

ASU researcher creates AI athlete that's here to help humanity

Robot crushes it at table tennis, but its real mission is making life easier for those who need it most

By Kelly deVos, ASU News
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Your aging loved one is home alone.

Heavy pots and pans fill high shelves. A light bulb out of easy reach needs to be changed. Outside, the overgrown lawn waves in the wind. Like [75% of Americans](#), your family member wants to remain independent in their own home. But, like many, you are concerned about the [growing aging population and the shortage of health care workers](#) to assist them.

In Mountain View, California, [Heni Ben Amor](#) is hard at work on the future of robotics. He is an associate professor of computer science and engineering in the [School of Computing and Augmented Intelligence](#), part of the [Ira A. Fulton Schools of Engineering](#) at Arizona State University.

Ben Amor spent a year embedded in Google's [DeepMind](#), part of a team that is coming up with the solution to your problem, and it's a robot ... that can play table tennis. If you did a double take just now, he hopes that you understand something important.

The same skills that help the table tennis bot move, react and understand instructions during play are key for building robots that could help aging adults live independently.

Imagine a robot that helps you grab items from a high shelf, prepares meals and tidies up the house — and processes what you're asking it to do. That's the reality Ben Amor and the DeepMind team are working toward.

"If you want to get robots out of the manufacturing plant, make them learn a sport," Ben Amor says. "They will pick up all the needed skills. These robots have to be really dynamic. They have to be aware of their surroundings. They have to anticipate the behavior of the people around them."

The score? Game: robot. Match: humanity

The roboticists began with a desire for an AlphaGo moment.

Remember when [Google's AlphaGo AI beat a Go world champion](#) and everyone freaked out? That was the AlphaGo moment for games. Then [AlphaFold](#) did it again for medicine by solving protein-folding puzzles. Now, DeepMind is going for a three-peat — with robots.

Enter the table tennis bot.

This little champ takes in text-based instructions from a user via [Gemini](#), a chatbot that uses Google's large language model, or LLM. Gemini combines human coaching with artificial intelligence, or AI, algorithms created by Ben Amor and the team. Those algorithms serve as a set of computer instructions, prompting the robot to play on its own until it demonstrates that it can perform as directed.

By reading the game logs and tweaking its performance based on plain-language instructions, the robot doesn't just play. It gets better every time it plays.

What's more, as it plays, the robot generates a series of "diary entries." Gemini then analyzes what the robot is doing, noting the changes made to play as the researchers' algorithms work. The chatbot reports this back to the user.

Pannag Sanketi, tech-lead manager on the robotics team at Google DeepMind, notes that this is a critical step. For us to be able to trust AI and the robots using it, we must be able to understand them. The user must always know what the robot is doing — and why.

"It's important for establishing trust and transparency," Sanketi says. "When a robot can explain why it's adjusting its actions, it builds user trust and makes the robot's behavior less opaque. If the robot isn't performing as expected, the natural language explanations provided by the LLM during its optimization process can help users or developers identify potential issues more easily."

In testing, the robot managed to beat half the amateur humans it played against and even scored points on expert players. So no, it's not yet the Serena Williams of table tennis, but it's got game.

Next up, Ben Amor and the team, including computer science doctoral students Yifan Zhou and Kamalesh Kalirathinam, will present their work at the 2025 [IEEE International Conference on Robotics and Automation](#) to be held later in May in Atlanta. The team is also exploring other collaborations with DeepMind.

(Video: <https://www.youtube.com/watch?v=e5ZWSJFK5eM>)

Students serve up smarter robots (and big impact)

Ben Amor has been on a sports-meets-science journey for years, building robots that play basketball, throw footballs and, now, crush it in table tennis. The efforts are part of a serious strategy to galvanize student enthusiasm for robotics.

By engaging students with fun, high-energy projects like robot sports, Ben Amor's lab is training the next generation of roboticists to tackle tough challenges, such as home assistance, health care and rehabilitation.

“It’s hard to get a student excited about programming a surgical arm on day one,” he says. “But tell them they’re building a table tennis robot that can outsmart their roommate? Now we’ve got their attention.”

Ben Amor’s team has applied the same techniques used in the table tennis and basketball robots to develop a prosthetic limb for individuals with lower-leg amputations. The intelligent prosthesis reduces musculoskeletal strain by adjusting to the user’s gait and changing terrain in real time. The team patented the design in 2024 and has been collaborating with a local startup to transition the technology from a lab prototype to a real-world solution.

[Ross Maciejewski](#), director of the School of Computing and Augmented Intelligence, says Ben Amor’s work is an important part of the school’s efforts to build a home for excellence in robotics education and research.

“Robotics is a critical field that’s shaping the future of everything from health care to space exploration,” Maciejewski says. “Heni’s work plays a key role in our efforts to prepare students to lead in this transformative area.”

And yes, the table tennis bot might be flashy and fun, but behind the cool spin shots and trick serves, it’s building the skills that will one day help real people live longer, healthier, more independent lives.

About this story

There's a reason research matters. It creates technologies, medicines and other solutions to the biggest challenges we face. It touches your life in numerous ways every day, from the roads you drive on to the phone in your pocket.

The ASU research in this article was possible only because of the longstanding agreement between the U.S. government and America’s research universities. That compact provides that universities would not only undertake the research but would also build the necessary infrastructure in exchange for grants from the government.

That agreement and all the economic and societal benefits that come from such research have recently been put at risk.

Learn about more solutions to come out of ASU research at news.asu.edu/research-matters.

This story originally appeared on [ASU News](#).

Main image



Heni Ben Amor plays an intense game of table tennis. Ben Amor is an associate professor of computer science and engineering and a roboticist in the School of Computing and Augmented Intelligence, part of the Ira A. Fulton Schools of Engineering at ASU. He spent a year embedded in Google's DeepMind laboratory on a team developing new artificial intelligence for a robot that plays table tennis. Photo by Erika Gronek/ASU