Here come the racing robots

Defense Dept. pushes unmanned vehicles

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PRIMM, Nevada (AP) -- This desert pitstop with a handful of casinos was supposed to be the finish line for a robot race sponsored by the Pentagon last year to spur development of unmanned vehicles for warfare.

Problem was, none of the self-driving entries made it this far.

On Saturday, 23 more robot racers will assemble here at the relocated starting line in a sequel to see if any can crisscross at least 145 miles of rough desert and mountain trails without a human driver or remote control.

The first to cover the course in less than 10 hours will win the $2 million purse of the Grand Challenge.

"We'll say a little prayer and hope for some Irish luck," said Bill Kehaly of Westlake Village, California-based Axion Racing, which is entering a modified Jeep Grand Cherokee named Spirit.

Last year's inaugural race ended without a winner when all the vehicles broke down on the desert course from Barstow, California, to Primm, just across the California state line.

Teams went back to the drawing board to improve the artificial intelligence and sensing systems needed to navigate the rough terrain without crashing. Some participants also tested their entries more rigorously by practicing on last year's course.

"Having that real base to work with allowed the teams to accelerate the technology development. Before that, it was all guesses," said Ron Kurjanowicz, program manager of the Pentagon's Defense Advanced Research Projects Agency, or DARPA.

To further motivate competitors, the agency doubled the taxpayer-funded prize after last year's $1 million offering went unclaimed.

Organizers have been impressed by the caliber of vehicles entered in the upcoming race and believe there's a good chance a robot racer will actually finish this year in less than 10 hours.

During qualifying trials earlier this week at California Speedway in Fontana, California, Carnegie Mellon University's converted red Hummer called the Highlander hit several obstacles but still narrowly defeated Stanford University's Volkswagen SUV to take the pole position.

Carnegie Mellon robotics professor William "Red" Whittaker attributed the mistakes to a
rollover accident during practice two weeks earlier. The mishap knocked one of its sensors slightly out of place and the team had to re-calibrate it.

It's one of two entries by Carnegie Mellon. The other, a modified red Humvee dubbed Sandstorm, took third position in the trials. It was the best performer in last year's race despite covering only 7 1/2 miles of the 150-mile course.

The exact route of Saturday's race will be kept secret until two hours before start time, but organizers have said it will begin and end in Primm and is expected to be more difficult than last year while covering as many as 175 miles.

The rugged, twisting route was designed to mimic driving conditions in Iraq. Vehicles must go on- and off-road, cope with natural and man-made obstacles and squeeze through narrow passageways.

"We're all in the same battle together," said Sebastian Thrun, a Stanford computer scientist. "The desert is going to be infinitely harder because you have to do 10 hours of it."

The vehicles use "drive-by-wire" technology, in which on-board computers control steering, braking and other movement. They rely on global positioning satellites for orientation while mounted sensors, lasers, radar and cameras feed data to several computers to detect and avoid obstacles.

"One can always wish for a better sensor, a faster computer and infinite testing time, but we're happy with what we have right now," said Umit Ozguner, an electrical engineer at Ohio State University, another team in the finals.

DARPA, which spent $9 million on the event, has a congressional mandate to have a third of all military ground vehicles unmanned by 2015. The military currently has a small fleet of autonomous vehicles stationed in Iraq and Afghanistan, but the machines are remotely controlled by a soldier who usually rides in the same convoy.

Early Saturday, teams in Primm will be handed a CD-ROM with GPS coordinates that chart the exact route for their vehicle. The robots will bolt from the starting gate at staggered times, each followed by a chase car with a judge who can stop the robot if it goes too far astray, ending its chance of winning.

Teams acknowledge that no matter how much testing a vehicle undergoes, luck plays a crucial role.

"It only takes one bad rock to get you out," warned Axion's Kehaly.

If no vehicle wins, DARPA said it would consider another race and perhaps double the purse again to $4 million.

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