RFID JOURNAL
THE WORLD'S RFID AUTHORITY

Enlisting Robots

Topics/Verticals: IT/Infrastructure, Innovation, Asset Tracking

Once robots are integrated into the Internet of Things, they can perform tasks automatically.

By Florian Michahelles, Rob van Kranenburg and Markus Waibel

Aug. 13, 2012—For the past decade, researchers have been building mechanisms to enable the Internet of Things (IoT), a network of networks that promises to connect everything and everyone everywhere to everything and everyone else. Radio frequency identification is one of the backbones of the IoT, alongside Internet Protocol version 6, bar codes, Quick Response codes and active sensors. RFID uniquely identifies objects and people, linking them to digital information and bringing them into the network. Essentially, this serves as the IoT's eyes and ears, providing continuous awareness of where, and in which context, things and products are in the real world.

But the IoT is still missing the arms and legs to take action automatically. So far, screens and displays alert humans to, say, bring goods from one place to another. If RFID-enabled robots equipped with sensors could be integrated into the IoT, they could act automatically and, potentially, navigate in a smart environment faster, more safely and more accurately than humans.

Michahelles, van Kranenburg and Waibel

The Auto-ID Lab at the University of St. Gallen/ETH Zurich is working with the Institute for Dynamic Systems and Control and The Internet of Things Council to investigate how IoT-instrumented environments could inform and guide robots with highly specific information in a targeted manner. Object recognition is a key unresolved challenge for robotics, but an RFID chip can provide information about, for example, a cup's color, size and weight. In addition, repetitive actions can be stored in knowledge repositories with their situational context, opening the door to further performance increases through learning and data mining.

Once robots get networked into the IoT, they can receive instructions and guidance from the network. The IoT, for example, could inform a service robot that an office waste bin is full. The network could help the robot navigate by passing commands to the building elevator. Once the robot reaches the waste bin, the IoT could point to the location of replacement garbage bags. Or, the robot could

proactively discover and use information from the IoT to autonomously perform tasks. As part of a cleaning routine operation, for example, the robot could query the network to report about the state of all waste bins in the office building, enabling the robot to plan its path accordingly.

Our goal is to move beyond a robot- or cloud-centric vision of robotics toward an integrated solution as part of the Internet of Things. This will leverage the role of robots to turn information into action, to act as physical servants for IoT applications and to become actors querying IoT infrastructure to perform their tasks.

Florian Michahelles is associate director of the St. Gallen/ETH Zurich Auto-ID Lab. Rob van Kranenburg is the founder of The Internet of Things Council think tank. Markus Waibel is a senior researcher at the ETH Zurich Institute for Dynamic Systems and Control, and the program manager at RoboEarth.