ROBOTICS

Rescue Droids Stumble In an Urban Jungle

AUSTIN, TEXAS—Broken bodies were strewn on the floor like discarded rag dolls. Severed legs protruded from under shattered furniture. Twitching fingers pushed hopelessly at a pile of bricks. Somewhere, a baby cried. Agonized moans drifted up from the basement, while unseen fingers tapped feebly on metal pipes. Then, clambering through the wreckage, came the robots.

It wasn't the set of *Terminator 3*, but the floor of the Austin Convention Center. There, in the midst of the 17th Annual National Conference on Artificial Intelligence,* four teams of engineers fielded mechanical contestants in the first annual urban ruin search-and-rescue competition—a simulated catastrophe created to test intelligent lifesaving robots that may one day lead rescuers to people trapped in the precarious rubble of collapsed buildings. The competition indicated that the technology still has a way to go.

Tag team. Search-and-rescue robots from the University of South Florida work in tandem at NIST's mock disaster site.

When a building tumbles down, rescuers have about 30 minutes to start searching for survivors, says Robin Murphy, a competitor and robot expert from the University of South Florida, Tampa. After that, the chance of survival drops precipitously. Flesh-and-blood rescue teams must wait 3 hours for the unstable building to settle before going in. Expendable robots, however, could get to work immediately, sniff out the survivors, give them food and first-aid supplies, and lead the rescue team straight to them.

Such robotic St. Bernards would have to be both agile and clever—mobile enough to climb over wreckage, smart enough to do it without human help. Radio control is too unreliable, and the clutter of a collapsed building makes tethers impractical. So rescue robots must solve one of the hardest problems in artificial intelligence: traversing a changing three-dimensional maze. To do that, an array of light, heat, and ultrasonic sensors feeds environmental information to the robot's computer brain. The robot then combines this with internal data about its moving parts to build up an internal map to guide it through the maze.

That's the theory, at least; the test course showed how hard it is to put it into practice. Designed by engineers from the National Institute of Standards and Technology (NIST), it resembled an Ikea showroom in hell. Meter-high walls of blue particle board and Plexiglas delineated several rooms in three increasingly realistic devastated buildings. Overturned chairs, tables, and a bed were spread through the spacious rooms of the easily navigable "yellow" course. The more difficult "orange" course was clogged with rubble piles and featured a loft reachable by a ramp, stairs, and a rope ladder. The extremely difficult "red" course was just an unstable pile of boards, aluminum siding, cinder blocks, chicken wire, and plastic tubing. Realistic plastic victims with internal heaters were hidden throughout the courses like gruesome Easter eggs.

In the last round of the competition, the robot finalists had 20 minutes each to conquer the course. Designs varied widely. Two contestants—from the University of Arkansas and the University of Kansas—mimicked the rolling-trash-can look of the "droid" R2D2 from *Star Wars*. The eventual winner, from Swarthmore College in Pennsylvania, resembled a Shop-Vac vacuum cleaner ringed with ultrasonic and infrared sensors and topped by a rotating camera. The brainy appliance mapped one room of the yellow course—and found one victim by crashing into him—without human help. But its small wheels faltered in the obstacle-strewn orange course.

The fourth team, Murphy's Floridians, fielded a pair of rugged radio-controlled robots, one resembling the tracks of a 61-centimeter-long bulldozer and the other an oversized Tonka truck. Watching for obstacles through the robots' camera "eyes" (a process Murphy compares to "driving while looking through a straw at mouse-eye level"), two graduate students guided the pair all the way to the end of the red course. Along the way they found several victims and a local TV news camera operator.

In the end, none of the robots came close to locating all the victims, and some wandered out of the course to "rescue" unsuspecting conference participants. "The teams aren't doing all that well," admitted contest organizer Alan Schultz after the preliminary rounds. Schultz emphasizes, however, that robots historically perform poorly in the first year of contests like the urban ruin course, but that engineers rapidly rise to the challenge. "This contest will be an inspiration to the community," he says. "I think in 5 years there is a reasonable chance that these robots will be able to work in real structures."

Lisa Meeden, a computer scientist at Swarthmore College who helped develop the winning robot, agrees that tough challenges are best. If the course is too easy, "you can fool yourself into thinking you have solved the problem when you haven't," she says. "We wanted to push the envelope." **–MARK SINCELL**

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ACADEMIC FREEDOM

Political Scientist Becomes Cause Célèbre

BERN—A right-wing political leader's successful defamation suit against one of Austria's most prominent political scientists, Anton Pelinka, has become a lightning rod for an international debate about academic freedom of speech. This suit and a second filed against Pelinka represent "a cynical effort to punish and suppress Professor Pelinka for his professional expression," contends Irving Lerch, director of international affairs for the American Physical Society, who sent a letter last month to Austrian President Thomas Klestil backing Pelinka's right to free speech.

On 11 May, a criminal court in Vienna found Pelinka guilty of defaming former Freedom Party leader Jörg Haider and fined him roughly $4500, although the court will not impose the fine unless Pelinka is convicted of making similar statements in the future. Haider, an outspoken populist who has made questionable comments about Nazism, accused Pelinka of defaming him for asserting in an interview on Italian television in May 1999 that some Haider statements had "trivialized" Nazism.

Haider is pursuing a second defamation suit against Pelinka for comments he made to CNN last year. (A decision is expected in October.) He has also sued two other Austrian intellectuals, including Wolfgang

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