NIST readies tests for DARPA robotics challenge (w/ Video)

December 5 2013, by Mark Bello

'Twill be nearly the night before Christmas, but at Florida's Homestead-Miami Speedway many a robotic creature will be stirring, while visions of a $2 million prize and international prestige dance in the heads of the machines' creators.

This Dec. 20-21, research teams from around the world will be competing in the trials of the DARPA Robotics Challenge—a mock-up of a disaster scenario prompted by Japan's Fukushima Daiichi nuclear meltdown, caused by the 2011 Great East Japan earthquake and tsunami. Teams will be directing their emergency-response robots to perform eight basic tasks that were drawn from the Fukushima Daiichi response and then converted into standardized tests by researchers at the National Institute of Standards and Technology (NIST).

A year later, the capabilities of robots that qualify in this year's trials will be tested in a more realistic disaster scenario. In the winner-take-all finals, robots will perform all eight challenges consecutively.

The goal of the novel competition, according to the Defense Advanced Research Projects Agency, or DARPA, is to spur "cost-effective" hardware and software innovations that will enable future robots to perform the most hazardous activities during or in the aftermath of a disaster.

Early on, DARPA engaged NIST to help it craft its disaster-response requirements for robots and distill them into tests that the Defense

Department agency can use to measure and compare the capabilities of competitors.

"The DARPA Robotics Challenge is a great learning opportunity for the robotics community and a chance for NIST to demonstrate how standard performance tests help to inspire and guide innovation while measuring progress in a diverse, fast-moving area of technology," says engineer Adam Jacoff, leader of the NIST testing program.

With support from the Department of Homeland Security, NIST engineers pioneered the use of standardized performance testing for emergency response robots used in bomb-response and for urban search-and-rescue operations. Since 2005, 15 NIST tests have been adopted as standards by ASTM International, and about 40 more are under various stages of development or review.

To date, more than 100 response robots, both experimental and commercial, have run the gauntlet of NIST test methods at Response Robot Evaluation Exercises and in support of robot procurements. Over the last few years, the suite of performance tests has been duplicated at sites around the United States and in Germany, Japan, and soon, Australia.

In the first two tasks during the December, 2013, trials, robot contestants will drive a utility vehicle through a slalom course, dismount, and traverse increasingly complex obstacles. Other tasks include removing debris from an entry, opening several doors, climbing a ladder, locating and closing valves, connecting a hose, and using tools to cut a hole through a wall. All tasks consist of three sub-tasks, with points awarded for each completed within a 30-minute time limit.

With collaborator Southwest Research Institute, NIST engineers are finalizing details on all sets of tasks. And instead of wrapping Christmas

presents, they soon will be packing up the simulated disaster scenario for shipment to Florida. All tests are designed to be stacked on—of course—standard pallets and arranged for easy reassembly at the competition site.

More information: A document describing the eight NIST-designed tasks can be accessed from the DARPA Robotics Challenge home page: www.theroboticschallenge.org/.

Provided by National Institute of Standards and Technology