Researcher's Notebook

Researcher's notebook: UW team develops AI-powered robotic arm to aid disabled

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Tucked in a quiet corner of the University of Washington's new Bill and Melinda Gates Center is a robotic arm that could make autonomous feeding possible to those who are unable to feed themselves.

ANTHONY BOLANTE | PSBJ

UW first year Ph.D. student Ethan Gordon (right) sits in a wheelchair while a robotic arm feeds him fruit. The team is housed in the Bill and Melinda Gates Center for Computer Science and Engineering at the University of Washington.

While the Assistive Dexterous Arm (ADA) still has a long way to go before becoming a mainstay in long-term care facilities or available to the mass market, a team of more than 12 researchers are doing what they can to use the artificial intelligence-powered robotic medical device to help people with mobility issues become more independent.

"Losing the ability to self-feed can be devastating," said Tapomayukh Bhattacharjee, a postdoctoral research associate in the Paul G. Allen School of Computer Science & Engineering at the UW. "Through this robot-assisted feeding technology, we hope to give people with upper-extremity motor impairments the independence to self-feed, which can potentially make a huge impact in their day-to-day lives."

The research team at UW is using the Jaco arm from Kinova, a Canadian company that manufactures service robotics platforms and applications for personal assistance, but added feeding autonomy to it through its own algorithms. The team has no plans to license its technology to medical device companies but is instead keeping the project open-source, releasing its codes and data to the public. The idea is to encourage researchers from around the world to build upon what the UW robotics team is doing.

"Through open-source, we can come up with innovations that make an impact in the world," Bhattacharjee said. "Sharing each other's work is a cornerstone for that."

According to a 2010 U.S. Census Bureau report, as many as 1 million people required assistance of another person to help them eat. A CDC report published last summer showed mobility was the most prevalent disability type (13.7 percent) reported by non-institutionalized adults in the U.S.

The UW's robotic arm can be mounted anywhere and uses a fork to move food from a plate to a person's mouth. Currently the algorithm the team created allows the robotic arm to identify 16 different foods — the arm scans the plate, picking out the food, each type of which is treated differently. Based on the type of food, the robot chooses the best way to pick up the food.

One thing the arm has to figure out is whether picking up the food requires an angle or not. For example, a strawberry or a banana slice can be stabbed right in the middle, but for a carrot the fork should go in near one of the two ends, so it

does not break.

The Taskar Center for Accessible Technology, housed in the Paul G. Allen School of Computer Science at UW, connected UW's team with the assisted living company Provail to help the team learn more about people with motor impairments. While the facility is not using the robotic arm, its caregivers and residents are providing feedback to the UW team.

The feedback is helping the team make the robot more efficient, ensuring that constant improvements are made to match people's needs. The team hopes to test the robotic arm with real users by the end of the year.

"Ultimately our goal is for our robot to help people have their lunch or dinner on their own," Siddhartha Srinivasa said in a press release. As a robotics professor in the Allen School, he is a member of the research team, but he was also appointed the director of robotics at Amazon in 2018.

"The point is not to replace caregivers. We want to empower them," he said. "With a robot to help, the caregiver can set up the plate, and then do something else while the person eats."

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