

## Robots Go Where Even Heroes Fear to Tread

Robots—God love 'em—have a very long history of instilling we humans with emotions encompassing wonder, dread and downright horror. Greek mythology has its Talos (Talon)—a giant automaton tasked with patrolling the shores of Crete to discourage foreign invaders. Robots of the sort also pop up in the Old Testament—AKA the “Golem.”

Some contemporary robotic wonder-horror-dread examples: The wonder—the Da Vinci Surgical System; the horror—2001, *A Space Odyssey's* HAL 9000 (Heuristically programmed Algorithmic computer), quoted here regarding a questionable ship malfunction: “It can only be attributable to human error”; and, the dread—a box of wires taking your place on the production line.

But this Power Play exists in praise of our metallic mates—specifically, the DARPA (Defense Advanced Research Projects Agency) Robotics Challenge (DRC), a U.S. Department of Defense (DOD)-sponsored competition beginning in October and wrapping up sometime around the end of 2014. Comprised of three competitions—a mix of virtual and live—the contest is a significant element of the DOD’s “strategic plan” that “calls for the Joint Force to conduct humanitarian, disaster relief and related operations.”

You can see where this is going, but to be precise: “The plan identifies requirements to extend aid to victims of natural or man-made disasters and conduct evacuation operations. Some disasters, however, due to grave risks to the health and wellbeing of rescue and aid workers, prove too great in scale or scope for timely and effective human response. The DRC “will attempt to address this capability gap by promoting innovation in robotic technology for disaster-response operations.”

First-responder robots—in our lifetime!

One can think back to any number of disasters in which life-saving robots replacing humans would have been a miraculous endeavor; for most Americans, 9/11 comes immediately to mind; the 2011 Fukushima (Japan) nuclear accident is a more recent example. According to the DARPA website, “The goal of the DRC is to develop ground robots capable of executing complex tasks in dangerous, degraded, human-engineered environments. Competitors...are to focus on (creating) robots (that can use) equipment commonly available—from hand tools to vehicles—with an emphasis on adaptability to tools with diverse specifications.”

Breaking it down, it is DARPA’s intent via the challenge “to advance (robotics’) current state of the art in the enabling technologies of supervised autonomy in perception and decision-making; mounted and dismounted mobility; dexterity; strength; and platform endurance.”

The competition will concentrate on “robotics hardware and software development tasks,” and will be open to all comers,

foreign and domestic, with a goal of increasing “the diversity of innovative solutions...including universities, small, medium and large businesses, and even individuals and groups with ideas on how to advance the field of robotics.” Yet another hope for the DRC is “to make software and hardware development for ground-robot systems more accessible to interested contributors, thereby lowering the cost of acquisition while increasing capabilities.”

In what shape, size or form the “contestants” might show up could be a real eye opener for those of us more familiar with the canned Hollywood versions we’ve come to know. In an April 9 story in the *New York Times* on the challenge by John Markoff, there is mention that “while such (abovementioned) tasks may well inspire humanoid designs, roboticists say they may also lead to the robotic equivalent of the Minotaur—a hybrid creature that might have multiple arms and not just legs but treads.” The piece goes on to quote Aaron Edsinger, co-founder of San Francisco-based Meka Robotics, that the robots would be a menagerie of “analogs to animals such as spiders, monkeys, bears, kangaroos and goats” that serve as “useful inspiration when considering parts of the challenge.”

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Carrying out time-sensitive, tricky tasks—such as pump repair or replacement—conducted in extremely dangerous, life-threatening environments is a part of what the DARPA robotics challenge is all about.

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Edsinger goes on to comment that the real challenge for the robots is not in the completion of each individual activity; rather, it will be in the successful integration (of the tasks) into a single, focused mission. “I feel we already have systems that can achieve each individual task in the challenge.”

According to a DARPA press release, there are “eight likely tasks the robot will need to perform, among them driving a vehicle to a simulated disaster site; moving across rubble; removing rubble from an entryway; climbing a ladder; using a tool to break through a concrete wall; finding and closing a valve on a leaking pipe; and replacing a pump.”

Also mentioned in the *Times* article regarding Fukushima is that “Despite Japan’s significant investment in robotics, Hirochika Inoue—the father of humanoid robot development in Japan—and who in fact suggested such a contest last year—noted that the country did not have any robots capable of completely replacing humans at the time of the Fukushima disaster.”

“Many people wanted to do it by robots,” (Hirochika) said in an e-mail, “but we had not prepared.” (For more information: [www.darpa.mil](http://www.darpa.mil).) 

Photo courtesy of DARPA