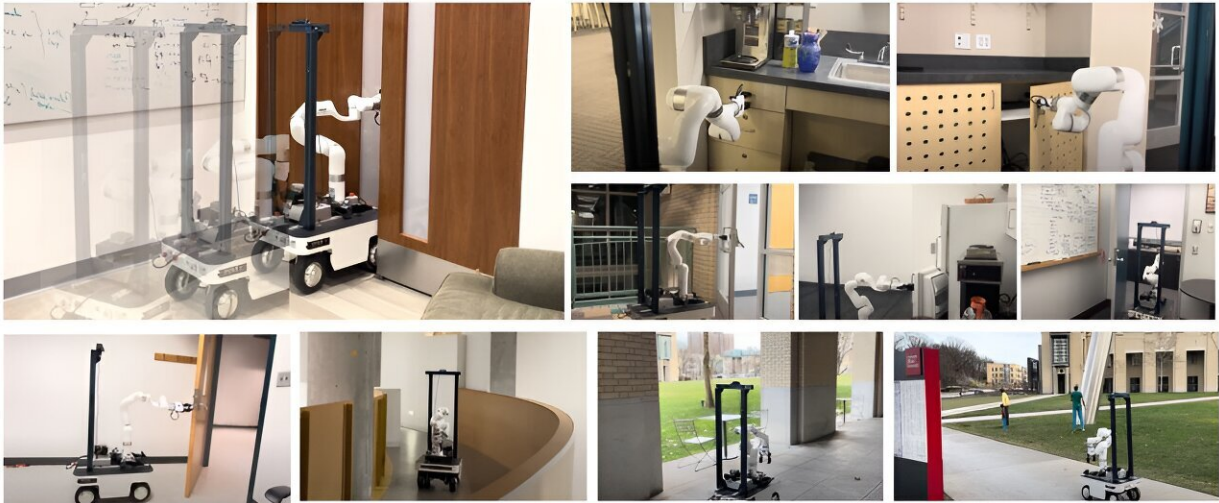# Adaptive robot can open all the doors

February 7 2024, by Bob Yirka

Open-World Mobile Manipulation System: We use a full-stack approach to operate articulated objects such as real-world doors, cabinets, drawers, and refrigerators in open-ended unstructured environments. Credit: *arXiv* (2024). DOI: 10.48550/arxiv.2401.14403

A small team of roboticists at Carnegie Mellon University has developed a training regimen that allows a robot to start out with limited abilities, such as carrying out a certain task like opening doors or drawers, and to improve as it teaches itself how to modify its techniques when faced with previously unseen challenges.

Haoyu Xiong, Russell Mendonca, Kenneth Shaw, and Deepak Pathak describe the training method in a paper posted to the *arXiv* preprint

server.

Much of the research involved in teaching robots to perform tasks involves training in laboratory settings. For this new study, the researchers suggested that the only way to train robots is under real-world conditions. To that end, they developed an adaptive learning approach that allows a robot to learn by starting with a limited knowledge base and adding to it through hands-on experience.

To test their ideas, the research team built their own four-wheeled robot with a single arm and clasp/grasp hand unit from off-the-shelf components. The robot's sole purpose was to approach a door or drawer and then use its clasper to grip and turn, or push, or whatever else was needed, to open the door. The researchers showed it how to manipulate a few doorknobs to gain entry to a room or building.

At an outdoor test site, the researchers let the robot attempt to open a door or drawer. They noted that if the knob type was one that had already been learned, the robot used its knowledge to open the door right away. But it if was unfamiliar, the robot would use what it knew about other door knobs to try to gain access.

The researchers found that given enough time (sometimes as long as a half-hour) the robot usually figured out how to open the door or drawer. Overall, it demonstrated a 95% success rate.

Citation: Adaptive robot can open all the doors (2024, February 7) retrieved 28 April 2024 from https://techxplore.com/news/2024-02-robot-doors.html