

University of Colorado, Denver Takes First at the 6th International Ground Robotics Competition

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The University of Colorado, Denver beat out teams from 11 other universities to win first place at the sixth International Ground Robotics Competition (IGRC) held at Oakland University, Rochester, MI, on May 30-June 1, 1998. Fifteen teams participated from 11 universities, including schools from Alberta, Canada and Tokyo, Japan. The University of Colorado, Boulder and Hosei University took second and third place respectively.

The competition was held on an outdoor grass course with white lines painted at 10-foot intervals. These lines were curved and dashed in various places. The object is for the vehicles to travel autonomously down the course, staying within the lines, at the fastest time. The vehicles must also negotiate around obstacles (orange and white construction barrels), climb over a ramp and cross a sandtrap. Some of the barrels are set to create dead ends, which require the robots to have extended vision (looking past the immediate obstacle). The sand trap provides not only a mobility challenge, but also a vision challenge, requiring that the robot cross an area that appears totally white like the lines it has been programmed to avoid.

The course is designed to be a mix of military and civilian challenges. The white lines emulate those found on the highway while the ramp addresses the slope capability required in combat vehicles. The obstacles are found in both environments. Simulated asphalt was added to represent lines on the highway with the inside (left-hand) line painted yellow similar to those on today's highway system.

The overall course was laid out to demonstrate capabilities required to achieve the autonomous and automated mobility/driving performance objectives of current and future Department of Defense (DoD) and Depart-

ment of Transportation (DOT) programs. The DoD-related programs include the OSD Demo III Experimental Unmanned Vehicle program, U.S. Army Tank Automotive Research Development & Engineering Center's Intelligent Mobility project and the DARPA Tactical Mobile Robotics program. Many of the course challenges focused on objectives of DOT's Automated Highway System and the Intelligent Transportation System.

The performance competition is complemented by a Design Competition sponsored by the Society of Automotive Engineers (SAE). The Design Competition requires each team to submit a technical paper describing the design of their vehicle according to IGRC guidelines to guidelines published in the IGRC rules. The papers along with a technical presentation and a static vehicle display overview are rated and scored by a team of four SAE judges. This year the three Virginia Tech teams swept the design competition. They finished first, second and third, collecting \$2,000 in prize money.

New this year was a Bonus Challenge Event (BCE). This separate performance-based competition required the teams to handle typical day-to-day highway hazards including mufflers in the road, delaminated tire debris, dead animals and barricades. Oakland University took first place and the \$1,000 prize; Hosei University came in second winning \$600; and University of Colorado, Cugar took third place and a \$400 prize. The BCE will be used as a testing ground over the years to experiment with new challenges prior to their introduction into the main event.

Next year a fourth event, Leader-Follower, will be added. This event will require the robots to be able to follow a lead vehicle, maintaining a set distance with minimum side-to-side variance/following. A beacon or placard will be placed on the lead vehicle. It will drive a random serpentine course. The vehicle with the best following capability will be awarded a \$1,000 prize.

The competition is sponsored by AUVSI. AUVSI has funded and sponsored the IGRC for all 6 years. Co-sponsors include FANUC Robotics, Oakland University, Oakland University School of Engineering and Computer Sciences, United Defense Limited Partnership (UDLP), AUVSI Great Lakes Chapter, Society of Automotive Engineers (SAE) and U.S. Army Tank-automotive & Armaments Command (TACOM)/Tank Automotive Research Development & Engineering Center (TARDEC).

Next year's competition is scheduled for June 5-7 at Oakland University Rochester, MI.

For further information, visit the IGRC website at: http://www.secs.oakland.edu/SECS_prof_orgs/PROF_AUVSI/index.html or select IGRC at the AUVSI website at: <http://www.auvsi.org/auvsi.cc>.

MIT Captures First AUV Competition Title

A robotic vehicle designed and built by students from the Massachusetts Institute of Technology (MIT) performed several elements of an autonomous mission and earned first place in the 1st Annual International Autonomous Underwater Vehicle Competition, sponsored by the Association for Unmanned Vehicle Systems International and the U.S. Office of Naval Research.



MIT's "ORCA" begins its mission on the way to a First Place finish

Finishing after MIT was Stevens Institute of Technology (Hoboken, N.J.), University of Florida, and Johns Hopkins University.

The Competition, held August 3rd at the U.S. Navy's Coastal Systems Station in Panama