

This ASU professor worked with AI before it was cool

Honoring Nancy Cooke's pioneering work with human-machine teaming

By Alicia Barrón, ASU News
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Long before artificial intelligence became a fixture in workplaces, Nancy Cooke was exploring how humans and intelligent machines could work together effectively.

A professor of human systems engineering in the [Ira A. Fulton Schools of Engineering](#) at Arizona State University, Cooke is a leader in team cognition and human-AI teaming. Her decades of research laid the foundation for the widespread use of AI into workplaces today — from AI agents counting inventory or writing code to unmanned aerial vehicles.

In 2017, she became the founding director of the [Center for Human, Artificial Intelligence, and Robot Teaming](#), or CHART, in ASU's [Advanced Capabilities for National Security Institute](#) to bring together experts across disciplines to study how humans, AI and robots can work together more effectively to support national security.

As Cooke retires and becomes a professor emerita on June 22, her influence continues to shape a field she helped create.

Human-robot trailblazer

Cooke didn't become a leader in human-robot teaming as a roboticist or even a technologist. Trained as a cognitive psychologist, she built her career around understanding how teams think, communicate and perform in complex environments.

"Most everything that we do in human systems engineering requires an understanding of human capabilities and limitations, and then putting that together with the technology," Cooke said.

As a graduate student, Cooke helped develop Pathfinder Knowledge Networks, a way of analyzing how knowledge is organized in the minds of individuals or teams. She later applied that work to team cognition, [publishing a landmark 1994 paper](#) that looked at knowledge elicitation methods developed to provide human expert input into expert systems, or what she calls the "AI of the

1980s.”

Her research challenged conventional thinking about teamwork. Rather than viewing effective teams as groups whose members share identical mental models, Cooke argued that successful teams depend on how people coordinate their different expertise.

“I didn’t think that made a whole lot of sense when you talk about things like surgical teams with the nurse and the surgeon and the anesthesiologist,” Cooke said. “Do they have to have the same knowledge to be a good team? I don’t think they do.”

That perspective ultimately led Cooke and her collaborators to develop the theory of interactive team cognition, which focuses on the interactions among teammates rather than the knowledge each individual possesses. A [landmark 2012 paper](#) helped establish the approach.

Over time, Cooke has expanded these concepts beyond human teams. As autonomous systems have become more integrated into workplaces, her work has taken on increased relevance.

In 1997, she began studying unmanned aerial systems and the crews that operated them, years before drones became commonplace. In 2008, she conducted some of the [first research on human-autonomy teaming](#).

Her team found that people often place too much trust in AI teammates, adapting their behavior to match the technology even when the AI is performing poorly. The findings highlighted a challenge that remains central to AI development today: Effectively employing AI depends not only on capable technology, but also on humans understanding its limitations.

“I feel like I must keep reminding people that humans have capabilities that AI cannot replicate: social and emotional intelligence, moral/ethical reasoning and more,” she said.

Cooke sees elements of her lifelong work reflected in how AI is integrated today when humans team with AI to do things that neither could accomplish alone, making the process better and more efficient. An example she highlights is a company called [Scientific Systems](#) that conducts search and rescue with dogs, humans and drones in a way that takes the best from each of them.

“We have an ideal team using human intelligence, combined with the drone’s wide visual field of view and the dog’s superior olfactory senses,” she said. “I get excited when I see a true integration of human and artificial intelligence. This is what my research is about.”

Recent military operations also illustrate the principles her work has helped develop. In June 2025, Ukrainian forces smuggled more than 100 drones into Russian territory before launching them and attacking five Russian air bases. The surprise attack, lauded by some as “ingenious,” damaged or destroyed an estimated 20% of Russia’s long-range aviation fleet.

What is human systems engineering?

Human systems engineering is the study and design of systems that integrate people and technology to improve performance, safety and user experience, focusing on understanding human capabilities, limitations and behaviors, then applying that knowledge to create tools, technologies and work environments that help people work more effectively.

“This is not AI alone, but a combination of human ingenuity and AI/drone capabilities,” Cooke said.

Engineering the future, one student at a time

Cooke is inspired by the diverse backgrounds students bring to human systems engineering at ASU, from computer science and engineering to psychology. Each perspective contributes fresh ideas. Blending those different ways of thinking is a good example of team cognition in action.

In her 23 years at ASU, she has advised 48 students on their master’s theses and graduated 15 PhD students, with six in progress.

Current PhD student [Savannah Bradley](#) said one of Cooke’s greatest strengths as an advisor is the way she supports students as people, not just researchers.

“She is incredibly validating, supportive and reassuring, and she consistently reminds her students that they are not alone,” Bradley said. “It is honestly difficult to put into words how much her guidance and mentorship have meant to me.”

Bradley is a fourth-generation hot air balloon pilot. Her interest in aviation led her to study mechanical engineering. But when considering her PhD path, she found her desire to understand what causes plane crashes and to improve aviation safety more closely aligned with human systems engineering.

“Understanding and supporting the human element in aviation ultimately felt like the most meaningful path toward improving safety,” she said.

Bradley said learning about team cognition from one of the foremost experts in the field has been an amazing opportunity. Cooke’s husband, Steven Shope, is also a hot air balloon pilot.

“Because of her guidance, I found my research path of studying drone-based search and rescue teams and developing ways to better support operators in high-consequence environments.”

Advancing CHART’s mission

Cooke’s mentorship has secured her legacy, as a former PhD student will lead CHART after her retirement.

Professor [Jamie Gorman](#) first met Cooke back in 2000 when he was accepted as a master’s student at New Mexico State University. She showed him an unmanned aerial vehicle, or UAV, project she and her team were working on while studying something they called “team cognition.”

“They didn’t just study it; they sought to tap into it to change behavior,” Gorman said. “That visit really inspired me.”

Gorman said it quickly became clear that Cooke and her team were addressing an emerging, critical need in military and industrial human factors. And the idea really took off.

Their paths crossed again at the end of his first year when he presented a poster about his cognitive psychology experiment.

"Nancy came by and asked me to explain my work," Gorman said. "At the end of the conversation she asked if I wanted to work with her over the summer, and so it began."

Gorman said the vision of CHART is seamless human-machine collaboration through teaming. The end goal is developing technologies that enable machines to anticipate and adapt to humans on the fly, while preserving distributions of influence in the human-machine relationship that respect humanity.

Besides helping her six PhD students finish their degrees, Cooke looks forward to spending more time with her three grandkids, traveling and catching up on reading.

"Most of my career, I've had a lot to read, but it's not reading for fun," she said.

Throughout her career at ASU, Cooke appreciated ASU's values of principled innovation and multidisciplinary collaboration. The idea of taking a group of mostly psychologists and putting them in an engineering college provided faculty with that much more connection to people from other disciplines and the whole theme of principled innovation.

"A lot of what ASU is about makes it a prime place to innovate and to build new things," Cooke said. "I still get contacted by people who are trying to build centers like that to say, 'How do you do it?'"

More about Gorman's work and vision for CHART

[The rise of human-machine teams: Q&A with Jamie Gorman](#)

Some of Cooke's major awards

HFES O. Keith Hansen Outreach Award (2006)

Jerome H. Ely Award (2010) "[Training Adaptive Teams](#)"

George Mason University Distinguished Alumna Award (2012)

Human Factors and Ergonomics Society (HFES) Arnold M. Small President's Distinguished Service Award (2014)

Salute to Service Award, Arizona State University (2015)

FAI Air Sport Medal (2016)

Ira A. Fulton Schools of Engineering Exemplar Faculty (2016–2018)

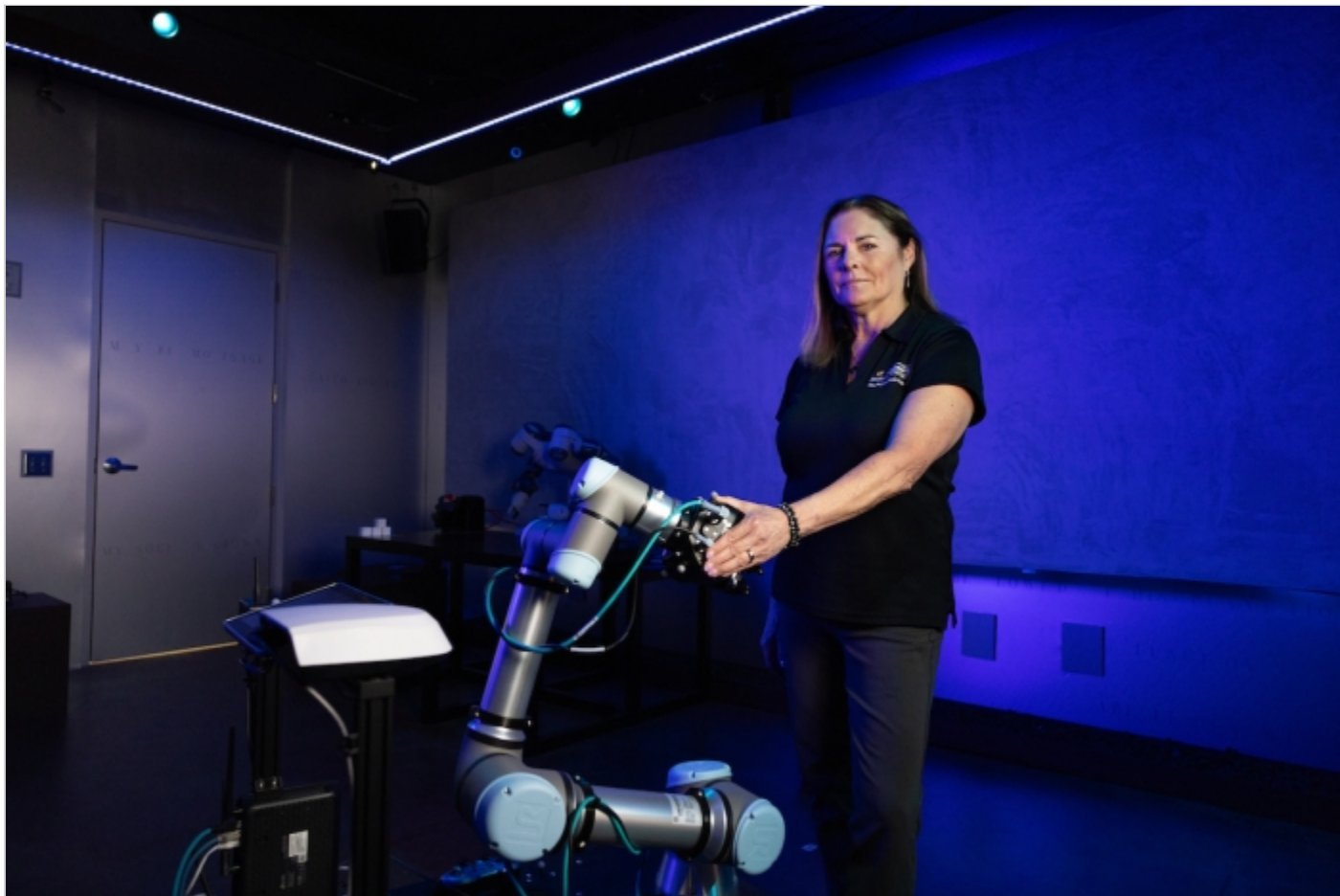
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Main image



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Text image(s)



Nancy Cooke poses next to a Robotiq machine in the GHOST Lab at the Polytechnic campus in Mesa on June 3, 2024. Photo by Samantha Chow/Arizona State University



PhD student Savannah Bradley said one of Cooke's greatest strengths as an advisor is the way she supports students as people, not just researchers. Courtesy photo