

# Robotic technology lowers military risks

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With suicide bombing and improvised explosive devices escalating violence in Iraq, engineers are working to advance robotic technology to counter these deadly military problems.

At a discussion Monday on military-robotic technology at the Heritage Foundation, Helen Greiner, co-founder and chairman of iRobot Corporation, described the PackBot, an invention that is currently being used in U.S. military efforts. The PackBot is the first ground robot used to clear caves in Afghanistan and to dispose of IEDs in Iraq.

"They (robots) simply provide a way to get dull, dirty and dangerous jobs done," Greiner said.

While the compact PackBot resembles a toy army tank, the robot's 2-meter arm used to detonate explosives is critical in saving soldiers' lives.

The robot's tactical head features a rotating camera, LED illumination and a laser that helps measure objects.

John J. Leonard, a professor of mechanical and ocean engineering at the Massachusetts Institute of Technology, said he hopes robotic technology will be developed for other military operations with the use of autonomous rescue robots.

"I love the idea of saving lives with robots," Leonard said.

Currently, Leonard and his colleagues are working on navigational robots. One of their designs, the Surface Craft for Oceanic and Undersea Training (SCOUT), is an autonomous underwater vehicle using an ordinary kayak.

Leonard, a member of the discussion panel, said SCOUT is equipped with sonar and WiFi technology to improve submarine warfare. Yet Leonard said with hardware similar to an L.L. Bean product, the vehicle is affordable and simple.

Vladimir Lumelsky, a technologist at NASA's Goddard Space Flight Center, said the near future of robotics includes the advancement of an autonomous, intelligent robot that uses what he calls "sensitive skin." He said these robots are equipped with sensors so that they avoid contact with human beings while performing their tasks.

This technology also programs robots to refuse "unfriendly commands." Lumelsky said that even with an express command, these robots would not perform actions when they sense that they would endanger a human.

Stephen Welby, director of the tactical technology office of the Defense Advanced Research Projects Agency, discussed unmanned vehicles and their benefits to the military.

DARPA sponsored a challenge last year for university engineering students to create an autonomous land vehicle that could complete a course through the Nevada desert. The teams could only control the robot with two commands: on and off. Five teams completed the course and this year DARPA is planning on a similar competition only in an urban setting with the robots running through 60 miles of city traffic.

Welby said unmanned vehicles have changed the way military operations are considered.

"I can do things (with unmanned vehicles) I cannot do with a crude vehicle," Welby said.

Greiner also said that her company's unmanned devices, especially the PackBots, are expanding the capabilities of military operations.

"What's the answer to a suicide bomber? It's doing things remotely," Greiner said. "You're making a decision to put a robot at risk."

Despite all the breakthroughs in robotics, though, the discussion panel also addressed the hurdles of this technology.

"Humans are never allowed to be near 'serious robots,'" said Vladimir Lumelsky, a technologist at NASA's Goddard Space Flight Center. "This is not possible today."

Lumelsky said that a powerful robot directly interacting with humans is a taboo since robotic force is dangerous and the control is not precise. He also said the complexities of robotic hand manipulation are currently impossible.

Leonard agreed with Lumelsky and said natural phenomena that people take for granted are difficult to engineer such as intricate movement, control and senses.

"Mother Nature is really hard to compete with," Leonard said.

Yet robotics is still relatively new, and many engineers predict that it has just started to progress.

"Fundamentally, we're at the Wright brothers stage with robots," Welby said.

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