

Research and Challenges in Commercializing Robots

Eduardo Torres-Jara
Worcester Polytechnic Institute

In most major technological innovation there has been a disconnect between the research and its potential markets. In the case of lasers, the quantum physicists that developed them were not thinking about CDs and DVDs players, permanent depilation, printers, bar code readers, etc. The scientists that developed the computers to decode messages were not thinking of desktops, laptops, washing machine controllers, iPods, or Google. In both cases the markets developed as the technology became available.

In robotics, we are living a similar situation. There is the general feeling that robots will be part of our daily lives soon because new technologies, such as GPS and lidar, are becoming widely available. For instance, Bill Gates has pointed out that there is the same level of excitement in the robotic community as there was in the computer community when he started Microsoft. □ These technologies have enabled the creation of robotic vehicles (air, water, and land) for military operations with navigation capabilities. However, robots with functional capabilities besides navigation are not yet available outside research laboratories.

A key capability for robots to perform tasks is manipulation. Currently, manipulation is limited to being performed autonomously in a very structured environment such as a car assembly line or being teleoperated such as in laparoscopic surgeries.

A number of challenges need to be overcome to make robots more functional and appealing to bring them to new markets. They include:

- Developing manipulation methods that work beyond a structured environment. An efficient method should be able to deal with uncertainties and be reactive to the environment.
- Changing the expectation about robots' capabilities and morphologies. Unlike other technologies, the media has set the public's expectations over many decades, most people imagine a robot being a humanoid robot with capabilities superior to those of a human. □
- Providing a flexible programming interface. Current robotic interfaces are difficult to use and expensive.
- Changing the perception that robots are insensitive and can only do the same task in a fixed pattern. This perception, which comes from current industrial robots, doesn't take into account that robots can have sensors. □
- Safety. Robots should be able to work safely around humans and with the materials they handle. □
- Reducing the cost. Finding alternative technologies and materials to reduce the cost of building a robot. □

In this presentation, I will discuss these challenges and the idea of introducing robots to market as sophisticated tools instead of fully autonomous robots.