

Senior Design Project Description for FALL 2016

Project Title: Astrobotics (UNCC_AST1)

Supporter: NASA/UNC Charlotte

Supporter Technical Representative: ASSIGNED

Faculty Mentor: ASSIGNED TBD (check one)

Single Team Dual Team (check one)

Personnel (EN/ET): 2 E, 1 Cp, Cv, 4 M, 1 SE

Expected person-hours: (250 per student)

Description of Project:

NASA's 8th annual Robotic Mining Competition is a university-level competition designed to engage and retain students in science, technology, engineering and mathematics (STEM). NASA will directly benefit from the competition by encouraging the development of innovative excavation concepts from universities which may result in clever ideas and solutions which could be applied to an actual extraterrestrial excavation device or payload. The challenge is for university teams to design and build an excavator, able to mine and deposit a minimum of 10 kilograms of lunar/Martian simulant within 10 minutes. The complexities of the challenge include the abrasive characteristics of the lunar/Martian soil simulant (BP-1), the weight and size limitations of the robot, and the ability autonomously control the robot from a remote mission control center. The scoring for the mining category will not be based primarily on the amount of material excavated in the allowed time but instead will require teams to consider a number of design and operation factors such as dust tolerance and projection, communications, vehicle mass, energy/power required, and level of autonomy.

Initial Project Requirements (e.g. weight, size, etc.):

NASA has not yet posted the project requirements for the competition this year. The requirements will be posted as soon as they are released by NASA.

Expected Deliverables/Results:

1. Full compliance with the rules of the NASA Robotics Competition.
2. All deliverables associated with the Competition.
3. All deliverables associated with the course.
4. An autonomous functioning robot by 1 March 2017.
5. A fully tested, robust and competitive Robot by 1 April 2017.

List here any specific skills or knowledge needed or suggested (If none please state none):

- Interface and logic design
- Labview
- Communications



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- Robot control and systems
- Programming
- Circuit design
- Communication and wireless
- Power systems and power management
- Robot control and systems
- Programming
- Computer Aided Modeling
- Machine dynamics or design

Special Skills needed:

- Experience with remote controlled vehicles or machinery.
- Control Systems or Robotics (including PID control and path planning)
- Experience with positional sensing and/or navigation
- Knowledge of Labview and RIO based control

This is a competition based project, and travel to the competition at Kennedy Space Center (May 2017) is a planned for students that demonstrate exemplary work ethic in the course of the project.