science started to develop as a distinct academic subject area, she became very interested in it and the artificial intelligence, machine learning, and computational aspects of computer science.

"Data science can be applied to so many types of problems in so many areas. This is something that I really enjoy about what I do," says Brown, now an associate professor of computer science at Michigan Tech. "There's always an opportunity to collaborate, and I'm always learning about new things and working with fantastic collaborators."

Brown's research interests focus on both theoretical data science topics and the application of data science techniques to other domains. She works with faculty across campus and at other universities, including experts in biology, forestry, chemistry and chemical engineering, and social sciences.

Brown is associate dean for data science initiatives in the College of Computing and also directs MTU's bachelor's and master's degree programs in data science. She is a member of two Michigan Tech research centers: the Institute of Computing and Cybersystems (ICC) and the Center for Agile Interconnected Microgrids (AIM).

## Undergrad Profile: Felicia Huffman, Data Science

Junior undergraduate Felicia Huffman, from Jackson, Michigan, has had a passion for math since the fifth grade, so it was important to her to find a career where she could apply it.

"I did some research and discovered data science," she says. "It provides a great salary, a strong job outlook, and an opportunity for me to be challenged. These factors, along with my computer science experience, are why I chose data science."



Huffman toured Michigan Tech as a high school student and loved it. "It was during Winter Carnival. There was snow everywhere, and I was surrounded by amazing ice sculptures. I love all the activities you can do in the snow, like skiing, snowmobiling, and snowball fights."

After Huffman participated in a data-science-focused exploration through MTU's Summer Youth Programs, she decided that Michigan Tech was where she wanted to be. "I got along with the other people at the camp better than I have with anyone," she says. "I connected with Dr. (Laura) Brown to confirm that the data science BS program was coming, and now here I am today."

Huffman is enjoying being a part of the new program, launched by the College of Computing in fall 2023 under Brown's direction. "I feel like we have a lot of flexibility and we also get to help create the path for future students," Huffman says. "It makes it feel more interactive, rather than the professor doing most of the work."

Huffman isn't yet sure where she wants to take her career, but she hopes to pursue work that helps people, potentially as a healthcare data scientist. "Data science is still such a broad category. If I had to choose now, I would say the artificial intelligence and machine learning side interests me the most," she says. "It's fascinating to me how data can drive a machine, and how, if that data is biased, it can significantly affect the machine's practicality."

Along with her bachelor's degree studies, Huffman is planning to complete an accelerated master's in data science. She hopes to graduate in fall 2027.



## Graduate Student Profile: Pradnya Pendse, Data Science

Pradnya Pendse began her graduate studies in data science at Michigan Tech in fall 2022 after working in the automotive and manufacturing industry for four years. She earned her bachelor's degree in computer science and engineering in 2018 from Shivaji University in Kolhapur, Maharashtra, India.

"As a computer science bachelor's degree graduate with work experience as a data analyst and engineer, I decided to study data science," says Pendse. "I see data science as the next logical step in my career, offering the opportunity to solve complex problems and contribute to informed decision-making through advanced analytical methods."

Pendse's interest in Michigan Tech was spurred by the University's work in the manufacturing and automotive domains. "The combination of well-rounded technical coursework in data science and the prospect of engaging in innovative research projects made MTU an appealing choice for me," she says.



"The well-structured courses at Michigan Tech offer an excellent balance between technical and functional domains," says Pendse. "The project-driven approach to learning not only enhances theoretical understanding, it provides opportunities to implement learning in real-time projects, fostering practical skills and application."

Pendse is particularly interested in the application of data science in the automotive industry. "What excites me the most is the prospect of using advanced analytics and machine learning to derive insights from complex datasets in manufacturing and automotive processes," she says. "I see the potential for impactful innovations and improvements in efficiency, quality, and decision-making within this industry."

At the 2023 IEEE ASEE Frontiers in Education Conference (FIE), Pendse presented her research paper, "Work-In-Progress: Python Code Critiquer, A Machine Learning Approach." She says the collaborative research described in the paper develops a system that automatically detects coding mistakes made by students in programming classes and provides immediate feedback to improve student learning outcomes and coding skills.

The work is funded by a research and development grant from the National Science Foundation; Assistant Professor Leo Ureel of the Department of Computer Science is the principal investigator. Pendse also presented this research at the 2023 First Year Engineering Experience Conference (FYEE).

In spring 2024, Pendse is completing a co-op as a data engineer in the SML Operations department of the Volvo Group, a major

producer of trucks, buses, construction equipment, and marine and industrial engines. In summer 2023, she worked as an advanced analytics intern with Driven Brands, the parent company of some of North America's leading automotive services. Her primary focus there was developing a comprehensive time series model from the ground

up, which encompassed meticulous data preprocessing and the application of sophisticated feature selection techniques.

"One of the most interesting parts of my internship at Driven Brands was building a strong model to predict how things change over time," she says. "To do this, I applied my analytical and statistical skills to make very accurate predictions. I also worked with models that consider multiple factors to get a better understanding of how things are connected."

Pendse expects to graduate with her Master of Science in Data Science this spring. She plans to restart her career in the manufacturing and automotive industry as a data engineer or data scientist. "While I am sad to close this chapter of my career, I couldn't be more excited for the next," she says.

## MS in Data Science Has New Home

Michigan Tech's interdisciplinary MS in Data Science, established in 2013, found a permanent home in the College of Computing in fall 2023, moving from its former administrative home in the Graduate School. Laura Brown directs the graduate program.

"We have accepted the responsibility to grow the program, which is a tremendous opportunity that should benefit both the University and our students," says Dennis Livesay, Dave House Dean of Computing.

"Continuing to grow our presence in artificial intelligence, machine learning, and data science is one of my biggest priorities," adds Livesay. "We'll continue to work closely with our colleagues across campus, especially business and math, to ensure that all aspects of data science are represented."

The data science master's program is extremely flexible, allowing students to concentrate on a specific area of interest. "If a student is more interested in the business side of data science, they can focus there. Or, if they wish to focus on the machine learning or statistics side, they can do that," says Brown. And even though the degree is a course-based program, students who wish to can pursue research with a faculty mentor.

Learn more at [mtu.edu/data-science](https://mtu.edu/data-science)

## Healthcare Transformed

In the world of biomedical data science, Associate Professor Guy Hembroff of the Department of Applied Computing has emerged as a leader in innovative research projects that aim to improve mental and physical healthcare. His work—centered on early detection and preventive and responsive customized solutions for patients and medical personnel—is enhancing safety and patient health outcomes through AI-based clinical decision models. Following is a summary of Hembroff’s current research projects, each contributing to the broader goal of transforming healthcare.

### Proactive and Responsive Holistic Wellness Solutions in K-12 Schools

This project focuses on K-12 schools and their responsibility for the well-being of students. Harnessing the potential of artificial intelligence (AI), the research provides real-time insights into students’ mental health. Through the analysis of data from sources including social/emotional check-ins, social determinants of health, and wearable devices, academic institutions are empowered to better understand students’ well-being. The goal is to offer timely support and customized resources to ensure that students receive the best possible care. Hembroff is working on a commercial application initially funded by the National Science Foundation Innovation Corps (I-Corps™).

### Enhancing Emotional Well-being through AI-enabled Self-regulation Interventions

Mental health disorders represent a significant global challenge. Hembroff’s research in this area seeks to leverage AI, specifically natural language processing (NLP) and deep learning models, to enhance emotional well-being through personalized interventions. By monitoring emotional states in real time using wellness apps and wearables, this work aims to recommend safe and effective interventions, ultimately improving patient outcomes. The Institute of Computing and Cybersystems (ICC) awarded Hembroff Rapid Seed Funding to support the early stages of this work.



### Automated Quality Control of MSK Radiographs using Deep Learning

Quality control is crucial in the field of radiology. Hembroff’s collaborative project with Henry Ford Health Radiology focuses on automating the quality control process for musculoskeletal radiographs. A convolutional neural network model is used to detect and classify various aspects of the radiographs. The research not only improves the efficiency of radiology workflow, it enhances patient safety by ensuring accurate imaging.

### Fracture Risk Predictions through Opportunistic Screenings

Osteoporosis is a significant concern, particularly among the aging population. This project aims to develop a deep learning model capable of the early detection of low bone mass using existing knee radiographs. The approach minimizes the need for additional imaging and reduces healthcare costs. It also enhances patient safety and well-being by expediting diagnosis and treatment. The project is funded by and conducted in collaboration with the radiology and imaging department of Henry Ford Hospital in Detroit.



## Public Health Disease Surveillance Architecture and Modeling

In collaboration with nonprofit hospital network Upper Peninsula Health Care Solutions (UPHCS), Hembroff's team is working on a secure web-based patient registry for disease surveillance. Through data-driven insights, the project enables real-time decision-making and policy development and contributes to improved public health outcomes and the safety of communities. The work is funded by the Michigan Health Endowment Fund.

## Enhancing Behavioral Health Capacity and Clinical Decision Modeling

This collaborative project focuses on creating a secure patient registry for use in integrated care settings. The registry records valuable information about patients' behavioral health, so care management personnel can make informed decisions. By translating data into critical visualizations and analytics, the project enhances healthcare and outcomes for patients. The work is conducted in collaboration with UPHCS and funded by a Michigan Department of Agriculture and Rural Development Rural Readiness Grant.

*(Left to right) Health informatics graduate student Nicole Andress; Guy Hembroff, associate professor of applied computing; and health informatics grad student Gina Adragna.*

**86.1%**

increase in students seeking an MS in Health Informatics from 2022 to 2023

## Graduate Profile: Ifunanya Akpoveta

While working in Nigeria’s health sector, Pharm Ifunanya Emmanuella Akpoveta (née Ezeumeh) noted a need for professionals with both clinical and technical skills. She wanted to pursue a graduate degree where she could gain those skills—and she found that a career in health informatics was the perfect fit.

In December 2023, Akpoveta received her MS in Health Informatics from Michigan Tech, with concentrations in public health informatics and artificial intelligence in healthcare.

“This degree provided me with all the requisite skills to become a health informaticist,” says Akpoveta. “By the end of the program, I had mastered the skills of analyzing health big data and developing and applying artificial intelligence to improve the delivery of healthcare services.”

Akpoveta says Guy Hembroff, associate professor of applied computing, was an exceptional mentor and advisor, challenging her to approach new problems with curiosity



and to think critically and creatively. Additional faculty mentors were Assistant Professors Weihua Zhou, Department of Applied Computing, and Xiaoyong (Brian) Yuan, who is affiliated with both the applied computing and computer science departments.

“Dr. Hembroff has been incredibly supportive of my academic and professional

goals and has helped me identify and pursue opportunities that align with my interests and aspirations,” says Akpoveta. “I am grateful for his guidance, support, and motivation. His commitment to my success has been instrumental in my academic and professional development.”

Under the guidance of Hembroff and Yuan, Akpoveta worked on several research projects at Michigan Tech. “In population health informatics research, I used machine learning algorithms to predict the risk of cardiovascular disease and polycystic ovarian syndrome,” she says.

In medical imaging informatics research, Akpoveta worked on the classification of brain tumors in magnetic resonance imaging (MRI) scans using convolutional neural networks. She says the research aims to auto-classify brain tumors while reducing the workload of radiologists.

During her time at Tech, Akpoveta was vice president and social chair for the African Students Organization and was active in Graduate Student Government, among many other activities. She says the best part of being at Michigan Tech was the relationships she built.



## College News: Guy Hembroff, Yu Cai to Receive Provost’s Award for Sustained Teaching Excellence

Guy Hembroff, associate professor in the Department of Applied Computing, and Yu Cai, professor and associate chair in the Department of Applied Computing, are recipients of this year’s Provost’s Award for Sustained Teaching Excellence. The award provides special recognition to instructors who have been nominated as finalists for the Distinguished Teaching Award four or more times. With this recognition, Hembroff and Cai are also members of Michigan Tech’s Distinguished Teaching Academy, an elite group of faculty with an established reputation for excellent teaching.



Michael Dabish (left) and his brother, Andre Dabish '23 BS in Mechanical Engineering, following Commencement exercises in December 2023.

## From High School Setbacks to Mastering Resilience

### Michael Dabish '20 '23

Years ago, Guy Hembroff, director of Michigan Tech's MS in Health Informatics program, was grabbing something to eat at a local Subway restaurant. Michael Dabish, then a first-year undergraduate student majoring in computer network and system administration (CNSA), was working there at the time.

"I was impressed with Michael's career aspirations in our short initial conversation. Soon after, we hired him to assist in our labs and he never stopped impressing us," says Hembroff. "Michael was a terrific student and is an even better person."

Dabish completed his bachelor's in CNSA in 2020 and his master's in health informatics in December 2023. His success may have surprised those who knew him in high school, where Dabish struggled academically.

"Looking back on my high school experience 10 years ago, when I graduated with a GPA below 1.0, I never would have considered this accomplishment a possibility. Typically, kids with those grades don't even attempt college," says Dabish.

But Dabish knew he was made for more. "Overcoming the odds of completing my undergraduate degree, and going a step further in my educational career is something that I am very proud of," he says. "I wish I

could go back and tell my high school self that everything would be okay, to embrace the challenges, and to let those barriers fuel the journey for growth and knowledge."

Dabish studied health informatics because he wanted to apply his knowledge of technology to the healthcare field. MTU professors encouraged him, knowing his expertise would give him an edge in that industry, which lags behind others in interoperability—the degree to which software systems, devices, and applications can effectively connect and communicate.

"A demonstrated leader and very intelligent person, Michael has developed a powerful, highly technical clinical skill set," says Hembroff. "He has a tremendously bright future and I couldn't be happier for him."

While Hembroff will miss his classroom and research conversations with Dabish, he is pleased to have witnessed his student's tremendous progression in both undergraduate and graduate school.

"I am extremely proud of Michael's efforts and positive attitude, which have translated into the many accomplishments he has already earned within academia and industry," says Hembroff. "Having a focused mindset to succeed is a powerful trait. It helps you overcome obstacles and believe in yourself when others may not see your potential. It also positions you to make the most of opportunities when they arise."

"Professor Hembroff is unbelievable," says Dabish. "He showed me that I am built for this. He taught me how to understand the importance of my work. Building from the ground up is not easy, especially if you need to tear it down first. It's been a long time coming, and it feels good!"

Dabish extends a huge thank-you to all of his professors at Michigan Tech, especially Hembroff, and to his family and friends, his brothers in the Sigma Pi fraternity, and the Michigan Tech community.

"I have unconditional gratitude for those in my life who believed in my potential," says Dabish. "Let this serve as a reminder that it is not about where you start, but how you finish. Here's to resilience, hard work, and the pursuit of knowledge!"

For the past three years, Dabish has been working at Ford as a cloud platform engineer in DevOps engineering. He is now seeking work as a clinical informaticist. "Critical IT infrastructure is not just machines, it's also people. I plan to help improve patient outcomes to better the lives of everyone," he says.

## Master of Science in Health Informatics

### Four Stackable Certificates. On Campus or Online.

The vigorous enrollment growth of Michigan Tech's Master of Science in Health Informatics program clearly demonstrates the growing need for health informatics credentials among healthcare professionals. At MTU, students and working professionals can acquire these credentials through the 30-credit-hour MS in Health Informatics program, which comprises four stackable graduate certificates that can be completed in any order, either on campus or online.

The new 12-credit-hour Foundations of Health Informatics certificate provides training in fundamental topics such as security and privacy, data analysis, programming, and system analysis. Its completion, along with two of the three 9-credit-hour focus area certificates below, leads to an MS in Health Informatics.

#### Artificial Intelligence in Healthcare:

The healthcare industry produces trillions of gigabytes of raw data annually. AI in Healthcare certificate students learn AI concepts, methods, and tools, building a strong foundation in computer science, healthcare, and machine learning to bridge AI and medicine.

#### Public Health Informatics:

Managing and deriving valuable information related to public health is critical today. Public Health Informatics certificate students gain proficiency in health data definitions and standards, learn the basic functions and operations of public health information systems, and acquire skills to plan and manage public health information systems projects.

#### Security and Privacy in Healthcare:

Healthcare privacy is complex—and the importance of safeguarding personal healthcare information and protecting hardware and software systems against attacks cannot be overstated. The Security and Privacy in Healthcare certificate program helps students build a solid foundation in computer science, risk management, and cybersecurity.



## Mechatronics Matters

### Shaping the Future Today

By Mark Gauthier '85, President,  
Donald Engineering

For as long as I can remember, the design and production of machines, devices, and processes have been bottlenecked by the separation of electrical and mechanical engineering. Mechatronics bridges this disconnect by combining electrical and mechanical engineering to create a set of engineering dynamics for the future. Over the past five years, it has progressed from a fairly unknown discipline to become part of everyday engineering conversations.

In today's fast-paced, changing world, time has become the essence of design. Designing the process and build for a product is squeezed for time as it moves from concept to reality. The efficiencies of using skills from both mechanical and electrical engineering move processes along at a much faster pace and generate superior, higher-quality outcomes. And, quality evolves alongside efficiency, setting the stage for ultimate performance.

As electronics become smaller, faster, and more intelligent, mechatronics concepts are critical. Mechatronics sheds light on the questions that need to be asked and offers a better understanding of the dynamics and controls required to make these tools run. With mechatronics, engineers have more choices for energy efficiency and quality of the device, and the knowledge to integrate tools that help reduce design time and build and increase the probability of success.

This requires logical thought processes, consideration of mechanical demands and efficiencies, and a firm grasp of how to program the sequence of operation for safety, logic, and cybersecurity. These are a lot to place on one person's shoulders—but so are the demands of a worldwide market.

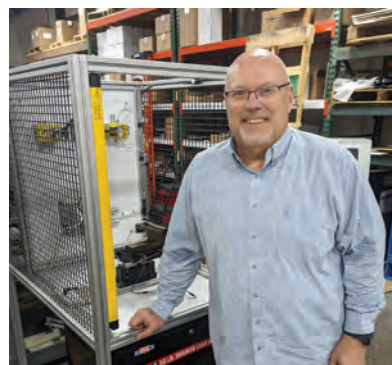
The innovative technologies used by modern manufacturers of mechatronics devices have expanded immensely. These tools and devices aid engineers, giving them choices and helping bridge the gap between the

mechanical and the electrical. Without an understanding of both systems, decisions are hampered, the design process slows down, and outcomes may be jeopardized.

Too often, machine design is based simply on cost, because money is easier to

understand than the stated performances. Mechatronics provides the engineer with the ability to choose products from a menu of modular components, such as life expectancy, dynamics, and load capability. Decisions can then logically be applied to the design and build to ensure the machine or device's performance and longevity. This modularity also aids in the consideration of maintenance cost, mean time between failure, and part or performance output capability.

Efficiencies are also playing a larger role in designing and building products—and so are quality checks and the need to retain quality data. And as we produce more, we also have to document quality verification. The ability of a machine to pick up a part without a smart





crews can dive into the exact location of the fault. Avoiding downtime is critical in the manufacturing process—the less time it takes to find and repair an issue, the better. Mechatronics-enabled smart devices, used in conjunction with mechanical and electrical devices, can monitor and improve performance in real time before a machine fails, limiting or eliminating surprises and allowing controlled, scheduled shutdowns.

The ability to imagine the step-by-step motion of a manufacturing process is an art form. To be able to access those skills is a gift. Knowing the process and how to make things move according to desire lays the foundation for success. The study of mechatronics helps develop these inner skills to define the ultimate questions before pencil hits paper.

The working environment is a key player in quality and efficiency. With everything moving and shifting, and multiple associates collaborating within the process, safety becomes a significant concern. Lockout/Tagout, a system that blocks all incoming energy and discharges stored energy in the equipment, is a huge step in ensuring worker and machine safety. Mechatronics helps determine the best safety practices to eliminate trapped energy to reduce safety hazards.

New rules and regulations from the International Organization for Standardization (ISO) and American National Standards Institute (ANSI) also contribute to safety, helping build morale within the working environment and giving workers more confidence to produce better results. These standards bring safety to the forefront and develop real-life concepts to increase profits and reduce exposure to dangerous working conditions and bad press.

Today's communications technologies let us monitor machines all over the world, allowing us to change settings on a machine

running in Germany from a desk in Houghton. The danger of this access falling into the hands of a competitor or unethical hacker is a reality. Unauthorized access can degrade performance, undermine safety implementation, and compromise critical company documents and processes. With mechatronics, systems can be

**70.6%**  
increase in students seeking a BS in Mechatronics from 2022 to 2023

developed and monitored more securely.

Most importantly, mechatronics engineers should have compassion for the working environment around them. They hold the key to taking ownership and responsibility for their work. This is not about reducing overhead labor costs. It's about making the world a better place to live.

Mechatronics engineers are passionate about what they do and how they do it. The challenges, excitement, and satisfaction of knowing you have the foundation to understand the changes are priceless. To see your work come to life is an exceptional way to enjoy your career. From the first day you knew you wanted to be an engineer, there was that desire to design, develop, and build. Now, through mechatronics, we have the curriculum to fine-tune those skills to prepare for the challenges of tomorrow. Once you understand the goal of the program, the sky is the limit—and you have to ask, "Where have you been all my life?"

Artificial intelligence and Industry 4.0 are not just buzzwords for "look what's coming." The future is here today—but rest assured, it will be different tomorrow. To meet industry demands and get an edge on the competition, today's manufacturers are looking for next-generation engineering prodigies, as I like to call them. The Michigan Tech mechatronics program is preparing and empowering next-gen professionals through real-life opportunities to gain the knowledge and experience they'll need to shape the future.

*Mark Gauthier '85 BS Electrical Engineering is the president of Donald Engineering, an engineering and distribution company headquartered in Grand Rapids, Michigan. Gauthier is a member of the Department of Applied Computing Industrial Advisory Board and a longtime supporter of Michigan Tech. Donald Engineering helped fund and build the University's Mechatronics Playground, a state-of-the-art hands-on learning lab supporting students studying mechatronics and other degree programs at Michigan Tech.*

gripper and pass on executing multiple part checks before it continues to the next process is just adequate. To understand more fully and streamline performance on the fly, mechatronics goes further to verify holes, dimensions, surface finish, and even weight—all documented before the gripper releases the part.

Documenting this information is priceless to the producer and the customer. In some cases, it saves time and may reveal exactly what is needed to fix an issue so maintenance





## Beginnings Track: Building the Mechatronics Workforce in the Upper Peninsula and Northern Michigan

From touchscreen tablets and phones to robotic assembly machines, today's advanced manufacturing sector is achieving unprecedented levels of automation, flexibility, and efficiency. A key driver of this revolution is the emerging field of mechatronics, which focuses on the development and use of automation for industrial applications.

Mechatronics is expected to remain a driving force in industry, and as its smart technologies evolve, it will require a larger and more diverse STEM workforce with advanced electrical, mechanical, computer, robotics, and controls skills.

Michigan Tech, Gogebic Community College, West Shore Community College, and eight industrial partners and nonprofit organizations are collaborating to train a new generation of professionals to lead this surge in advanced manufacturing in northern Michigan and the Upper Peninsula.

Their work is supported by a three-year research and development grant from the National Science Foundation's (NSF's) Experiential Learning for Emerging and Novel Technologies (ExLENT) program. The \$999,930 project, "Beginnings Track: Experiential Learning for the Mechatronics Workforce in the Upper Peninsula and Northern Michigan," aims to increase interest in careers and continued education in advanced manufacturing among community college and university students, working professionals, displaced workers, and high school students.

The three-phase undertaking has begun with the development of an online mechatronics education portal (MEP) to teach theoretical knowledge in critical areas. To be launched in May 2024, the MEP comprises five self-directed learning modules.

In Phase II, participants will engage in 40 hours of hands-on, practical experiential learning on state-of-the-art equipment at Michigan Tech. In Phase III, participants will visit industrial companies in northern Michigan and the Upper Peninsula to gain firsthand knowledge of complex mechatronics systems.

Further, professional mentoring and community-building activities with academic and industry partners will help participants expand their network with industry collaborators, promote a sense of belonging, and foster a diverse community of mechatronics practitioners.

Overall, three cohorts of 20 students each will complete 120-150 hours of work through the program. A generous package of stipends and support is offered, and participants will receive a certificate of completion when they finish all phases of the training.

Another component of the grant is the research and development of a tele-operated robotics work cell at Michigan Tech. Accessible to students from anywhere in the world through an internet connection, the remote work cell will allow students to complete the same operations as a user physically present in the lab.

Alex Sergeyev, professor in the Department of Applied Computing, is the principal investigator (PI) on the \$999,930 "Beginnings Track" grant. Co-PIs are Vinh Nguyen, Department of Mechanical Engineering-Engineering Mechanics; Paniz Hazaveh, Department of Applied Computing; Scott Kuhl, Department of Computer Science; David Labyak, Department of Manufacturing and Mechanical Engineering Technology; and Linda Wanless, Center for Teaching and Learning.

The nonprofit organizations engaged in the project are the Keweenaw Economic Development Alliance (KEDA), Michigan Works, and the MTEC SmartZone. The participating industrial partners are Burton EMS, Ironwood; Calumet Electronics, Calumet; FloraCraft, Ludington; GS Engineering, Houghton; Ironwood Plastics, Ironwood; REL Inc., Calumet; Metalworks, Ludington; and Orbion Space Technology, Houghton.





## Faculty Bio: Alex Sergeev, Mechatronics

Professor Alex Sergeev, Department of Applied Computing, joined Michigan Tech as a faculty member in 2007. He holds an MS in Physics and a PhD in Electrical and Computer Engineering. Sergeev is the graduate program director for the Master of Science in Mechatronics and director of the University's FANUC Certified Industrial Robotic Training Center.

"I think that mechatronics is the future of engineering," says Sergeev. "Traditional engineering degrees will always be in high demand, but the complexity of mechatronics systems will certainly require specialists who can understand those systems from multiple dimensions."

Mechatronics is a multidisciplinary field at the intersection of mechanics, electronics, and computing. It deals with the robotics, control systems, and electromechanical systems needed in the contemporary manufacturing industry, where advanced processes are becoming more and more automated.

"Today, there are very few purely electrical or mechanical devices," says Sergeev. "Complicated electromechanical systems with advanced controls have become the norm. To support existing technologies and develop new, even more versatile and advanced devices, the modern engineer needs to possess skills encompassing all the pillars of mechatronics."

Sergeev's physics and electrical engineering background and eight years of post-undergraduate industrial experience allow him to relate some of the theoretical mechatronics subjects to actual applications. "Knowing the subject is key. An ability to relate the theory to industrial applications makes teaching a subject more interesting and productive," he says.

His expectations for students are high. "I'm always open with the students but also very

straight in my requirements. Sometimes, they don't like it, but the truth of life is that they must be ready to implement their skills on day one once they join the industry. It is a very demanding task, and I want them to be ready for that."

Sergeev recalls a School of Technology Industrial Advisory Board (IAB) meeting about 15 years ago at which an IAB member proposed incorporating industrial robotics into the curriculum.

"None of the faculty had expertise in industrial robotics at that time, but in discussions, it became clear that we should consider incorporating it in our BS in Electrical Engineering Technology (EET) program curricula," says Sergeev. "We saw a massive trend in the growth of industrial robots in manufacturing and other industrial sectors. Providing these skills was a must for graduates of Michigan Tech, and it would make the EET program stand out."

Sergeev took on the challenge to lead this endeavor. "It was not easy and required months of training at FANUC America—the largest manufacturer of industrial robots and source for self-learning of the subject," he says.

Learning even more, Sergeev experienced firsthand how advanced manufacturing is taught in Europe during a sabbatical leave at Aarhus School of Marine and Technical Engineering in Denmark, and later during work with faculty and students at Heilbronn University of Applied Sciences, Germany.

"In Europe, I was immersed in the field of mechatronics and the electrical, mechanical, controls, robotics automation, and computing fields of study. These extraordinary educational and research experiences encouraged me to introduce and launch the mechatronics degrees at Michigan Tech," says Sergeev.

Today, the mechatronics bachelor's and master's programs at Tech are growing rapidly. Graduates are in high demand, and they are hired by Tesla, General Motors, Ford, and many other leading manufacturing companies.

"All of this would not be possible without the support of the exemplary MTU faculty, staff, and administration, who are pushing the envelope of this rapidly growing field," says Sergeev. "I am very proud to be part of this team that is fostering our educational programs at Michigan Tech."

## Graduate Profile: Joshua Olusola, MS in Mechatronics

"My Michigan Tech education gave me the skill sets needed to pursue a field I enjoy and find purpose in," says Joshua Olusola, who completed his Master of Science in Mechatronics in spring 2023.

Olusola completed his BS in Mechanical Engineering in 2019 at the University of Ibadan, Nigeria. In his final year of undergraduate studies,

he interned at an industrial automation company, which spurred his interest in mechatronics.

After two years of postgraduate employment, he was ready



to pursue a graduate degree. And when a friend shared a research opportunity at Michigan Tech, Olusola found himself on the University's website.

"I was super excited when I saw the mechatronics program," says Olusola. "And not only were they teaching robotics, they were teaching industrial robotics using FANUC robots and industrial controls using Allen-Bradley PLCs (programmable logic controllers)! Those are the big products when it comes to industrial automation."

Olusola's research into Michigan Tech's mechatronics master's program confirmed that the course structure and lab software and equipment were consistent with the skills needed by companies in the industry. "This was what drew me to the program," he says.

Olusola is now working at Tesla Inc. as a manufacturing controls and automation engineer at the company's Gigafactory based in Austin, Texas. There, he supports a team developing manufacturing lines for battery packs and drive units.

Olusola is currently focused on pursuing professional certifications relevant to the field. However, further down the line, he says he would like to pursue an MBA and/or a PhD in robotics.



## Powered by Michigan Tech Talent

"Michigan Tech has had a great influence on our company," says Jeff Halonen '16 BS Mechanical Engineering, CEO of Steelhead Technologies. Founded in 2021 and headquartered near Michigan Tech, Steelhead provides cutting-edge job shop technology and efficiencies to process manufacturing businesses that are struggling

with outdated process management systems.

"We observed an acute need in the job

shop manufacturing environment for a tool to improve workflow and to guide owners on how to improve profits," says Halonen. "Many shops have inefficient systems to run their enterprises, whether it be quoting, production management, or scheduling."

Over 70 percent of Steelhead's full-time roster are MTU alumni, and several part-time employees are working on their Tech degrees. Steelhead is excited to have Michigan

Tech as a talent resource as their Calumet office expands. Tech grads also work in Steelhead's growing offices in Minneapolis and metro Detroit.

"Michigan Tech graduates have been a great talent source for the growing company," says Halonen. "They bring with them a strong work ethic and create a positive work culture."

Steelhead started small with a few engineers and one or two customers. Now, just before their third anniversary, they have over 50 employees and customers in 28 states. The Upper Peninsula's low cost of living, coupled with the resources at Michigan Tech, has kept the Steelhead headquarters and technical team firmly planted "up north," even as the sales team has spread out across Michigan and the Great Lakes region.

"Our customers provided lots of patience and helped us to solve issues that came up as we grew our business," says Halonen. "I think it helped that we acknowledged the areas for improvement and found people



**STEELHEAD**  
technologies



who could provide the insight we needed. It's important to know what you don't know and find wisdom before you act."

So far, Steelhead has helped dozens of plants improve profitability, sales, operations, scheduling, and more. The company's success was recognized in 2022 with a Keweenaw Community Sparkplug Award, presented by the Keweenaw Chamber of Commerce. The Sparkplug Award recognizes local businesses, organizations, community projects, and individuals for their efforts during the previous year.

"Our biggest reward is our growing business," says Halonen. "When a business is easier to run or makes more money, they can better serve their customers, employees, and communities."

Halonen notes that for a new business to thrive, you need a good team, a good product, a product-market fit, and great customers. But what about the capital?

"You can find the capital," says Halonen. "If you have a great product, customers that need and love your product, and you can build a team around that product, partners are out there to help you grow that business."

"If you know how to speak and you have energy and passion, that capital will come," adds Halonen. "I think a lot of people just assume raising capital is some fat-cat thing that only big shots do. That's absolutely not true. Tens of thousands of investors are out there working all day long just to find great businesses with growth potential."

Steelhead clients have a lot to say about how the company has helped them improve their operations and profitability. "I can see where we are doing well and where we're not," says one client. Another notes, "While utilizing Steelhead we have increased visibility in all areas of our process." Still another says, "I cannot speak highly enough about all of the ways Steelhead has improved our quoting process."

**50**

employees serving  
75 clients in 28 states  
and provinces

**25+**

of the Steelhead  
staff are Michigan  
Tech alumni



## Graduate Profile: Jake Timmer, Superior Technologies

Jake Timmer '17 BS Computer Science began his education at Michigan Tech in 2013. From the start, he intended to start his own company. "I like taking that kind of risk and the independence and freedom that come with running the show," he says.

In 2016, while he was still in school, Timmer founded Superior Technologies, which delivers software development services across a wide range of technologies, including Go, C++, Java, and Python. Clients include military contractors, automotive manufacturers, and firms that service large data centers. Based in Houghton, the company employs about 20 people.

"A lot of companies have a hard time hiring for technical talent. They come to us when they don't have specific expertise in a given technology," Timmer says. "Companies often don't want to hire a salaried person for six months when they need a specific skill for just a short time."

All but one of the company's current employees are Michigan Tech graduates. The company has hired more than 35 MTU students and alumni over the years.

"MTU students are an order of magnitude tougher than some of the other schools that we have recruited from. It's a willingness to confront difficult problems," Timmer says.

Superior Technologies encourages its employees to cultivate a healthy work-life balance. "I think it's the best way to build an enthusiastic and productive team," Timmer says. "Very rarely will we ask them to work overtime, and we try to be super flexible about vacations."

"We're also big on mentorship," Timmer says. "Our newer employees are paired with senior developers who coach them and help them succeed. It puts junior developers in a position where they can learn quickly and do better work."

Timmer has always liked math and he is also creative and artistic. He attended art school for a while, but decided that it wasn't the right path. He wasn't sure what to do next and was considering math, engineering, and computer science.

When a longtime friend attending Michigan Tech suggested he look into computer science at MTU, Timmer found his answer. He completed his paperwork quickly and was fast-tracked to start his bachelor's degree at Michigan Tech in fall 2013.

"Computer science is the kind of field where nobody ever knows everything. You're constantly learning. It's a good balance of problem-solving and creativity," Timmer says. "Almost by definition, programs are infinitely reproducible for almost no cost, so anything that you're building is like a new thing. I like that aspect of it."

"The computer science program at Tech is practical enough and difficult enough that it teaches the problem-solving skills necessary for the real world," Timmer says. "The program is broad enough to encompass all the major things you can do with your career."

It gives students a good idea of what they want to do and teaches them how to learn.”

Associate Professor Robert Pastel of the Department of Computer Science was a helpful influence to Timmer during his time on campus. “I talked with him a lot; he was awesome,” Timmer says.

“There are so many brilliant people who attend Tech,” Timmer says. “It’s a good environment to become engrossed with your peers. I have friends from Tech who have started huge companies and friends who are working at companies like Facebook and Google.”

Timmer’s advice to current Michigan Tech students? “Keep trying! Every success is built on a lot of failures, especially for people getting into entrepreneurialism,” he says.

“You’re the product of the five people you hang out with. You never want to be the smartest or most successful person in the room,” Timmer adds. “You want to surround yourself with like-minded people you can learn from and grow with, and who want to do the same type of things that you do.”

Superior Technologies supports Michigan Tech hockey, Women in Computer Science, and the Makerspace. Superior Technologies partner Rob Sweet ’97, who joined the company in 2018, serves on the Department of Computer Science External Advisory Board and the Management Information Systems (MIS) Advisory Council.

Timmer is part of a large family from Jenison, Michigan, and the Grand Rapids area. He enjoys attending Michigan Tech hockey games, reading classic books, playing pool and tabletop games, cooking, and spending time with his wife and daughter. He is a member of Evangel Community Church, Houghton.



**SUPERIOR**  
TECHNOLOGIES

## Developing Entrepreneurial Skills Across Campus

From Enterprise and Senior Design to Design Expo and Husky Innovate, Michigan Tech students have dozens of resources to help develop their entrepreneurial endeavors.

### Enterprise Program

With coaching and guidance from faculty mentors and business sponsors, the more than 25 interdisciplinary student Enterprise teams on campus invent products, provide services, and develop solutions. Popular among computing students are the Humane Interface Design Enterprise, which designs, develops, and evaluates human-computer interfaces for campus and industry sponsors, the Husky Game Development Enterprise, which focuses on developing video games for business, education, and fun, and the IT Oxygen Enterprise, which focuses on software development, cybersecurity, and IT.

### Husky Innovate

Husky Innovate, a collaboration among the Pavlis Honors College, the Office of Innovation and Commercialization, and the College of Business, connects student innovators with support and resources to advance their ideas through co-curricular educational and experiential learning programs, mentorship, and funding opportunities. Husky Innovate programs include Innovation Week, the Bob Mark Business Model Pitch Competition, the Alley Makerspace, and Experience Innovation student trips.

### Senior Design

Senior Design undergraduate capstone projects, required by many undergraduate degree programs, are more like a first job than a last class. Students work on small teams to tackle challenging, client-based projects spanning two semesters, applying skills acquired in earlier coursework.

### Design Expo

Hosted by the Enterprise Program and the College of Engineering, each year Design Expo engages more than a thousand students, providing a venue for Enterprise and Senior Design teams to showcase their work and compete for awards. A panel of judges, made up of distinguished corporate representatives, Michigan Tech staff and faculty members, and community members, critique the projects and determine the award winners.

### Office of Innovation and Commercialization

Michigan Tech’s Office of Innovation and Commercialization (OIC) provides expertise, services, and initiatives to support campus researchers seeking to commercialize their work. The OIC offers funding opportunities, training programs, and licensing agreement preparations and negotiations, and partners with the MTEC SmartZone and other organizations to support researcher-led start-up businesses.



## CyberHuskies, GenCyber, and CyberCorps

### Michigan Tech Cybersecurity Students Share their Knowledge and Passion

Today's youth immerse themselves in technology at a young age, learning skills they will use throughout their lives. But many hazards accompany those cool smartphone and computer applications, and it's never too early to be aware of the risks. Just like looking both ways before crossing the street, children can be prepared to protect themselves from cyber threats.

Kids can soak up basic cybersecurity skills as rapidly as they pick up new technologies. Michigan Tech students from the CyberCorps® Scholarship for Service (SFS) program and the MTU RedTeam, a cybersecurity-centric student organization, are showing them the way through CyberHuskies, a team of Houghton-area middle and high school students excited about cybersecurity and computer topics.

On Saturday evenings during the academic year, SFS students teach these enthusiastic youth about security concepts and guide them through hands-on labs. The SFS students have also coached CyberHuskies to impressive finishes in competitions that help them practice the skills they are learning. All local youth are invited to join CyberHuskies and membership is free.

SFS student Aston Purdom says the best part of volunteering for CyberHuskies is sharing his cybersecurity knowledge and experience with younger students who are eager to learn more.

"I get a sense of fulfillment from passing down what I have learned to those bright students and helping them further encourage their education," Purdom says. "The students are enthusiastic about taking on challenges and they have a great time working together."

RedTeam student Andrew Martin also enjoys seeing younger students get excited about computing and cybersecurity. "Working with them enriches my education and allows me to master the fundamentals as I explain essential concepts to students who might not understand more technical language."

## Cybersecurity Competitions

In their first-ever National Cyber League (NCL) competition, in April 2023, two teams of CyberHuskies middle and high school students placed 25th and 57th among 600 teams, earning a ranking of 17th in the nation. The NCL is a community and virtual training ground that gives youth opportunities to develop and demonstrate their technical cybersecurity skills.

In the 2022 Michigan Governor's High School Cyber Challenge (GHSCC), one CyberHuskies team finished in the top 10, competing against more than 600 students from across Michigan. Four additional CyberHuskies teams finished in the top 100. The GHSCC competition tests students on their knowledge of cybersecurity, computer science, and information technology.

And, in the 2022 CyberPatriot contest, one CyberHuskies team secured the No. 7 spot in the platinum tier, and a second team ranked No. 7 in the gold tier. Nationally, 5,000 teams and over 20,000 students competed in the event, which puts high school and middle school students in charge of securing virtual networks. In the 2021 CyberPatriot event, a CyberHuskies team from Houghton Middle School captured first place. CyberPatriot aims to inspire K-12 students toward careers in cybersecurity and other STEM disciplines critical to our nation's future.

SFS students also organize an annual "WonderHack" capture the flag event for middle and high school students and teachers in Michigan. In the 36-hour competition, players complete a collection of cybersecurity challenges and are awarded a flag for each challenge they correctly complete. At the end of the competition, the flags are tallied to determine the best players and teams, and top winners receive special gifts.



## GenCyber Summer Camps

Michigan Tech students also contribute to K-12 cybersecurity education through their work as assistants for the Michigan Tech GenCyber camps. Michigan Tech has held six GenCyber camps since 2019. In 2022 and 2023 alone, the camps provided cybersecurity training to more than 150 middle school and high school teachers and youth from across the country.

SFS student Matthew Bailey, who has worked as an assistant for the GenCyber camps, liked making connections with the kids and knowing that he was contributing to their learning. "The kids ask a ton of questions and want to know everything about everything," he says. "You can literally see the learning happen. It's rewarding that the things I'm spending time on are being used in a meaningful way. It's different from school, where the end goal is years away."

GenCyber is hosted by Michigan Tech's Summer Youth Programs and the College of Computing and funded by the National Security Agency and the National Science Foundation. Camp activities include hands-on exercises, interactive lectures, games, career exploration, and campus tours. All camp activities are free, including tuition, activities, and room and board.

## CyberCorps Scholarship for Service

Coordinated and conducted by multiple departments and faculty across campus, the CyberCorps Scholarship for Service (SFS) national scholarship program is designed to help recruit and train the next generation of cybersecurity professionals. A multimillion-dollar grant project awarded to Michigan Tech in 2021, SFS funds two- or three-year full scholarships for up to 20 cybersecurity undergraduate and graduate students. In return for their scholarships, following graduation, SFS recipients agree to work in a federal, state, local, or tribal government cybersecurity-related position for a period equal to the length of the scholarship.

"The CyberCorps scholarship is such a blessing," says Bailey. "I am so fortunate to be one of the students selected. It lifts a burden from my shoulders and allows me to put my full focus on school, knowing that the rest is taken care of. It is not an exaggeration to say that it is life-changing."



(Left to right) Dev Sanghani, MS in Cybersecurity student; Ryan Klemm, BS in Cybersecurity student; Josh Stiebel, BS in Computer Science student; and Noah Holland, BS in Cybersecurity student.

## MTU RedTeam Leads the Pack

In the fall 2023 National Cyber League (NCL) individual competition, two Michigan Tech RedTeam members ranked in the top 100 out of 7,930 players across the nation: computer science major Ryan Klemm placed fifth, the best RedTeam record in the NCL individual games since 2017; and cybersecurity major Noah Holland placed 40th. In team competition, the RedTeam was ranked 11th out of 454 teams.

In the spring 2023 NCL team competition, two RedTeam teams placed 30th and 199th out of 3,909 teams. At the 2023 CyberSEED Capture the Flag competition in March 2023, RedTeam 1 placed third with 2,390 points and 93.41 percent accuracy, earning a \$2,000 prize. Team 2 placed 73rd and Team 3 finished 99th.

Michigan Governor Gretchen Whitmer personally recognized the Michigan Tech RedTeam for finishing eighth in the National Cyber League fall 2022 competition.

The RedTeam is a registered student organization that promotes a security-driven mindset among MTU students and provides a community and resource for those wishing to learn more about information security. The group is advised by faculty members Bo Chen, Department of Computer Science, and Yu Cai, Department of Applied Computing.

51%

of students on  
MTU's Esports  
team are enrolled  
in the College of  
Computing

Learn more at: [michigantechhuskies.com/sports/esports](https://michigantechhuskies.com/sports/esports)

## Michigan Tech Esports: Bringing Everything Great about Sports to More People

The Michigan Tech Esports program, established in fall 2019, engages students from across the University. The Esports team participates in the National Associate of Collegiate Esports (NACE) Collegiate Starleague and several game-dependent leagues, including the Activision Blizzard Collegiate Tournament, League of Legends, and the Great Lakes Collegiate Rocket League (GLCRL) tournament.

Chris Gelety, assistant director of Michigan Tech Esports, shares more about the program.

### How do you recruit team members?

**CG:** There are multiple methods for MTU Esports recruitment. In open tryouts, any Tech student can fight for a spot. We also do traditional recruiting of high school athletes through combines, recruiting events, scouting platforms, and referrals from coaches. Occasionally, a student will reach out and request a walk-on tryout. We have also elevated extracurricular MTU student club teams, such as Valorant, and most recently the Call of Duty team.

### In what games does the MTU Esports program compete?

**CG:** Right now, the team competes in Apex: Legends, Call of Duty, Counter-Strike 2, League of Legends, Rocket League, Super Smash Bros. Ultimate, Overwatch 2, and Valorant.

### Do individual team members have specific games in which they compete?

**CG:** Yes. We encourage the team members to specialize, and most of our team members play a specific game. However, we do have a handful of multisport student-athletes.

### Who does the MTU Esports team compete against?

**CG:** MTU Esports student-athletes compete against many collegiate opponents. Sometimes we play Great Lakes Intercollegiate Athletic Conference (GLIAC) schools, and there is a GLIAC championship for member schools in February. But each conference for each league or tournament has a considerable variety of teams from all over North America.



### How long is the team's season? When do they compete?

**CG:** Esports is played year-round, but the main leagues typically run from early September through early November and from late January through early April. However, each game has its own tournament organizers, who run on their own schedules. Combining annual invitationals, tournaments, and off-season leagues, the MTU Esports calendar fills up quickly.

### In how many contests does the team compete each year?

**CG:** In the 2022-23 season, we competed in 350 matches: 146 matches in Rocket League, 32 in Counter-Strike, 34 in Super Smash Bros. Ultimate, 45 in League of Legends, 39 in Overwatch, 20 in Apex: Legends, and 34 in Valorant. This season we're competing considerably less as we focus on building regular-season play within the GLIAC conference. In the fall of 2023, we competed in 77 games.

### How many Esports student-athletes participate in a single competition?

**CG:** Most games are five-on-five, or 5v5, competitions. Smash runs a 4v4 crew battle format. Call of Duty is 4v4, as well. Rocket League and Apex: Legends are both 3v3 games.

### What is the duration of the typical competition?

**CG:** This is very game- and tournament-specific. Rocket League matches can be over in under 30 minutes, while Apex tournaments often run the greater part of an afternoon. Ninety minutes is most common, with an average duration of one to two hours.

### Are the competitions played in a particular location?

**CG:** While most contests are facilitated online, the grand finals or the final day of a tournament will be typically hosted in person. The GLIAC championship was hosted at Davenport University last year, and it is being hosted at Ferris State University this year. These in-person competitions are often called LAN events, as the games are played over a local area network instead of the internet.

### Do Esports student-athletes engage in physical training?

**CG:** Yes. Working with the lifting coach, our student-athletes work out twice a week in a general strength and conditioning regimen. The athletics department provides leadership training, psychology training, and general student citizenship training. We are

also in the beginning stages of working with the kinesiology and integrative physiology and cognitive and learning sciences departments to conduct research to optimize not only our direct practice and computer actions, but everything that connects the student-athlete to the computer. Things like posture, diet, and mindset matter. As we learn more, we will apply interventions to improve our student-athletes' performance.

### What's the difference between Esports and other sports?

**CG:** Esports are similar to traditional sports in a lot of ways, but there are two major differences: the people and the property. First, the property. Companies own the game. For instance, the game developer Riot Games owns Valorant, and the company has a lot to say about how its intellectual property is used. This provides unique challenges to those who wish to build upon the game's foundation to create a sport.

Then, the people. Esports catches a different set of people who become student-athletes. While there is some overlap of folks who played both traditional sports and Esports growing up, more often than not, Esports team members are less athletically gifted but still enthusiastic competitors. With Esports, we can bring everything great about sports to more people, including competitors and fans. We have the opportunity to build something new that takes what we love about sports—and perhaps leaves some of the stuff we don't—for something even greater.

### What does the future of Esports look like?

**CG:** Esports is in an interesting place as an industry. The professional scene is in a recession and things are very uncertain for the short term. I'm not worried. As long as people continue to like competing in video games, Esports will continue. However, even with the uncertainty in the professional world, collegiate and scholastic Esports seem to have a much stronger foundation and brighter future. The year-over-year growth in Esports competition has been steady, so I expect to see more Esports for a long time to come!

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*Check out the MTU Esports Twitch channel at [twitch.tv/mtuesports](https://www.twitch.tv/mtuesports) to catch the games live. The games are also uploaded to YouTube at [youtube.com/@mtuesports](https://www.youtube.com/@mtuesports). Follow the program's X (Twitter) account [@mtuesports](https://twitter.com/mtuesports) to stay up to date on their competition schedule.*

## MTU Esports Program Accomplishments

- 2023 GLIAC Champions: Overall Esports (including two first-place finishes and one second-place finish)
- 2023 GLIAC Champions: League of Legends
- 2023 GLIAC Champions: Super Smash Bros. Ultimate
- 2023 GLIAC Runners-Up: Rocket League
- 2023 NACE Varsity Plus East 4 Conference Champions: Call of Duty: Modern Warfare 2
- 2022 Rockstar Energy Collegiate Esports Invitational Mankato Champion: Rocket League
- 2023 Great Lakes Collegiate Rocket League Runners-Up
- Spring 2023 NACE Varsity West-Central Conference Champions: Counter-Strike: Global Offensive
- Fall 2022 NACE Varsity Premier East 4 Conference Champions: Rocket League
- Fall 2022 NACE Varsity Plus East 5 Conference Champions: Rocket League
- Fall 2022 NECC Champions League Champions: League of Legends
- Spring 2021 NACE National Champions: Counter-Strike: Global Offensive



Michigan Lieutenant Governor Garlin Gilchrist II (left) with Michigan Tech electrical engineering major Emily Roth, at the North American International Detroit Auto Show on September 14, 2023.

## The Michigander Scholars Program: Electrifying Careers in Michigan

Hosting nearly one-fifth of all US automotive production, Michigan has long been a hub for engineering and manufacturing jobs. Today, the state's tech landscape is evolving and growing rapidly, offering a variety of new high-tech career opportunities in areas including electric vehicles (EVs), mobility tech, and semiconductors.

But at least 3,000 jobs are currently vacant in these sectors. Filling these positions is critical, not only to Michigan's success, but to the future of mobility and how that technology is developed, designed, manufactured, and deployed. Michigan aspires to add more than 290,000 new EV and mobility tech jobs by 2030.

To help Michigan businesses working to fill these high-demand, high-tech jobs, while also increasing the state's workforce longer-term, the Michigan Economic Development Corporation (MEDC) launched The

Michigander Scholars scholarship program in March 2023.

The program is an initiative of the Talent Action Team, a public/private consortium convened by the MEDC Talent Solutions division and part of a multimillion-dollar talent attraction and retention strategy. MEDC describes the push as the nation's largest campaign to promote high-growth jobs, notably in EV/mobility sectors. Michigan Tech helped pilot the program and is one of seven state universities now participating.

Now in its second year, The Michigander Scholars connects students interested in EV/mobility or semiconductor careers with core Michigan companies looking for tech talent. Eligible Michigander Scholars jobs include computer, electrical, and process engineers and software developers. Participating EV employers include BorgWarner, Bosch,

Denso, Ford, General Motors, LG Energy Solutions, Magna, Mahle, Nissan, Our Next Energy (ONE), Shape Corp., Subaru, Toyota, Ultium Cell, and ZF. Participating semiconductor employers include Calumet Electronics, Hemlock Semiconductor, KLA, and SK Siltron CSS.



The program awards scholarships of up to \$10,000 to students who complete internships or accept a postgraduate letter of employment with a participating employer. Students who complete experiential learning coursework sponsored by a participating employer as part of Michigan Tech's Senior Design and Enterprise programs may also be eligible for scholarships.

At Michigan Tech, more than 190 students are participating in the University-wide initiative. Over 20 Scholars at MTU have been awarded scholarships to date, and the



(Left to right) James Hill, Michigan Tech industry fellow; Michigander Scholar Marina Fernandez, mechanical engineering major at Tech; and Kay Oliver, MTU staff advisor to The Michigander Scholars program.

University plans to award an additional 30 scholarships in 2024.

While participating in the program, Scholars are encouraged to attend networking events, expos, career fairs, and other learning and networking opportunities. In summer 2023, Scholars participated in a slate of Detroit Intern Experience events, which included virtual events that covered skill building, professional development, financial literacy, and more. In several in-person events, Scholars from across Michigan met to discover what Detroit has to offer, talk with Talent Action Team representatives, and meet with employers.

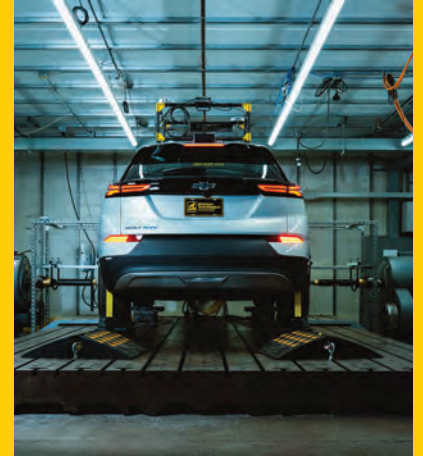
Scholars at Michigan Tech also took part in activities at the North American International Detroit Auto Show in September 2023. At the auto show, Huskies Emily Roth and Livi Morgan participated in a panel discussion to inspire high school students to explore engineering and STEM careers, sharing their college experiences and career plans. In addition, Roth, Morgan, MTU student Daniel Douglas, and other Scholars from the University of Michigan and Michigan State University participated in a roundtable discussion with Michigan Lieutenant Governor Garlin Gilchrist II.

MTU mechanical engineering major Marina Fernandez completed an internship at ONE in Novi, Michigan, in summer 2023, receiving a \$5,000 scholarship from The Michigander Scholars program. At ONE, Fernandez worked with the product design team, applying software to develop 3D models.

Fernandez had already explored a career in the EV industry when she found out about The Michigander Scholars program, but she says it helped her look at the industry in a different way.

“The Michigander Scholars scholarship is important to me. It not only helped me financially, it fueled my passion for a career in the EV industry and heightened my awareness that EV and mobility tech is the future for the next generations,” Fernandez says.

In 2023, The Michigander Scholars program was administered by the College of Computing. In 2024 and beyond, Pavlis Honors College will oversee the program.



## MTU Research Supports Mobility

In addition to The Michigander Scholars program, Michigan Tech recently received over \$18 million in federal research grants to develop technologies for recycling and reusing EV batteries. This faculty-initiated research will help ensure that Michigan has a steady and sustainable supply of batteries going forward.

On the semiconductor front, Michigan Tech has received \$838,000 from the MEDC’s Talent Solutions program to support a major expansion of semiconductor education and training programs across the Upper Peninsula. Michigan Tech will establish a talent pipeline to meet Michigan’s increased demand for engineering professionals and skilled technicians in the semiconductor industry, where jobs are projected to grow at least 11 percent in the next five years.



## DeepBlizzard to Empower Groundbreaking Research

A recently awarded National Science Foundation (NSF) Major Research Instrumentation (MRI) program grant has funded a high-performance computing cluster located at Michigan Tech. Named DeepBlizzard, the \$432,111 cluster will be used by over 125 users across 20 departments and five colleges at Michigan Tech—and also by partners at North Carolina A&T University. Throughout its life, DeepBlizzard will serve as a center of innovative research, empowering groundbreaking research by supporting cross-disciplinary and collaborative research opportunities.

DeepBlizzard was designed by a team of experts from the Michigan Tech Departments of Computer Science, Physics, Chemistry, and Biomedical Engineering in coordination with Information Technology staff. The principal investigator of the project is Professor Dukka KC, Department of Computer Science.



## Alumna Dianne Marsh Receives Distinguished Alumni Award

Dianne Marsh '86 '92 BS MS Computer Science is the 2023 recipient of Michigan Tech's Distinguished Alumni Award, presented annually by the Alumni Board of Directors. The award recognizes University alumni who have made outstanding contributions to both their careers and Michigan Tech.

Marsh is the first College of Computing graduate to receive the award and the second woman. She is a member of the College of Computing External Advisory Board and the Department of Computer Science External Advisory Board.

## Michigan Tech Designated National Center of Academic Excellence in Cyber Defense

In March 2023, Michigan Tech was designated as a National Center of Academic Excellence in Cyber Defense (CAE-CD) by the National Security Agency (NSA). The designation is in effect through the 2028 academic year.

CAE-CDs have met rigorous requirements set forth by the NSA. The prestigious designation is awarded to select academic institutions offering cybersecurity degrees and/or certificates at the associate's, bachelor's, and graduate levels. The goal of the CAE-CD program is to improve the overall cybersecurity posture of the United States by promoting and supporting quality academic programs of higher learning.

"CAE-CD designated institutions are recognized as leaders in cybersecurity education and research, and graduates of CAE-CD programs are highly sought after by employers in the cybersecurity field," says Professor Yu Cai, Department of Applied Computing, who led the CAE-CD designation effort. "This recognition can help to attract students and faculty members, as well as funding and collaboration with government agencies and industry partners."

Dan Fuhrmann, chair of the applied computing department, notes that the designation "puts Michigan Tech on the map as one of 300 institutions in the country with high-quality academic programs in cybersecurity, which will lead to increased visibility and growth of those programs."

## Faculty Awards and Accolades

College of Computing faculty received a number of awards and accolades in 2022 and 2023.

AC denotes Department of Applied Computing. CS denotes Department of Computer Science.

**Briana Bettin** (CS) and coauthors were awarded the best paper award at the 27th ACM Conference on Innovation and Technology in Computer Science Education.

In fall 2022, Bettin received an exceptional "Average of 7 Dimensions" student evaluation score. Bettin's score was in the top 10 percent of similarly sized sections University-wide.

Bettin was awarded an Institute of Computing and Cybersystems (ICC) Achievement Award at Showcase [AI] in October 2023. The award recognizes ICC members for their exceptional contributions to the mission of the ICC.

**Yu Cai** (AC) and **Guy Hembroff** (AC) were among the five finalists for the spring 2024 MTU Outstanding Teaching Award in the associate professor/professor category.

**Bo Chen** (CS) was selected as a Class of 2022 European Alliance for Innovation Distinguished Member. The designation recognizes professionals for extraordinary accomplishments in their technical areas.

**Ali Ebnehasir** (CS) and **Charles Wallace** (CS) were two of only 74 instructors who received an exceptional "Average of 7 Dimensions" student evaluation score in spring 2023. Their scores were in the top 10 percent of similarly sized sections University-wide.

**Guy Hembroff** was featured in the 2023 Dean's Teaching Showcase coordinated by Michigan Tech's William G. Jackson Center for Teaching and Learning.

**Dennis Livesay** was elected to the Computing Research Association Deans Group, a three-person leadership team.

**Aleksandr Sergejev** (AC) received the 2023 Best Moderator Award at the 2023 Conference for Industry and Education Collaboration.

**Keith Vertanen** (CS) was named the endowed Dave House Associate Professor of Computer Science.

**Zhenlin Wang** (CS) and coauthors won the Best Paper Award at the 37th International Conference on Supercomputing.

**Brian Yuan** (AC, CS) received the 2022 ORAU Ralph E. Powe Junior Faculty Enhancement Award in Mathematics/Computer Sciences.

Spring 2023 Department of Applied Computing student course evaluations were in the top 10 campus wide. The following applied computing faculty members received "top 10 percent" letters from the University's provost: **Todd Arney, Mojtaba Bahramgiri, Yu Cai, Paniz Hazaveh, Guy Hembroff, Tim Van Wagner, Brian Yuan, and Weihua Zhou.**

## Promotions, Tenure, and New Leadership Roles

Congratulations to the following College of Computing faculty and staff, who have received promotions and tenure: **Paniz Hazaveh**, promoted to associate teaching professor of applied computing; **Kristi Hauswirth**, promoted to director of finance and data operations; **Dukka KC**, promoted to professor of computer science; and **Yakov Nekrich**, who received tenure in the Department of Computer Science.

Congratulations to faculty who have new leadership roles in the College: **Yu Cai**, associate chair, Department of Applied Computing; **Paniz Hazaveh**, program director, BS in Mechatronics and BS in Electrical Engineering Technology; **Guy Hembroff**, graduate program director, PhD in Computational Science and Engineering; **Jean Mayo**, graduate program director, Department of Computer Science; and **Zhenlin Wang**, chair, Department of Computer Science.



## Endowed Position Renewed

The endowed William and Gloria Jackson Professorship will be held by Timothy Havens, Department of Computer Science, for an additional five years. The professorship recognizes an exceptional scholar and teacher whose expertise and activity bridges the disciplines of computer science, electrical and computer engineering, and business entrepreneurship. Havens is also director of the Institute of Computing and Cybersystems and the Great Lakes Research Center at Michigan Tech.

## New Faculty and Staff

The Department of Computer Science welcomed two new faculty members in fall 2023: Koloud Al Khamaiseh and Stella Otoo, both assistant teaching professors.

The Department of Applied Computing also welcomed two new faculty members in fall 2023: Nader Abu-Alrub, assistant teaching professor, and Ronghua (Sam) Xu, assistant professor.

The College of Computing welcomed two new staff members: Sherry Wyeth, academic advisor, and Margaret Landsparger, coordinator and graduate assistant for the Department of Applied Computing.



Kanwal Rekhi '69



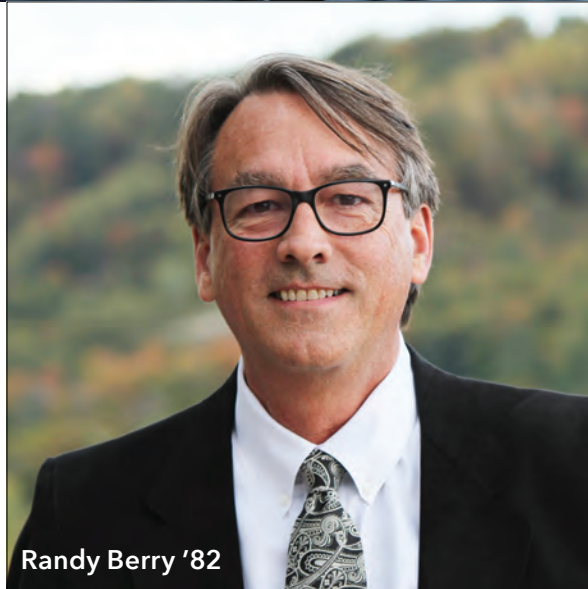
John Furton '87

## Honor Academy

The 2023 inductees to the College of Computing Honor Academy are Kanwal Rekhi '69, Randy Berry '82, and John Furton '87.

The Honor Academy recognizes Michigan Tech graduates who have distinguished themselves in their professions and others who have made extraordinary contributions to the advancement of the College of Computing. The inductees were announced October 4, 2023, at the opening event of Showcase [AI].

Rekhi is a highly successful entrepreneur and investor, and a tireless supporter and benefactor to Michigan Tech and the College. Berry, a member of the College of Computing External Advisory Board, is an energy industry professional with 30 years of experience. Furton serves on the Computer Science Advisory Board. He is chief operating officer of Sifter and an investor and advisor to several early-stage technology firms.



Randy Berry '82



## GIVE BACK TO THE PACK

**\$177K**

in gifts to the College of Computing were raised during the 2023 event

## Give Back to the Pack Recap

Thank you to alumni and friends who gave a gift during the 48-hour Give Back to the Pack event in February 2023. Gifts to the College of Computing totaled \$177,000—the second-highest Give Back to the Pack giving total across the University.

We are grateful for the generosity of our Challenge donors: Mark Gauthier '85, who sponsored the Mechatronics Playground Challenge; Dale Luck '79, whose matching gift supported broadening opportunities in computing; and an anonymous donor who pledged a matching gift in the Dean's Innovation Fund Challenge. During the Give Back to the Pack event, 1,200 donors collectively donated \$1.29 million to support Michigan Tech students.

The 2024 Give Back to the Pack event took place April 10-11. We look forward to sharing the results soon.



Electrical Engineering grad student Shivayogi Akki (right), presents his research on "Benchmarking Model Predictive Control and Reinforcement Learning for Legged Robot Locomotion." On the left is Keith Vertanen, computer science faculty member.

## Fall Showcase Explores Artificial Intelligence

The fall 2023 Computing [MTU] showcase, Showcase [AI], held October 4-6, delved into the realm of artificial intelligence, engaging MTU faculty, students, and visitors. The event highlighted the excitement, applications, and controversies surrounding AI, and underscored AI's impact on academia, industry, and manufacturing. At the kickoff banquet, the Institute of Computing and Cybersystems presented achievement awards and the College of Computing inducted new Honor Academy members. A discussion panel on AI in academia and industry closed out the evening.

The two-day event displayed cutting-edge equipment and research, including research in the Robotics and Remote Sensing Lab, led by Ashraf Saleem, Department of Applied Computing; an interactive AR/VR demonstration by graduate students working under Vinh Nguyen, Department of Mechanical Engineering-Engineering Mechanics; and research posters from Michigan Tech research institute members and other faculty. Jennifer Weller of the National Science Foundation and Bill Spotz of the US Department of Energy presented research funding opportunities. Weller also joined the "Women in IT and Tech" discussion panel that addressed gender challenges in a male-dominated sector.

The final day of Showcase [AI], Manufacturing Day, featured a keynote talk by Tom Kelly, CEO of Automation Alley, which explored how AI is reshaping manufacturing. Jeffrey Horn, Northern Michigan University, shared his extensive work on industrial shape nesting. And, nearly 30 MTU graduate students presented their research in the student poster competition.

## MS in Applied Computer Science

Advances in data collection, analysis techniques, and computational power mean that computers are now being used to solve problems in virtually every aspect of industry and society. To do so, however, practitioners need knowledge in both computer science and the application domain. To prepare these practitioners, the Department of Computer Science has recently launched a Master of Science in Applied Computer Science (MSACS).

MSACS students are trained to apply theoretical knowledge within the context of real-world problems. The program is designed for students who are completing a bachelor's in a field outside computer science and wish to add computing credentials to their degree. Students can be admitted to the new graduate program from any Michigan Tech bachelor's program. The program is directed by Professor Jean Mayo, Department of Computer Science.



## Charles Wallace Is MASU Distinguished Professor of the Year

Associate Professor Charles Wallace, Department of Computer Science, has been selected to receive the prestigious 2024 Michigan Association of State Universities Distinguished Professor of the Year award. Wallace is also among the finalists for the 2024 Michigan Tech Distinguished Teaching Award, which is based on more than 35,000 instructor ratings by students. He is also a 2024 Deans' Teaching Showcase nominee, which identifies him as an outstanding instructor and potential recipient of a Michigan Tech Center for Teaching and Learning Instructional Award.



## Ryan Klemm is 2023 Computer Science Departmental Scholar

Ryan Klemm '24, a senior computer science major, was selected as the 2023 Computer Science Departmental Scholar.

A stellar student, Klemm's journey at Michigan Tech includes numerous achievements. He is a recipient of the National Science Foundation Scholarship for Service, a leading competitor and officer of the MTU RedTeam, a research assistant in the MTU Security and Privacy Lab, and an instructor for the local middle/high school CyberHuskies Team.

The Computer Science Departmental Scholar Award, established by the Office of the Provost, recognizes a student who represents the best of student scholarship in the department, especially in the areas of intellectual curiosity, creativity, and communication. Departmental Scholars are nominated for the Provost's Award for Scholarship, to be awarded in spring 2024.



Michigan  
Technological  
University

1400 Townsend Drive  
Houghton, MI 49931-1295

**\$6.2M**

in research  
expenditures by  
the Institute of  
Computing and  
Cybersystems

**48.9%**

graduate  
program growth  
between 2022  
and 2023

**9.7%**

undergraduate  
program growth  
between 2022  
and 2023

Michigan Tech's computer and information science research expenditures are **89th** in the nation, having increased 26 spots in one year and over 60 spots since 2019.

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