Lunabotics Mining Competition:
Inspiration through Accomplishment

Robert P. Mueller[1]

[1]Surface Systems Office, National Aeronautics & Space Administration (NASA) Kennedy Space Center, FL, USA

ABSTRACT

NASA's Lunabotics Mining Competition is designed to promote the development of interest in space activities and STEM (Science, Technology, Engineering, and Mathematics) fields. The competition uses excavation, a necessary first step towards extracting resources from the regolith and building bases on the moon. The unique physical properties of lunar regolith and the reduced $1/6^{th}$ gravity, vacuum environment make excavation a difficult technical challenge. Advances in lunar regolith mining have the potential to significantly contribute to our nation's space vision and NASA space exploration operations.

The competition is conducted annually by NASA at the Kennedy Space Center Visitor Complex. The teams that can use telerobotic or autonomous operation to excavate a lunar regolith geotechnical simulant, herein after referred to as Black Point-1 (or BP-1) and score the most points (calculated as an average of two separate 10-minute timed competition attempts) will earn points towards the Joe Kosmo Award for Excellence and the scores will reflect ranking in the on-site mining category of the competition. The minimum excavation requirement is 10.0 kg during each competition attempt and the robotic excavator, referred to as the "Lunabot", must meet all specifications.

This paper will review the achievements of the Lunabotics Mining Competition in 2010 and 2011, and present the new rules for 2012. By providing a framework for robotic design and fabrication, which culminates in a live competition event, university students have been able to produce sophisticated lunabots which are tele-operated. Multi-disciplinary teams are encouraged and the extreme sense of accomplishment provides a unique source of inspiration to the participating students, which has been shown to translate into increased interest in STEM careers.

Our industrial sponsors (Caterpillar, Newmont Mining, Harris, Honeybee Robotics) have all stated that there is a strong need for skills in the workforce related to robotics and automated machines. In 2010, 22 United States (US) universities competed, and in May 2011 the competition was opened to international participation, with 46 Universities attending. There were 12 international teams and 34 US teams. This combined total directly inspired an estimated 544 university students. More students and the public were engaged via internet broadcasting and social networking media. This is expected to be of value for actual future space missions, as knowledge is gained from testing many innovative prototypes in simulated lunar regolith.

More information is available at www.nasa.gov/lunabotics/.