Honda lends a helping hand to the next generation of roboticists

A research program gives ASU students rare access to advanced robotics hardware inside Honda's San Jose lab

By Kelly deVos, ASU News
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Honda did not just lend Arizona State University students a lab bench this September. It lent them a hand.

A very advanced one.

For three weeks, Heni Ben Amor — a professor of computer science and engineering in the School of Computing and Augmented Intelligence, part of the Ira A. Fulton Schools of Engineering at ASU — and his students worked inside the Intelligence Robotics Research Lab at Honda Research Institute USA in San Jose, California, with the company's dexterous multi-fingered hand. The robotic system was built to tackle one of the thorniest challenges in automation: making machines that can handle the physical world with something closer to human skill.

ASU was one of four universities selected for Honda's robotics research program, joining the University of Michigan, Northwestern University and the University of Southern California. The idea was to invite faculty-led teams into Honda's lab, give them access to sophisticated hardware and let them explore what artificial intelligence could make possible for the future of robotics.

"What makes this opportunity so valuable is the support for students," Ben Amor says. "Honda gave them the chance to work directly with the robot, use the latest hardware and software, and access computing resources that, honestly, universities don't always have. This kind of experience is rare, and we're very grateful for it."

The ASU group included Mohamed El Mistiri, a postdoctoral fellow in the ASU Interactive Robotics Laboratory; Xuechao Zhang, a student pursuing a master's degree in robotics and autonomous systems; and Hsiang (Sean) Fu, a computer science doctoral student. Fu says the experience was inspiring.

"I was surprised by how collaborative the work was," Fu says. "We talked with people from different backgrounds who were constantly sharing ideas and learning from one another. It was really cool to see the thought and teamwork that go into developing ideas that could shape the future of

robotics.”

Get a grip

The Honda hand is impressive partly because it is so easy to underestimate the problem it is trying to solve. Factory robots are already strong, fast and precise. They can weld, lift and repeat the same motion thousands of times without issue. But human hands are not just precise. They are adaptable. They pick through clutter, squeeze connectors into tight spaces, adjust pressure instantly and use tools designed for people.

Soshi Iba, division director of the Intelligence Robotics Research Lab at Honda Research Institute USA, says the company’s hand was designed to combine dexterity, durability and power — three qualities robots have historically struggled to bring together.

“We think the hardest problem in robotics right now is not locomotion,” Iba says. “Robots can travel on wheels. But doing things by hand is still one of the most difficult issues.”

Honda’s multi-fingered hand is roughly the size of a human hand, with 16 joints that allow more complex finger movements than a simple robotic gripper. Its maximum continuous fingertip force of 50 newtons means it can apply real pressure, not just delicately pick things up. Honda says the hand has also completed more than 450,000 practical durability test cycles, a key measure for any technology meant to survive factory work. In manufacturing, that combination could help robots take on tasks that are still difficult to automate, from handling oddly shaped parts to inserting connectors, tightening screws or operating power tools.

But Ben Amor’s team was not in San Jose just to admire the machinery. Their ASU project focused on in-context learning and adaptation for dexterous manipulation, a research direction that asks whether AI can help robots apply what they have learned to new objects, tasks and environments.

Traditionally, robots have needed careful programming for specific situations. A system trained to grasp one object may struggle when the object changes shape, material or position. The promise of newer AI models is that robots might become more flexible: able to reason, adapt and follow higher-level instructions.

Ben Amor describes it as a shift from conversational AI toward action-oriented AI. The goal is to make robots easier and safer for people to work with. He hopes AI models will eventually allow a human to communicate with a robot in ordinary language. A robot might also be able to explain what it is doing as it changes behavior, offering a rationale for its movement before or during a task.

“We’d like to go from a ChatGPT to an ActGPT,” he says.

That kind of human-robot interface could be critical as robots move beyond isolated industrial settings and into more collaborative environments. For Ben Amor, the work connects directly to his mission to build robots that can operate safely and usefully in the real world.

His lab has long used attention-grabbing projects, including robots that play basketball, throw footballs and compete in table tennis, to get students excited about robotics. At the same time, those projects help researchers build machines with the skills needed to assist people at home, in

health care or in rehabilitation.

From lab access to leadership

Walking through Honda's halls, Ben Amor says he has seen posters from past projects where his former students were listed as first authors. To him, that is evidence of something bigger than a single program. The collaboration has become a pipeline, giving students experience with industry-scale robotics problems while helping Honda explore what advanced AI can do with advanced hardware.

For this year's ASU team, the experience meant working not on a simplified academic demo but on a piece of technology built for the messy realities of the physical world. The students could test ideas against a hand that is strong, sensorized and sophisticated enough to expose the gap between what AI can describe and what a robot can actually do.

"This is the kind of experience that turns students into roboticists," says Ross Maciejewski, director of the School of Computing and Augmented Intelligence. "They are not just learning concepts in a classroom. They are working with advanced systems, industry researchers and real technical challenges that will shape where robotics goes next."

The hand may be the flashy part, but the deeper story is how expertise moves from industry to university, from lab to student and from one generation of roboticists to the next. In a field obsessed with what machines may someday learn to do, Honda's helping hand is also helping teach the people who will train them.

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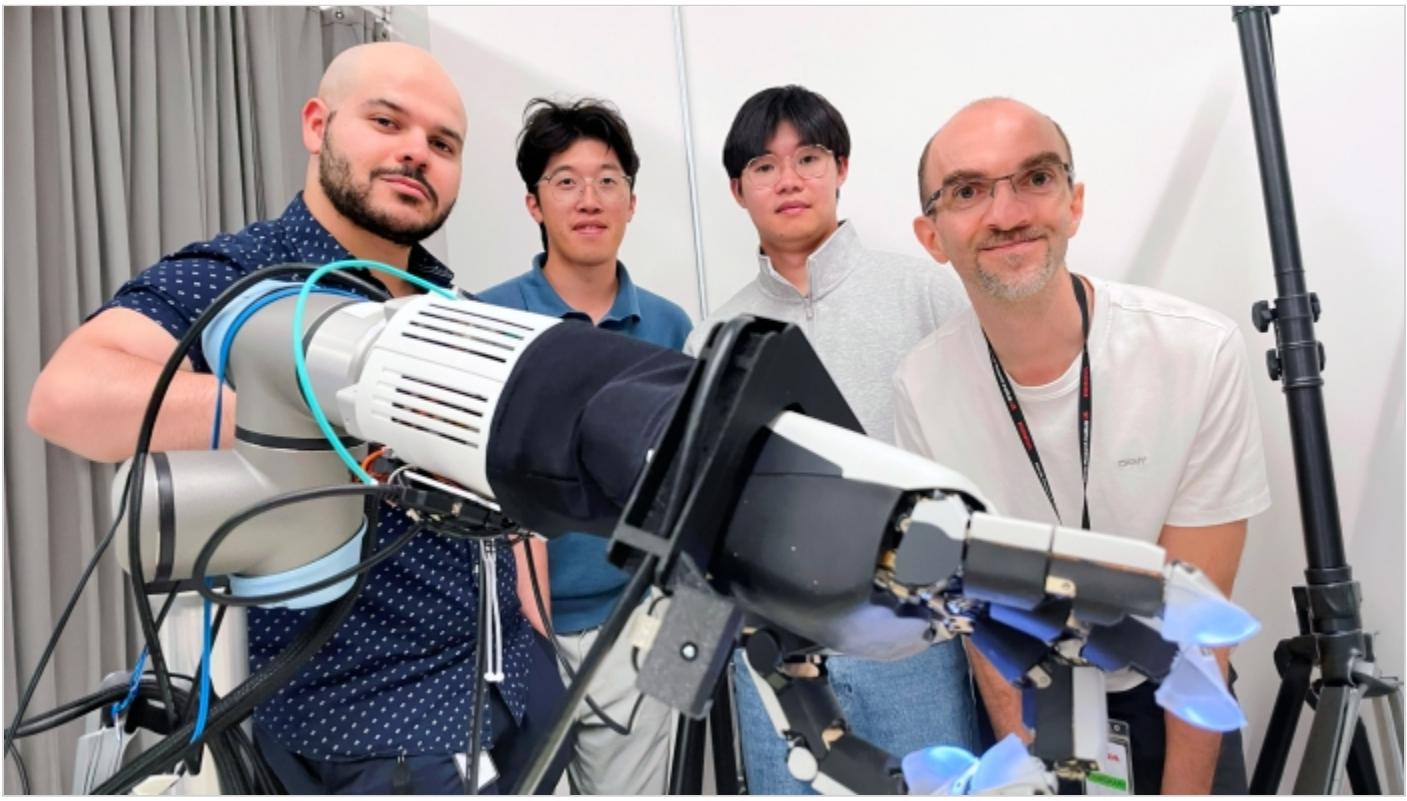
Main image



Heni Ben Amor, a professor of computer science and engineering in the School of Computing and Augmented Intelligence at ASU, poses with students at the Honda Research Institute USA, where they worked with Honda’s dexterous multi-fingered robotic hand: (from left) Mohamed El Mistiri, a postdoctoral fellow in the Interactive Robotics Laboratory at ASU; Xuechao Zhang, a student pursuing a master’s degree in robotics and autonomous systems; Hsiang (Sean) Fu, a computer science doctoral student; and Ben Amor. Photo courtesy of Heni Ben Amor/ASU

Text image(s)



Ben Amor (far left) and Soshi Iba (far right), division director at Honda Research Institute USA, pose with students and researchers outside the San Jose, California, facility. Photo courtesy of Heni Ben Amor/ASU



Ben Amor (right) and students train the dexterous multi-fingered robotic hand to pick up a container of mustard. Photo courtesy of Heni Ben Amor/ASU