NSF awards researchers $2.3M to create virtual job training for people with neurodevelopmental disabilities

The National Science Foundation has awarded a multi-disciplinary team of researchers from Temple University and George Mason University a four-year, $2.3 million Future of Work Award to develop personalized, virtual job assistants that support individuals with neurodevelopmental disabilities to succeed in entry-level information technology (IT) jobs.

With varied expertise in data science, software engineering, human-computer interaction, behavioral science and special education, the researchers aim to create an artificial intelligence (AI)-enabled software that will help employers implement effective strategies for job customization, training and on-job support.

Approximately 4 percent of children and young adults in the U.S. are diagnosed with neurodevelopmental disabilities, such as autism, that include disturbances of movement, cognition, hearing and vision, communication, and emotion and behavior. Such disabilities lead to challenges with education, independent living and, importantly, employment.

The researchers are focusing on a large segment of this growing group, those who have mild or moderate neurodevelopmental disabilities. They qualify for some job training and support programs, but not for more intensive life-long supports afforded to those with more significant disabilities—particularly after they turn 21.

“After high school, they may get a few months of career training and then are supposed to be able to find jobs and keep them,” says Slobodan Vucetic, the principal investigator who is a professor of computer and information sciences and director of Temple’s Center for Hybrid Intelligence. “Also, typically these jobs are quite menial, such as minimum wage positions bagging groceries or working on a simple assembly line.”

Chair’s message

Our students, faculty and staff faced unprecedented challenges in 2020 with Temple-made dedication, grit and resilience. Together, we made a rapid transition to remote instruction and worked diligently to implement best practices for online learning. We celebrated as students became graduates, moving forward in their careers at Comcast, Vanguard, Google and many others.

Over the past year, CIS faculty explored research that addresses important societal issues, such as using augmented reality to provide enhanced computing education for those with atypical neurocognitive abilities and studying the impact of COVID-19. Given the importance of computing to addressing today’s many challenges, we have introduced two new graduate programs that will offer broader access to those interested in computing education.

Meanwhile, as the nation grappled with racial injustice, including the unjust deaths of African Americans such as George Floyd, the Black in Computing organization urged the computing community to act. In response, we reaffirmed our commitment to advancing diversity, equity, inclusion and anti-racism in our department in a number of significant ways (see page 4).

When I look at what our students, faculty and staff accomplished during this unprecedented year, I am amazed—but not surprised. Our CIS community epitomizes the university motto: Perseverantia Vincit, or Perseverance Conquers.

Jamie Payton
CIS Chair and Associate Professor
Apart from an in-person interview at the U.S. headquarters of SAP, the multinational business software corporation, Brian Davis has never physically worked beside his SAP peers. Nonetheless, during the coronavirus pandemic Davis has worked out of his family’s Northeast Philadelphia home as part of a team of manufacturing and supply chain support engineers. Their job is to design, build and improve customers’ digital solutions using SAP’s business software and technology.

“I’m learning a lot about applications of machine learning and how the collaborative atmosphere of a company works,” says Davis, a mathematics & computer science major and a Temple Honors Academic Scholarship recipient.

At Temple, Davis worked with faculty investigating data mining, vehicular traffic flow and computer vision & machine learning. He also served as a data structures & algorithms teaching assistant.

“My courses, combined with the research and teaching experiences, really gave me confidence in my abilities,” he says. “Academically, CIS does a really good job of getting you all the computer science foundations that you need to succeed.”
Jie Wu's research tackles 'deepfake' video chat forgeries

With video conferencing platforms such as Zoom experiencing hundreds of millions of users each day, Jie Wu has developed a technique to defend against real-time deepfake video chat forgeries.

Deepfake (a portmanteau of “deep learning” and “fake”) forgeries use artificial intelligence and machine learning techniques to superimpose existing images and videos onto another subject’s face—techniques that have been used to create fake celebrity pornographic videos, bogus news and malicious hoaxes.

“The problem is, how do you know the person you are talking to is a real person?” asks Wu, Laura H. Carnell Professor of Computer Engineering, director of the Temple Center for Networked Computing and AAAS and IEEE Fellow.

In a paper published in the Proceedings of the 40th International Conference on Distributed Computing Systems, Wu and one of his former doctoral students, Jiacheng Shang, describe a technique they developed that requires nothing more than the camera and screen found on most computers. Their solution involves using the screen to emit beams of light towards the supposed person while the computer’s camera senses the light reflected off that person’s face.

“With legitimate users, the light reflected off their face is proportional to the screen light,” says Wu. “Since face reenactment attackers cannot generate the real-time face reflection in a photo-realistic fashion, legitimate users can detect the face forgery.”

Experimental results indicate the technology flags fakes with nearly 95 percent mean accuracy. This research has been funded, in part, by several grants from the National Science Foundation, Army Research Office and Office of Naval Research.

Machine learning researcher joins faculty

Assistant Professor Hongchang Gao, who focuses on machine learning research, joined CIS this past summer. Gao, who earned his PhD in computer engineering from the University of Pittsburgh, has been a research intern with both Yahoo! and Adobe. In China, Gao earned his BS in mathematics and applied mathematics from Ocean University of China and his M.S in computer science from Beihang University.

“Temple’s CIS Department is a very good place for junior faculty like myself, because the department’s faculty mentors, including IEEE fellows and NSF CAREER award winners, are conducting cutting-edge research,” he says. “There are great opportunities for high-quality, collaborative research. I also enjoy working with Temple’s excellent students.”

Student-run OwlHacks coding challenge draws hundreds of students

Organized by CIS students, the first-ever virtual OwlHacks coding challenge drew more than 300 participants—mostly regional college students but also local middle and high schoolers.

It was organized and run by four student organizations: the ACM (Association of Computing Machinery), ACM—Women’s Chapter, STARS Computing Corps and TuDev. The hackathon included organized workshops, professional panels and coding challenges from such funding sponsors as Vanguard, Lincoln Financial and RSM, an auditing, tax and consulting firm.

“Given the pandemic, the logistics of the event were challenging, but it was highly successful thanks to a herculean effort by all of the students,” says Claudia Pine-Simon, assistant professor of instruction.

“As a judge, I saw many of the coding projects, which were quite impressive.”

NSF award

However, many of these individuals have quantitative skills and other capabilities that lend themselves to better paying and more fulfilling entry level IT positions. Such jobs also often allow flexible hours and the ability to work from home–another plus for this population.

Beth Garrison, CLA ’07, EDU ’09, now a CIS PhD student whose doctoral advisor is Vucetic, was instrumental in launching the research. After earning her master’s degree in ABA, she was an ABA therapist, trained behavioral therapists to work in clinical and vocational programs with these individuals and formerly was the CEO of the Autism Cares Foundation’s Adult Services Division.

Other co–principal investigators from Temple include Donald Hantula, organizational psychologist and associate professor of psychology; Matt Tincani, professor and chair of the Teaching and Learning Department in the College of Education and Human Development; and Eduard Dragut, associate professor of computer and information science, as well as Ray Hong, assistant professor in human computer interaction at George Mason University.
Increasing women and minorities in computer science

CIS is committed to increasing the number of students from underrepresented groups pursuing computer and information sciences degrees and careers.

“It’s a matter of equity,” says Jamie Payton, department chair. “We are excluding a significant portion of the population—students who identify as women, Black, Latinx and indigenous—from participating in the well-paying technology workforce.”

According to Payton, removing barriers would both foster economic mobility and “provide opportunities for individual to develop creative tech solutions that address the needs of all the diverse communities in our society.”

Currently, the percentage of women and Black students earning CIS undergraduate degrees at Temple mirror the national averages, while the percentage of Latinx students falls below. To increase access among all underrepresented groups, CIS’ latest initiatives include:

The BRAID Initiative

BRAID (Building, Recruiting, and Inclusion for Diversity) supports computing departments in implementing evidence-based practices for increasing the representation of women in their degree programs. In 2019, Temple was selected as one of five U.S. schools to participate in a one-year training program as an affiliate institution.

Subsequent BRAID commitments include leading inclusive outreach programs for high-school teachers and students and developing and/or promoting majors that combine computer science and other disciplines that are perceived to have a societal impact.

The NCWIT Learning Circles

The National Center for Women in Information Technology (NCWIT) Learning Circles program provides resources to support computing departments in developing a strategic plan for implementing evidence-based approaches to recruiting and retaining women in computing degree programs, with a focus on approaches that address the intersection of race and gender.

The CIS Department’s Diversity, Equity & Inclusion Committee, comprised of six faculty members, including Payton, is working with an NCWIT consultant to develop a strategic plan for recruiting and retaining women, Black and Latinx students in CIS programs.

New CIS programs

Master’s & Certification in Cybersecurity & CS

A new 10-course, 30-credit master’s in information science and technology is designed to help professionals add tech and information science skills to their industry-specific experience, for careers such as business analyst, network administrator, database manager, UI/UX designer, mobile app developer, cyber security professional.

CyberDIA Certificate

As cyber threats increase, there is a growing shortage of security professionals. This 10-credit certificate includes intro courses in digital forensics and either criminal justice or cybercrimes; and a four-credit course in either computer and network security or wireless networks and security.

Grad Cert in CS Instruction

Designed for math and science teachers who want to quickly develop skills to teach computer science at the secondary level. Four courses can be completed over 15 months. Fall and spring semester courses will be offered online to allow in-service teachers to remotely participate during the academic year, with two intensive, short-term courses on campus during summers.