



**LUNABOTICS
MINING COMPETITION
May 27-28, 2010
Astronaut Hall of Fame**

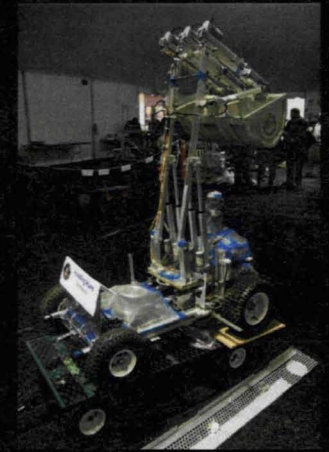
Kennedy Engineering Academy 67, July 20, 2010

**Rob Mueller, Chief, NASA KSC, Surface Systems Office, NE-S
Gloria Murphy, NASA KSC, Education Project Manager, XA-D**

What is a Lunabot?



- Robot Controlled Remotely or Autonomously
- Visual and Auditory Isolation from Operator
- Excavates Black Point 1 (BP-1) Aggregate
- Weight Limit - 80 kg
- Dimension Limits - 1.5m width x .75m length x 2m height
- Designed, Built and Tested by University Student Teams





Background/History

The Competition is linked to a Senior Design Class and Systems Engineering Curriculum

ESMD Senior Design Project
KSC1-05-SD
Lunar Regolith Excavation O2
Prod/Outpost Emplace
posted in 2007 on the ESMD Space
Grant Education Project website:
<http://education.ksc.nasa.gov/esmdspacegrant/>

**Lunar Regolith Excavator
Senior Design Course
incorporating NASA Systems
Engineering Process**
Curriculum developed and pilot
tested by Auburn University
during 2008-09 and posted at:
<http://education.ksc.nasa.gov/esmdspacegrant/LunarRegolithExcavator.htm>

**Lunar Regolith Excavator
Senior Design Course
Faculty Workshop**
Held at KSC on May 27, 2009
with 43 faculty from around the
country participating of which
37% were from minority
serving institutions.





Competition Categories

- On-site Mining
 - 1st, 2nd & 3rd Place for most lunar simulant deposited in collector within 15 minutes
 - Minimum of 10 kg required to place
- Systems Engineering Paper (mandatory)
- Outreach Project (mandatory)
- Slide Presentation (optional)
- Team Spirit (optional)



Benefits

- Prepare Students for Future Workforce
- Soil Containment Structure for New Technologies Development (ISRU)
- New Concepts for Excavation Technologies
- Community Awareness of Future KSC Activities
- Outreach to local middle schools, FIRST Robotics, Girl Scouts and Boys & Girls Club



Partnerships

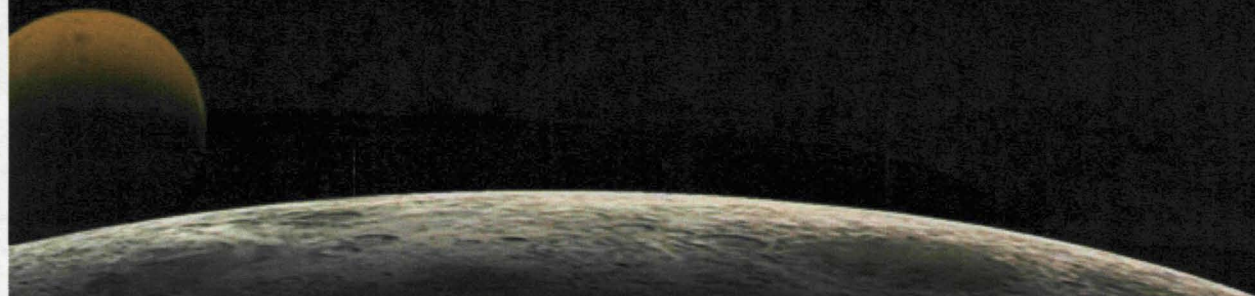
- Technical Expertise - KSC Engineering
- Project Management - KSC Education
- Funding - ESMD Education
- Host – Delaware North
- Collaboration with Exploration Technology Development Program (ETDP)
- Involvement - JPL, JSC, LaRC, MSFC



Sponsors

- Caterpillar, inc
- Newmont Mining Company
- Honeybee Robotics Spacecraft Mechanisms Corporation
- Reynolds, Smith & Hills (RS&H) Consulting Engineers
- AIAA Space Resources Technical Committee (TC)
- ASCE Regolith Operations, Mobility & Robotics TC

Thank you to our sponsors!





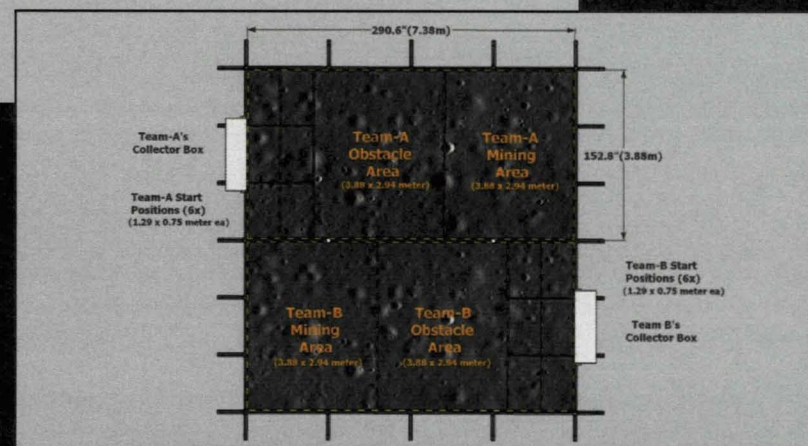
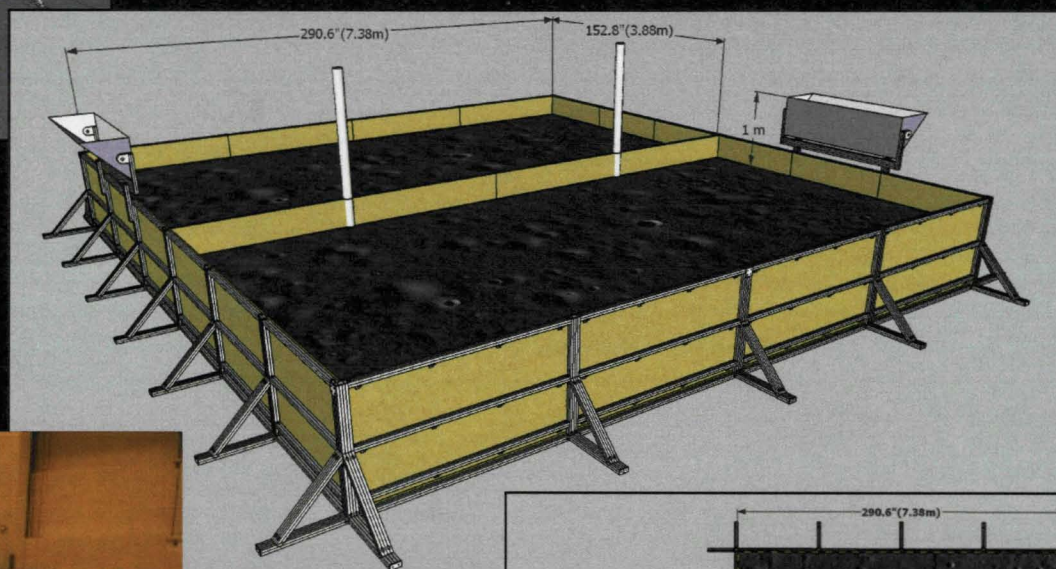
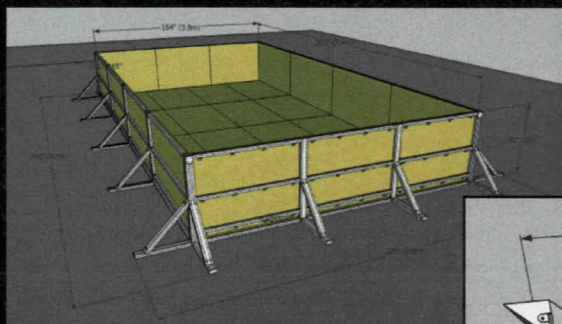
Competitors

- Akron, Univ. of
- Alabama, Univ. of
- Arkansas, Univ. of
- Auburn Univ. / Tuskegee Univ.
- Bridgeport, Connecticut, Univ. of
- Carnegie Mellon Univ. / Hampton
- Colorado School of Mines
- Embry Riddle Aeronautical Univ. FL
- Florida Institute of Technology
- Florida State Univ. / Florida A&M
- Iowa State University
- John Brown University
- Milwaukee School of Engineering, WI
- Montana State University
- North Carolina-Charlotte, Univ. of
- North Dakota School of Eng. & Mines
- Prairie View A & M Univ.
- South Dakota School of Mines & Tech
- Southern Indiana, Univ. of
- Temple University, PA
- Virginia Tech
- Western Kentucky University

Over 250 students participated, gained valuable skills and were inspired !



Lunarena



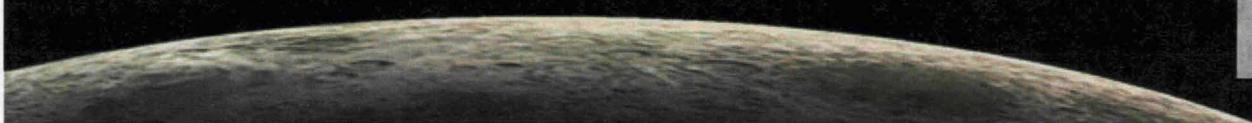
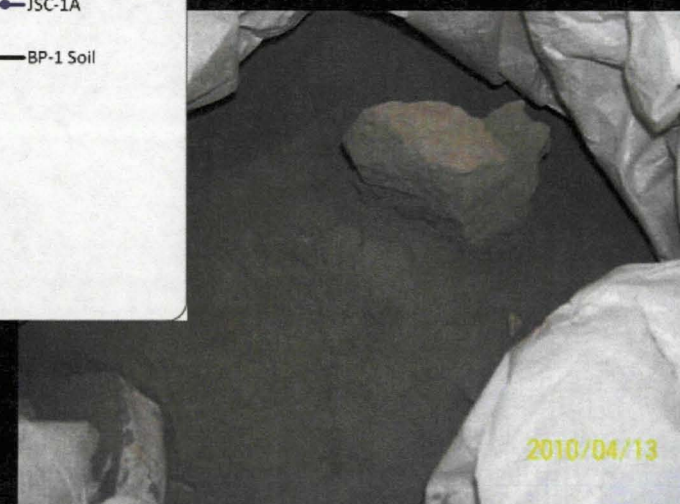
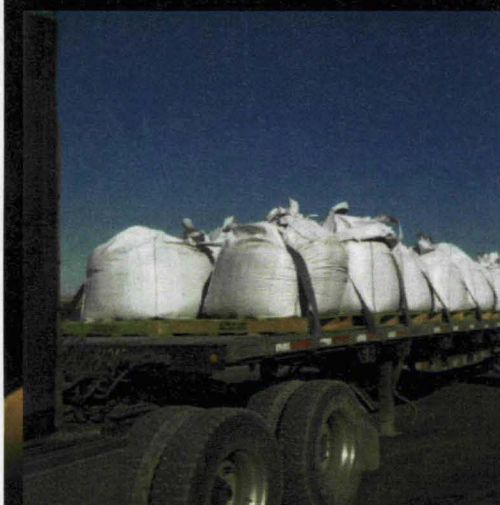
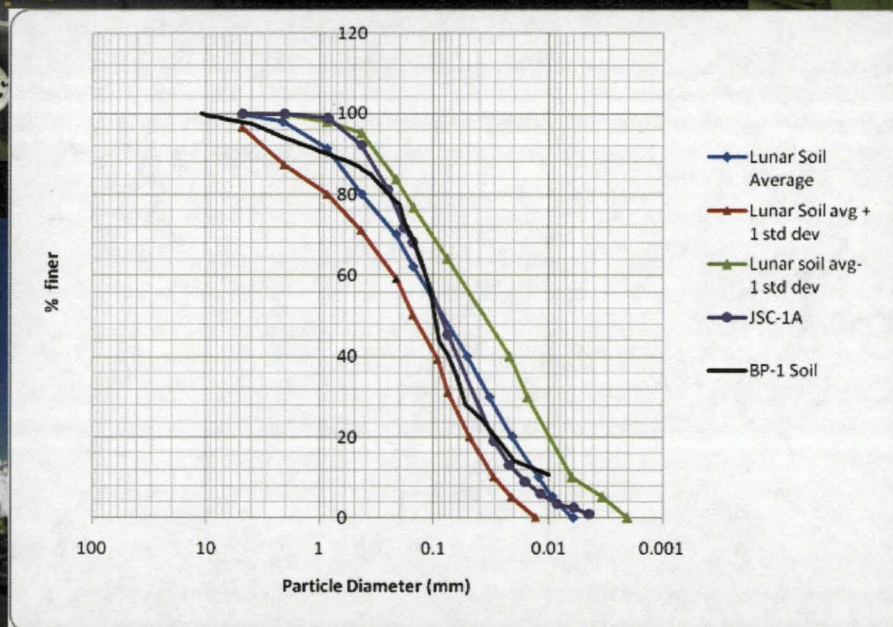
Lunarena





Black Point 1 (BP-1)

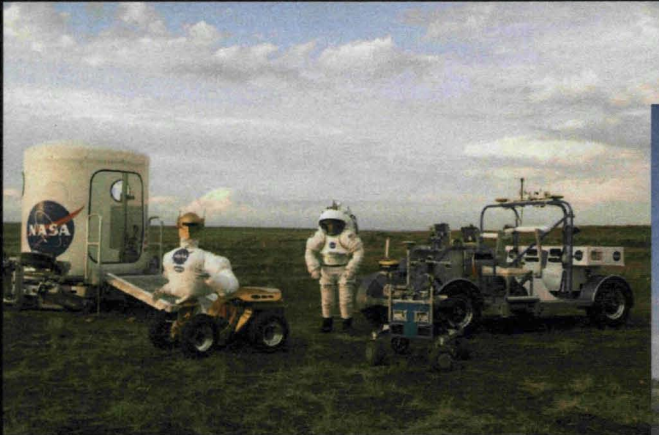
Discovered during 2009 Desert RATS in Flagstaff, AZ



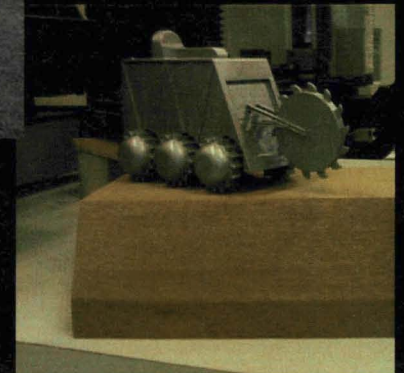
Joe Kosmo Award for Excellence



Grand prize trip to NASA Desert RATS awarded to
team with highest accumulative score



Trophy designed and built by Pre-Engineering
students from Rocklin High School, California

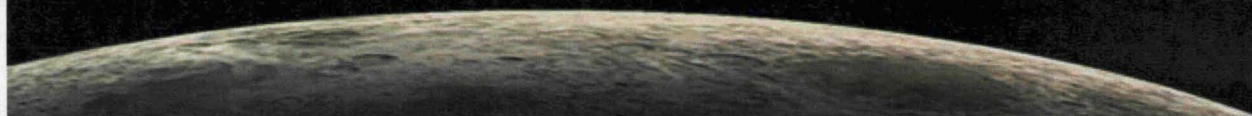




2010 Competition Winners

- In-Situ Mining: Montana State University
- Systems Engineering Paper: Auburn U.
- Outreach Project: Embry-Riddle AU Daytona
- Slide Presentation: Western Kentucky U
- Team Spirit: Univ. of Southern Indiana

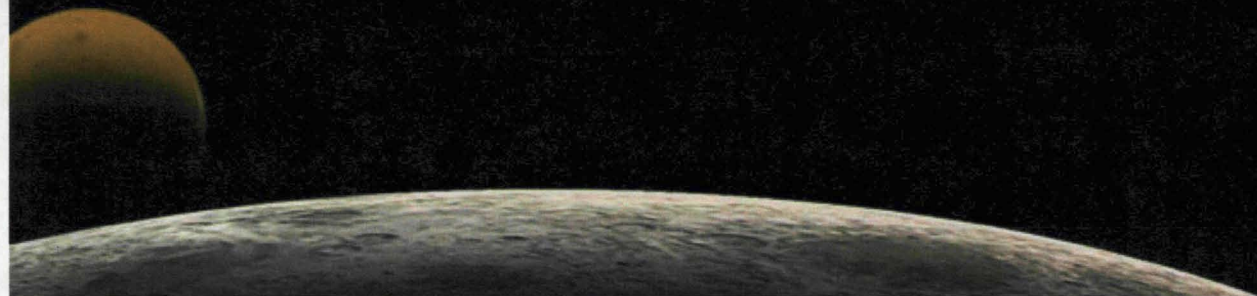
- Joe Kosmo Award: Montana State University





Lunabotics 2011

- KSC will host NASA Lunabotics 2011
- Possible International Participation at Satellite Lunarenas (S. Korea, Netherlands)
- Rules will not change
- We are already planning for 2011!
- You are invited to participate



Lunabotics Mining Competition POCs



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Competition Website: www.nasa.gov/lunabotics

Facebook Page: www.facebook.com/Lunabotics

