

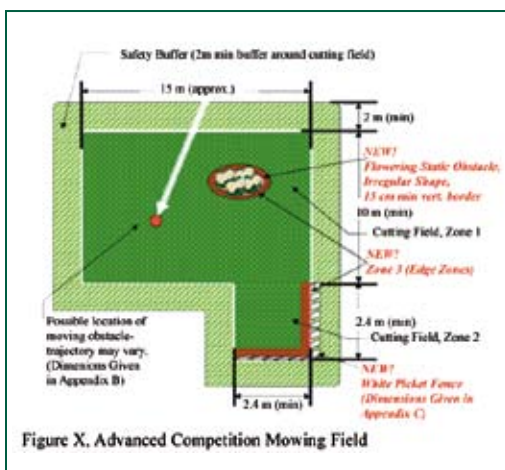
Mowing in the Merry Month of May

By: Jacob Campbell & Don Venable

Six cunning lawn mowers and their human masterminds from the U.S. and Canada converged on Siebenthaler's Garden Center near Dayton, Ohio on May 28 with one goal in mind: winning the 6th ION Robotic Lawn Mower Competition and grabbing a share of the \$35,000 in sponsored prize money.

After three days of competition, Case Western Reserve University took home the \$15,000 grand prize in the advanced, or dynamic, category: the first big win for CWRU. Three-time grand prize winner Ohio University took second prize with \$10,000. Although four-time competitor L' Ecole de Technologie Superieure (ETS) robot did not manage to mow more than half of the grass, the team placed third and was awarded 25% of the full \$5,000 prize.

The University of Cincinnati, competing for the first time and the only entry in the basic (or static) category, was rewarded for their efforts with a \$625 prize.



Advanced Competition Mowing Field

Rounding out the field, the University of Evansville returned for their third time in the advanced competition. The 2007



The Winning Team — Case Western Reserve University. L to R: Jonathon Taylor, Jonathon Beno, Bradley Hughes, (an arm and shoulder of Daniel Bennett), Alexander Schepelmann.

and 2008 grand prizewinner, Wright State University, competed, but did not place this year.

Sponsored by the ION Satellite Division and the Air Force Research Laboratory (AFRL), the annual contest seeks the perfectly-designed unmanned lawn mower, one that uses the art and science of navigation to rapidly and accurately mow a field of grass. Eighty-percent of the total score is based on the robot's performance in the field. Twenty-percent is based on the human team's presentation and report.

Many of the 2009 teams used Trimble and NovAtel differential GPS receivers integrated with various inertial, odometer, magnetic, camera, and laser sensors.

The 2009 co-sponsors were Sensors Directorate, Honeywell,

John Deere and Siebenthaler's Garden Center.



The Line-Up

First, let's take a look at the 2009 competitors (in alphabetical order): Case Western Reserve University (CWRU) competed again with their "CWRU Cut II" mower (pronounced "crew cut").

Competing for their first time, University of Cincinnati was the lone entry in the basic category with "UC Robomow."

L' Ecole de Technologie Superieure (ETS) from Canada returned for their fourth year in the advanced competition with the "Herbinator."

A six-time competitor in the advanced category — and the only team that has not missed this event since it started —

was Ohio University with their aptly named "Autonomous Lawn Mower" mower.

University of Evansville came back for their third year in the advanced competition with "UEzMoe3."

And, finally, for their fourth consecutive year in the advanced competition was Wright State University (WSU) with "Clean Cut."

Lead Up to the Big Day

The contest took place over three days with paper and presentation judging and qualifying rounds before the mowing competition. Dr. Jacob Campbell, chair of this year's event, and a representative from co-sponsor John Deere spoke at the kick-off. After that, each team presented their work and designs to guest judges from the Air Force Institute of Technology and AFRL and an audience of students and faculty from the competing universities.

The teams this year had some very

impressive designs, many controlled by Trimble and NovAtel differential GPS receivers integrated with various inertial, odometer, magnetic, camera, and laser sensors.

The first day culminated in a cookout organized by Lts. Carrie New and Casey Miller and sponsored by the ION Mini-Urban Challenge, a navigation-robotic contest for high school students. High school contestants and mower competition college students ate and talked together – and, no doubt, traded strategies.

And, in what has quickly become a tradition, many of the teams worked late into the night — with some through the night — tweaking their equipment in preparation for the Big Day.

On Day 2, all teams passed the qualifying round, a major milestone in which teams demonstrate that their mower is fit to compete by passing safety and operations tests.

The morning of the final event came quickly. Volunteers arrived at 7 a.m. as



2009 Mower Competition Qualification Day Volunteers. L to R: Boyd Holsapple, Sam Grey, Jacob Campbell, Don Venable, Mark Smearcheck, Bert Peterson, Sergio Perez, Mike Ross, Neeraj Pujara, Jared Kresge.



Scoring Team CAPRA's run



A close-up on Wright States University's mower



Ohio University mowing around the obstacle

the dew rose from the grass and everyone could see it was going to be a beautiful day to do some mowing. Col. Steven Bills, Deputy Director of the Air Force Research Lab Sensors Directorate opened the competition.

When most of the 2008 teams failed to mow over half the grass last year, event coordinators decided to leave the advanced category field unchanged. As shown in Figure 1, the field included an L-shaped lawn with a flowerbed and fence that needed edging and a moving obstacle — a motorized stuffed poodle.

The simpler field for the basic competition was a rectangular lawn with a stationary obstacle.

Compared to previous years, the teams improved the quality of the cut, with several teams showing great accuracy in mowing around the obstacles. However, many of the teams continued to have challenges putting all the various required autonomous mowing skills together in a single run, and because of this, the mowing field will probably remain the same in 2010.

The 2010 competition will be held June 3-5, again at Siebenthaler's

Garden Center, Beavercreek, Ohio. For information, e-mail Don Venable at donald.venable@wpafb.af.mil and check the website: www.automow.com.

The authors wish to thank all the volunteers from AFRL/RYRN and the AFIT ANT Center for making this year's competition a success. ♦