

Robots to spur economy, improve quality of life, keep responders safe

EurekaAlert!

A new roadmap for robotics presented to Congress today

Robots are being used more widely than expected in a variety of sectors, and the trend is likely to continue with robotics becoming as ubiquitous as computer technology over the next 15 years.

That is the message Henrik Christensen, Georgia Tech's KUKA Chair of Robotics in the College of Computing, will bring to the Congressional Robotics Caucus on March 20 as he presents "A Roadmap for U.S. Robotics: From Internet to Robotics - 2013 Edition."

The report, which outlines the progress of robots in multiple industries over the last five years and identifies goals for the coming decade, highlights robotics as a key economic enabler with the potential to transform U.S. society.

"Robots have the potential to bring manufacturing jobs back to the U.S., to improve our quality of life and to make sure our first responders and warfighters stay safe," said Christensen, who is also the coordinator of Robotics VO, sponsor of the report. "We need to address the technical and educational needs so we can continue to be leaders in developing and using robotic technology."

A group of more than 160 experts from universities, industry and government came together for five workshops over the last year to fully evaluate the use of robotics across various applications and create a roadmap to the future. Christensen is presenting that report to lawmakers as a guide on how to allocate resources to maximize progress.

Most notably, the group found using robots in manufacturing could help generate production systems that are economically competitive to outsourcing to countries with lower wages.

Companies such as Apple, Lenovo, Samsung and Foxconn already have begun to "reshore" manufacturing by using robotics in production systems. The sale of robotics in manufacturing grew by 44 percent in 2011 as robots have become cheaper and safer. The use of robots is shifting from big companies such as General Motors, Ford, Boeing and Lockheed Martin to small and medium-sized enterprises to enable burst manufacturing for one-off products, the report found.

Christensen notes that automation in manufacturing will not lead to job losses for U.S. workers, but will create new high-value jobs.

"Some jobs will be eliminated, but they are the 'dirty, dull and dangerous' jobs," Christensen said. "Those jobs will be replaced with skilled labor positions. That's why one of the goals in the roadmap is to educate the workforce."

In addition to manufacturing, robots are helping businesses such as Amazon improve logistics and reduce delivery costs, a savings that could be passed on to the consumer. In agriculture, robots are being used to precisely deliver pesticide onto crops, reducing unnecessary exposure of chemicals on produce. The report recommends continued progress in both areas.

With advances in human-like manipulation, robots are increasingly assisting individuals with disabilities with tasks such as getting out and preparing meals. They are also being used in 40 percent more medical procedures than a few years ago and in a greater number of surgical areas such as cardiothoracic, gynecology, urology, orthopedics and neurology. The use of robots for surgery can reduce complications by 80 percent, the report found.

Robots have proven their value in removing first-responders and soldiers from immediate danger. More than 25,000 robotic systems were deployed in Iraq and Afghanistan for ground and aerial missions. More than 50 percent of pilots in the U.S. Air Force operate remotely piloted systems and never leave the ground.

Also robots are becoming an integral part of space exploration, such as the Opportunity and Curiosity on Mars rovers. A "robonaut" is on the International Space Station helping with menial but important research tasks.

As impressive as the progress in robotics has been, the report outlines five-, 10- and 15-year goals to take robotics to the next level. Critical capabilities that should be developed for robotics include 3-D perception, intuitive human-robot interaction and safe robot behavior.

The report is an update of the initial robotics roadmap, which was published and presented to Congress in May 2009. That roadmap led to the creation of the National Robotics Initiative, an effort jointly sponsored by the National Science Foundation, the U.S. Department of Agriculture, the National Aeronautics and Space Administration and the National Institutes of Health. It also established Robotics VO, an umbrella organization that brings all robotics players together to focus on joint initiatives.

"Robotics is one of a few technologies capable of building new companies, creating new jobs and addressing a number of issues of national importance," said Christensen. "We hope this report will help foster the discussion on how we can build partnerships and allocate resources to move the robotics industry forward."

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