Information

Members of Top Nine Software Teams Move Forward from DARPA's Virtual Robotics Challenge

June 27, 2013

After Several Mergers, Seven Teams to Receive DARPA Support to Compete with an ATLAS Robot in 2013 DARPA Robotic Challenge Trials

The DARPA Robotics Challenge (DRC) (http://www.theroboticschallenge.org/Default.aspx) was created with a clear vision: spur development of advanced robots that can assist humans in mitigating and recovering from future natural and man-made disasters. Disasters evoke powerful, physical images of destruction, yet the first event of the DRC was a software competition carried out in a virtual environment that looked like an obstacle course set in a suburban area. That setting was the first proving ground for testing software that might control successful disaster response robots, and it was the world's first view into the DARPA Robotics Challenge Simulator, an open-source platform that could revolutionize robotics development.

Disaster response robots require multiple layers of software to explore and interact with their environments, use tools, maintain balance and communicate with human operators. In the Virtual Robotics Challenge (VRC) (http://www.theroboticschallenge.org/participate.aspx) , competing teams applied software of their own design to a simulated robot in an attempt to complete a series of tasks that are prerequisites for more complex activities.

Twenty-six teams from eight countries qualified to compete in the VRC, which ran from June 17-21, 2013. DARPA had allocated resources for the six teams that did best, but in an interesting twist, good sportsmanship and generosity will allow members of the top nine teams, listed below, to move forward:

1. 1. Team IHMC, Institute for Human and Machine Cognition, Pensacola, Fla. (52 points)
2. 2. WPI Robotics Engineering C Squad (WRECS), Worcester Polytechnic Institute, Worcester, Mass. (39 points)
3. 3. MIT, Massachusetts Institute of Technology, Cambridge, Mass. (34 points)
4. 4. Team TRACLabs, TRACLabs, Inc., Webster, Texas (30 points)
5. 5. JPL / UCSB / Caltech, Jet Propulsion Laboratory, Pasadena, Calif. (29 points)
6. 6. TORC, TORC / TU Darmstadt / Virginia Tech, Blacksburg, Va. (27 points)
7. 7. Team K, Japan (25 points)
8. 8. TROOPER, Lockheed Martin / University of Pennsylvania / Rensselaer Polytechnic Institute, Cherry Hill, N.J. (24 points)
9. 9. Case Western University, Cleveland, Ohio (23 points)

The top six teams earned funding and an ATLAS robot (http://www.theroboticschallenge.org/aboutrobots.aspx) from DARPA to compete in the DRC Trials in December 2013 (DARPA is also funding several other "Track A" teams to construct their own robot and compete in the Trials). The Trials are the second of three DRC events, and the first physical competition.

In a demonstration of good sportsmanship, Jet Propulsion Laboratory, which also has a DARPA-funded Track A effort with its own robot, decided to merge its two efforts and offer the bulk of the resources it earned in the VRC to other teams. DARPA split the freed resources between the next two teams:

- The robot associated with the JPL win and some funding now goes to TROOPER (Lockheed Martin).
- Additional funds are being allocated to a newly formed team of Team K and Case Western. That team, now known as HKU, will use an ATLAS robot generously donated to it by Hong Kong University to participate in the DRC Trials in December.

Thus, in total, seven teams with ATLAS robots and DARPA support will be going to the DRC Trials, where they will compete with other teams with their own robots.

VRC teams were evaluated based on task completion and effective operator control of the robots in five simulated runs for each of three tasks (15 total timed runs) that addressed robot perception, manipulation and locomotion. The tasks included: entering, driving and exiting a utility vehicle; walking across muddy, uneven and rubble-strewn terrain; and attaching a hose connector to a spigot, then turning a nearby valve. To simulate communications limitations in a disaster zone, the VRC imposed a round trip latency of 500 milliseconds on data transmission, and varied the total number of communications bits available in each run, from a high of 900 megabits down to 60 megabits.

To conduct the VRC, DARPA funded the Open Source Robotics Foundation to develop a cloud-based simulator that calculates and displays the physical and sensory behaviors of robots in a three-dimensional virtual space, in real time. The simulator allowed teams to send commands and receive data over the Internet to and from a simulated ATLAS robot—information very similar to what would be sent between a physical robot and its operator in the real world.

“The VRC and the DARPA Simulator allowed us to open the field for the DARPA Robotics Challenge beyond hardware to include experts in robotic software. Integrating both skill sets is vital to the long-term feasibility of robots for disaster response,” said Gill Pratt (http://www.darpa.mil/Our_Work/DSO/Personnel/Dr_Gill_Pratt.aspx) , DRC program manager. “The Virtual Robotics Challenge itself was also a great technical accomplishment, as we have now tested and provided an open-source simulation platform that has the potential to catalyze the robotics and electro-mechanical systems industries by lowering costs to create low-volume, highly complex systems.”

Additional video and images of the simulation and teams' runs are available at: http://www.youtube.com/DARPAtv (http://www.youtube.com/DARPAtv) and on http://www.theroboticschallenge.org/media.aspx (http://www.theroboticschallenge.org/media.aspx) .

###

Tweet @darpa

Media Queries

Please direct all media queries to Outreach@DARPA.mil

Images

Click for High-Resolution Image

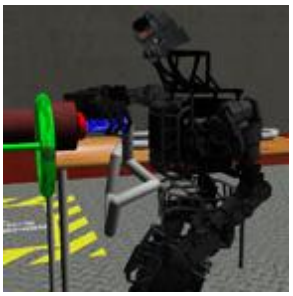
The first VRC task involved the robot walking to, entering and driving a utility vehicle along a course with obstacles, and then exiting the vehicle and walking through a final checkpoint.

Click for High-Resolution Image

Rear view of a simulated ATLAS robot preparing to drive a utility vehicle. During the VRC, teams could only view the course from the point of view of the robot's onboard sensors.

Click for High-Resolution Image

In the second VRC task, teams had to guide the robot over a series of terrain, including mud, uneven ground and a debris-littered path.



Click for High-Resolution Image

In the third VRC task, the robot had to pick up a hose, connect it to a pipe and turn a valve.

Additional Info

- DARPA Robotics Challenge (http://www.theroboticschallenge.org/Default.aspx)