

WISCONSIN ROBOTICS

FALL NEWSLETTER 2018



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Wisconsin Robotics is made possible through the generous donations and support from our sponsors. These contributions, both financial and in-kind, allow the team to develop advanced robotics systems for international competitions and to remain involved in community outreach to inspire K-12 students to pursue STEM. We are grateful for the continued support of our sponsors, University, and extended community. To this end, we have compiled a newsletter detailing our progress this far into the 2017-2018 academic year.

The Competition

With the 2018 University Rover Challenge (URC) rules released, the team spent the fall semester designing and creating prototypes to overcome the challenges of this year's competition. Although the same competition categories remain from last year, the tasks within each category have increased in difficulty from previous years. A brief summary of each task is as follows:

Science Cache Task:

- Obtain a wide angle panorama of the site of interest with an indication of scale
- Obtain a close up, high-resolution image of soil of interest with an indication of scale
- Obtain a stratigraphic profile to determine the environmental factors and history of water
- Obtain at least a 5 gram, subsurface sample from 10cm or deeper
- Return the sample stored in sealed container to prevent contamination
- Measure subsurface moisture content, temperature, and have at least one additional science capability
- Perform a lab analysis on the returned sample to look for indications of life

Extreme Retrieval and Delivery Task:

- Traverse soft sand, rough stone, rock/boulder fields, vertical drops of 1 meter or more, and slopes in excess of 45 degrees
- Teleoperate the rover up to 1 kilometer away with no line of sight communication
- Pick up hand tools, supply containers, rocks, all weighing up to 5kg and be capable of accurately placing items in their correct locations

Equipment Servicing Task:

- Pick up a 3kg cache which is partially buried
- Open a drawer on mock mars lander, place the cache in tight fitting compartment, and close the drawer
- Undo a latch on hinged panel
- Type commands on a keyboard and follow directions on a display screen
- Be capable of pushing buttons, flipping switches, and turning knobs
- Be capable of turning a hand crank
- Replace an electronics board using a rugged board-to-board connector
- Pick up and use screwdriver or wrench

Autonomous Traversal Task:

- 4 stages of multiple legs with increasing difficulty, GPS location ambiguity, and obstacles
- For each stage:
 - Each leg's gate is marked with a tennis ball and GPS coordinates
 - Must be able to autonomously navigate to within 2m of GPS waypoints/markers while avoiding obstacles and signal the rover's arrival

If interested, competition requirements can be viewed in full detail [here](#).

Fall Semester Progress

The team's 2018 competition rover, Amelio, being built from the ground up, expands on the successful designs of last year's rover, Ascent, while addressing its shortcomings and areas in need of improvement. The decision to build a new rover was made so Ascent could remain functional and act as a test platform while Amelio is being built. With the majority of Amelio's systems having been either modeled or prototyped, the first iteration of the rover is beginning assembly.

This past December, the team submitted their Preliminary Design Review for the competition. This review ensures that teams have the necessary structure, support, and resources to be competitive at URC. This year, submissions from 95 teams across 12 countries and 6 continents have been given approval to compete: the largest number of accepted submissions to date.

The next competition milestone will be the System Acceptance Review, where approximately only one third of the 95 teams will be accepted to travel to compete at URC in Hanksville, Utah. In the past, this deadline has required a five minute video as well as a five page paper detailing the rover's systems and the team's solution to overcoming the challenges faced at URC. Filming and work on the System Acceptance Review will begin shortly along with initial system tests on Amelio.

Outreach

This fall semester, Wisconsin Robotics attended the Wisconsin Science Festival and a Girl Scouts Activate! event, reaching well over 10,000 individuals in combined attendances. At these events, the team demonstrated Ascent's capabilities and allowed people of all ages to drive Atlas, another team test platform; Rocket, a racecar-like outreach robot designed specifically for kids to drive; and tankbot, a laser-tag playing robot.



In the upcoming semester, Wisconsin Robotics will be attending the Elkhorn Maker Faire on January 20th, Engineering EXPO April 6-7th, and the Robot Block Party at the Museum of Science and Industry in Chicago, tentatively April 15.

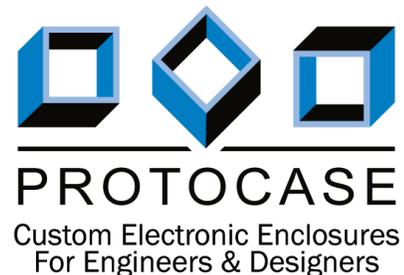
In addition to the team's regular outreach events, and in collaboration with the Wisconsin Institute for Discovery, Wisconsin Robotics has also been hosting a Saturday Science event which takes place on the first Saturday of each month. At these events, members of the team dedicate their time to teach young kids the basics of programming using LEGO Mindstorm kits.

Wisconsin Robotics is able to pursue and ultimately succeed at challenging and educational projects thanks to our sponsors. With your help, we are able to develop and expand our skills, create competitive and advanced robotic systems, and inspire interest and excitement in STEM fields, and for that, we are sincerely thankful.

A Special Thanks to our Sponsors!



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