



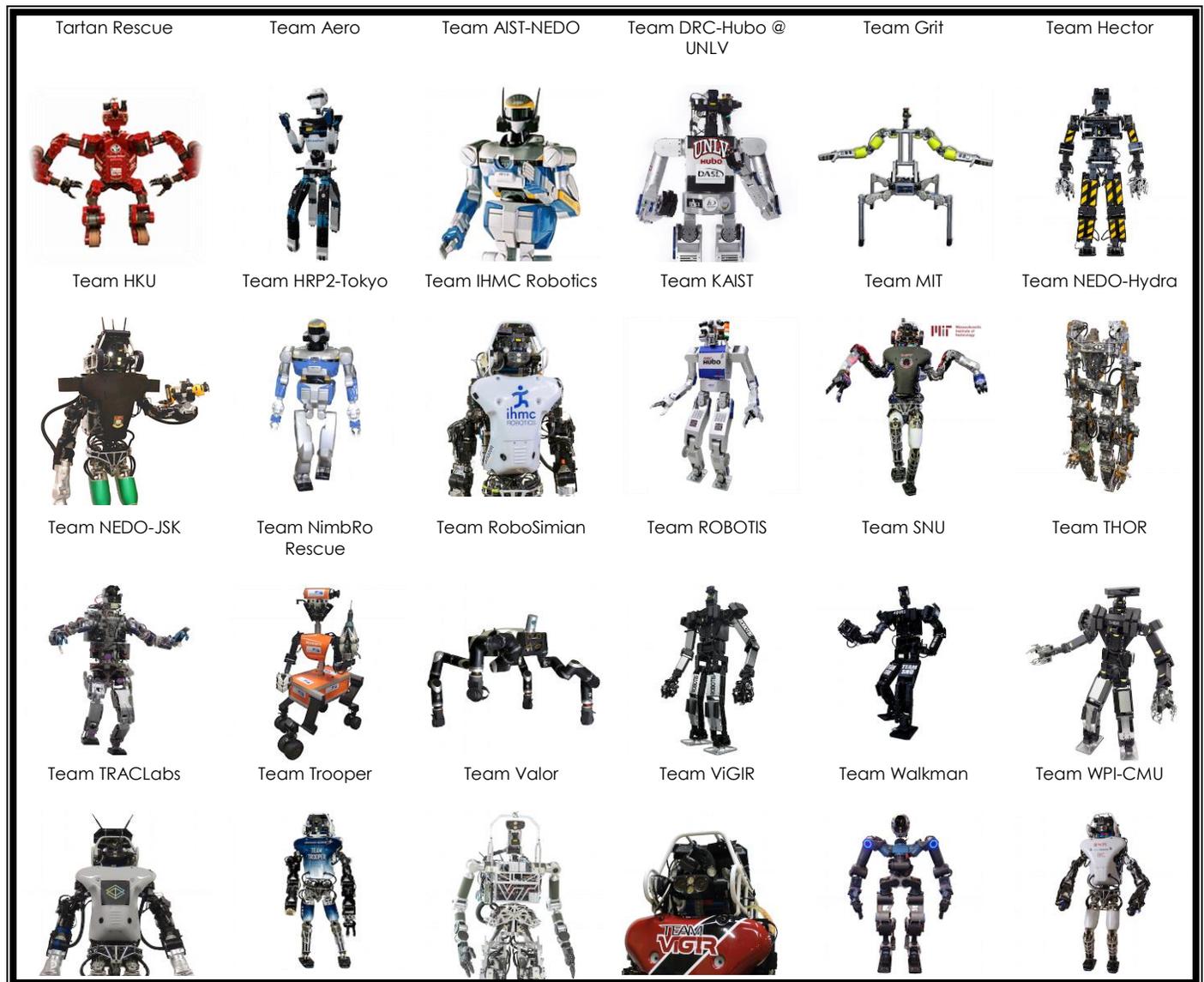
June 5-6, 2015  
Fairplex, Pomona, California

DRC Finals Competition: 8:00AM to 6:00PM  
DRC Robotics Expo: 9:00 AM to 5:00 PM  
Food Concessions: 7:00 AM to 7:00 PM

The Defense Advanced Research Projects Agency (DARPA)—the federal agency that laid the groundwork for the Internet, stealth technology, handheld GPS and much more—invites the public to attend the exciting conclusion of the DARPA Robotics Challenge (DRC), a three-year robotics competition focused on developing robots that can help humans respond to natural and man-made disasters. Twenty-four teams from around the world will test their robots on simulated disaster courses during hour-long runs for a chance to win a total of \$3.5 million in prizes.

In addition to the competition, an on-site robotics exposition will feature interactive robotics exhibits and demonstrations of technology from more than 70 diverse organizations related to disaster response, robotics and unmanned systems.

This outdoor event is open to the public, free to attend, and suitable for all ages. Neither tickets nor advanced registration is required. There is a \$10 per vehicle charge for parking.



More information about the DARPA Robotics Challenge is available online at [www.theroboticschallenge.org](http://www.theroboticschallenge.org).

# Background on the DARPA Robotics Challenge

## What is the DRC?

The DRC is a public prize challenge launched by DARPA to propel the field of robotics and develop the enabling technologies that will allow future robots to help humans respond to natural and man-made disasters. The competition was inspired by the lack of availability of such robots in the aftermath of the 2011 Fukushima earthquake and tsunami. Far more than just a test of robotic hardware, the competition has pushed the limits of intuitive human-machine interfaces, challenging participating teams to develop technologies and strategies that allow human operators to issue commands and confidently predict a robot's actions even when the communications link between operator and robot is degraded.

The competition was designed to be extremely difficult. Participating teams have innovated on a very short timeline to develop the hardware, software, sensors and interfaces that may enable their robots to complete a series of challenge tasks selected by DARPA for their broad relevance to disaster response. Three progressively more difficult DRC events have emphasized both hardware and software:

- the Virtual Robotics Challenge in June 2013 tested software teams' ability to effectively guide a simulated robot through three sample tasks in a virtual environment;
- the DRC Trials in December 2013 served up the first physical challenges, with 16 teams having to complete eight tasks, with thirty minutes allotted for each task—but with the relative comfort of off-board power, hardwired communications with their operators, and safety belays to prevent falls;
- the DRC Finals asks robots to complete a circuit of eight consecutive physical tasks within a one-hour window, running on onboard power only, communicating wirelessly with their operators, and being resilient enough to survive and recover from falls.

The DRC Finals tasks include:



## What new capabilities is DARPA hoping to achieve?

Robots have the potential to be useful assistants where humans cannot safely operate. But despite the imaginings of science fiction, robots of today are not yet robust enough to function in many disaster zones. The robots DARPA envisions to aid in these situations must be adaptable and boast several key capabilities:

- intuitive interface between robot and human operator to allow progress to be made on tasks even when the communications link between them is poor;
- task-level decision-making based on operator commands and sensor inputs;
- mobility to maneuver in the degraded environments typical of disaster zones;
- dexterity to manipulate and use a diverse assortment of tools designed for humans;
- strength and resilience to survive damage during operations;
- ability to be operated by humans who have had little to no robotics training;
- power efficiency to sustain operations absent a hardwired power supply.

## How are the DRC Finals different from the previous DRC Trials?

Inspired by the performance of the teams and robots during the 2013 DRC Trials, DARPA significantly increased the difficulty of the DRC Finals to further push the technology for effective disaster-response robots on several fronts.

DRC Trials	DRC Finals
<ul style="list-style-type: none"><li>• Unlimited hardwired power to an off-board source</li></ul>	<ul style="list-style-type: none"><li>• Onboard power that must last at least one hour</li></ul>
<ul style="list-style-type: none"><li>• Safety belays to keep robots from incurring damage when they fell</li></ul>	<ul style="list-style-type: none"><li>• No fall arrestors – if a robot falls, it must recover on its own or accept at least a ten-minute penalty if team members intervene</li></ul>
<ul style="list-style-type: none"><li>• Eight tasks attempted separately, with 30 minutes allotted for each task</li></ul>	<ul style="list-style-type: none"><li>• Eight tasks attempted consecutively in one course, with 60 minutes to complete the entire course</li></ul>
<ul style="list-style-type: none"><li>• Wired communications link between robots and operators with scheduled latency</li></ul>	<ul style="list-style-type: none"><li>• Wireless communications link between robots and operators with scheduled latency and periodic communications blackouts</li></ul>

The extra challenges engineered into the DRC Finals are intended to simulate the conditions of an actual disaster, in which a robot would have to be capable of operating at a significant distance from human first responders and continue to make progress in its assigned tasks even when poor communications prohibit step-by-step commands from human operators.

During the Finals, robots will still need to be told by human operators which tasks to chain together to achieve larger goals, but DARPA expects that the robots will demonstrate a greater ability than in the DRC Trials to autonomously carry out simple commands such as “Turn the door handle” or “Pick up the drill.”

## What results might the DRC deliver?

It is DARPA’s mission to reveal new possibilities and enable groundbreaking capabilities that support national security. The Agency’s projects are finite in duration, but create lasting revolutionary change. Its breakthroughs often leap ahead of current technologies and open up entirely new fields of research that can yield astonishing advances.

DARPA does not expect the DRC to deliver field-ready disaster-response robots in the next year or even the next decade. Instead, DARPA expects to show what is possible, eliminate some of the risk inherent in developing cutting-edge technology, and encourage other organizations to invest in further advancing that technology.

This model is similar to the one DARPA explored in its first set of prize challenges, the Grand and Urban Challenges to develop self-driving vehicles. The extraordinary progress that engineers and others made during the interval between these two events in 2004 and 2007 proved the seeming impossibility of driverless travel to be possible, paving the way for significant commercial investment in autonomous vehicle technology. Today, just over ten years later, “self-driving” vehicles are legal in several states and many mainstream car companies use technologies first developed for the DARPA Challenges to improve vehicle safety on the roads. DARPA expects that the DRC Finals will similarly mark the beginning of a historic transformation in robotics.

## Can't Attend the DRC Finals In Person? We have Options for Remote Viewers

- Website: Regular updates, photos and videos posted on the DRC website ([www.theroboticschallenge.org](http://www.theroboticschallenge.org))
- Social: Follow #DARPADRC on Twitter (@DARPA), Facebook, Instagram and Google+ for updates
- Webstream: Tune in to [DARPA TV on YouTube](#) for live streaming of the event (active June 5-7, 2015)



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