Rise of the RFID Robots

Terminator Salvation may be a hit at movie theaters this summer, but a recent breakthrough in robotic development by researchers at the Georgia Institute of Technology is bound to have a more lasting impact. Sure, Hollywood’s Terminators are more powerful (albeit malicious), but the Georgia robots are real. And what makes them so interesting—even fascinating—is that they are capable of perception. They have the ability to

find objects among a random group of similar-looking things and reach out and grab them, no matter which way they're facing.

While Hollywood's robots—from the Terminators to WALL-E—are able to sense the world around them, most real-life robots aren't. Take, for example, the robots that work on automobile production lines. They're miracles of mechanics and movement, but if the wrong cars were to show up at their workstations, or if for some reason cars arrived upside down, the robots would get confused, assuming they'd notice at all.

The Georgia Tech robots are more like Hollywood robots in that they have enhanced vision that allows them to see and distinguish objects, thanks to radio frequency identification. The researchers put ultrahigh-frequency RFID tags on the objects the robots were looking at, and then used what are called Received Strength Signal Indicator (RSSI) images to enhance the robots' camera-based vision system.

The RFID tag not only helps the robot identify the object it's looking for, it also helps the robot locate the object. First, the robot uses long-range RFID antennas operating in the far field to work out roughly where the target object is—even if it's hiding behind something. Then, as the robot gets closer to the object, it extends fingertips that contain RFID antennas operating in the near field. This, coupled with a camera-based vision system, lets the robot precisely orient its hand relative to the object, then reach out and pick it

up.

In tests, the robot found the right object 17 out of 18 times, and positioned its hand to grab it correctly eight out of nine times. Not quite Terminator performance, but much better than non-RFID vision systems.

The researchers imagine all sorts of possible applications for this technology, which is probably a few years from commercialization. One of the best ideas is to use RFID robots to help disabled and elderly people pick up the right medicine every time, or get a jar of something from a high shelf and open it. Another possible use is automated picking and packing in RFID-enabled warehouses and distribution centers. Thankfully, destroying the human race and world domination aren't on their list. Even with this new breakthrough in robotic perception, that kind of capability remains literally out of reach.

Kevin Ashton was the cofounder and executive director of the Auto-ID Center. Photo: (c) LEO Reynolds | Detail of sculpture by César Baldaccini