ENAE 488R Project Statement

- Design, build, test, and operate a small remotely operated rover to participate in the 2014 RoboOps competition
- Rover must be capable of rapid and highly robust maneuverability in all terrains at the JSC Rockyard
- Rover must be capable of collecting samples (rocks and small dolls) for points
- Rover must be controlled via cellular data link(s) from home university

Goals of ENAE 488R

- Learn the basic skills of robot design & operation
- Simulate the cooperative group engineering environment of the aerospace profession
- Develop experience and skill sets for working in teams
- Utilize knowledge from other classes in real-world product development process
- Perform product development under tight constraints in time, funding, and external requirements

ENAE 488R Grading

- Grading will be based on quantity and quality of involvement in class
  - Attendance at regularly scheduled meetings
  - Involvement in design/build/test functions
  - Volunteering for support activities (e.g., editing final report, social media, graphics creation
- Each student will prepare a monthly statement of personal accomplishments and plans for next month
- Peer evaluations

RoboOps Requirements

- Rovers must fit within a 1x1x0.5 meter volume to start and deploy to operational configuration
- Rover must be <45 kg; tactical advantages go to lighter rovers
- Rovers must operate without local interaction for one hour
- Rovers must be controlled via cell networks from participating university's campus
- Rovers collect colored rocks and small dolls to score points

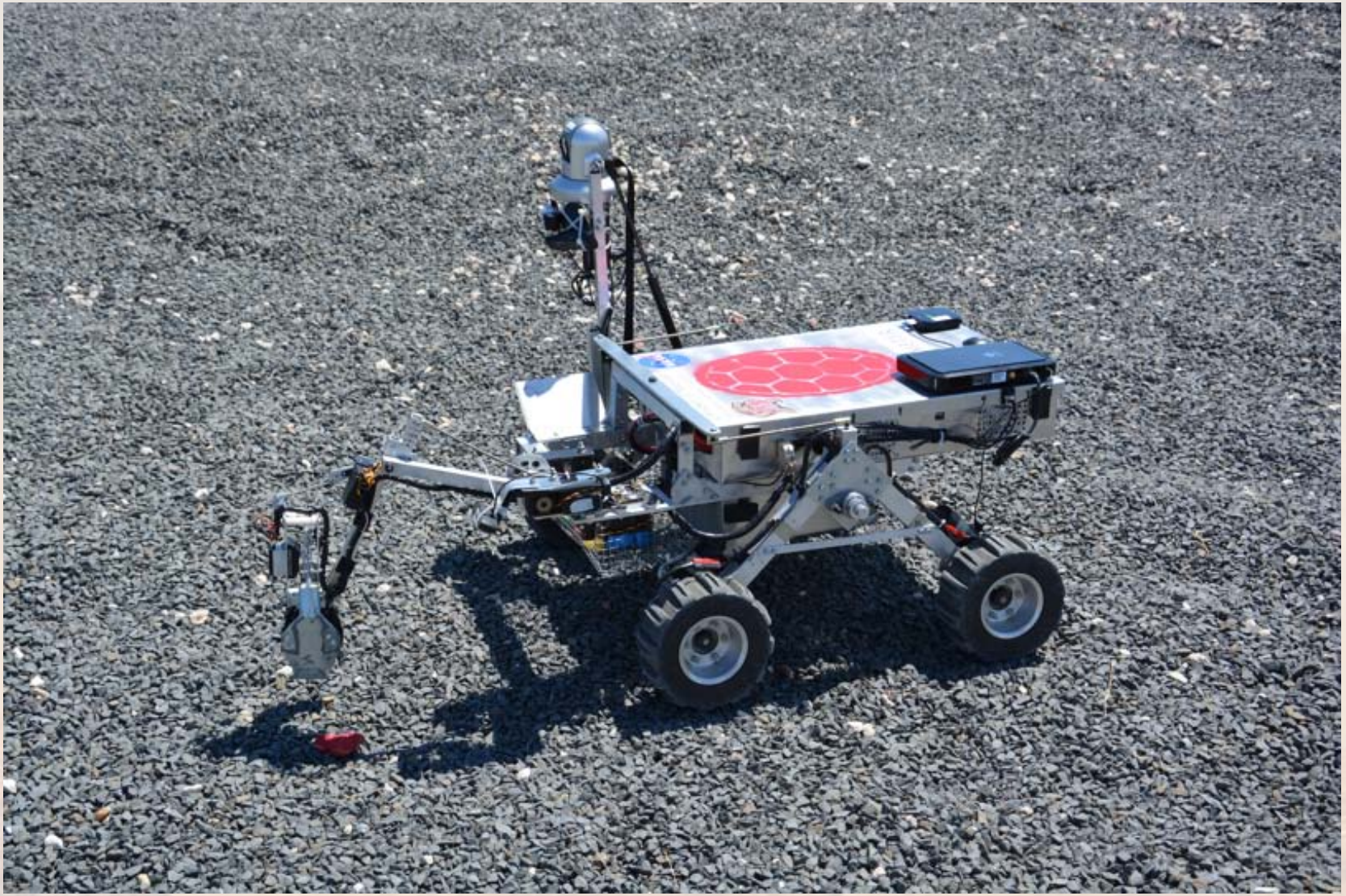
Competition Deadlines

- March 17 - Midproject Review
  - Must present video evidence of driving and arm manipulation
  - Gateway to receiving rest of funds
- June 3-5 - Competition at JSC Rockyard

Competition Scoring

- 70% - performance during official run
- 10% - technical paper
- 10% - poster presentation
- 5% - blog/social media site
- 5% - streaming live video and recording for later showing

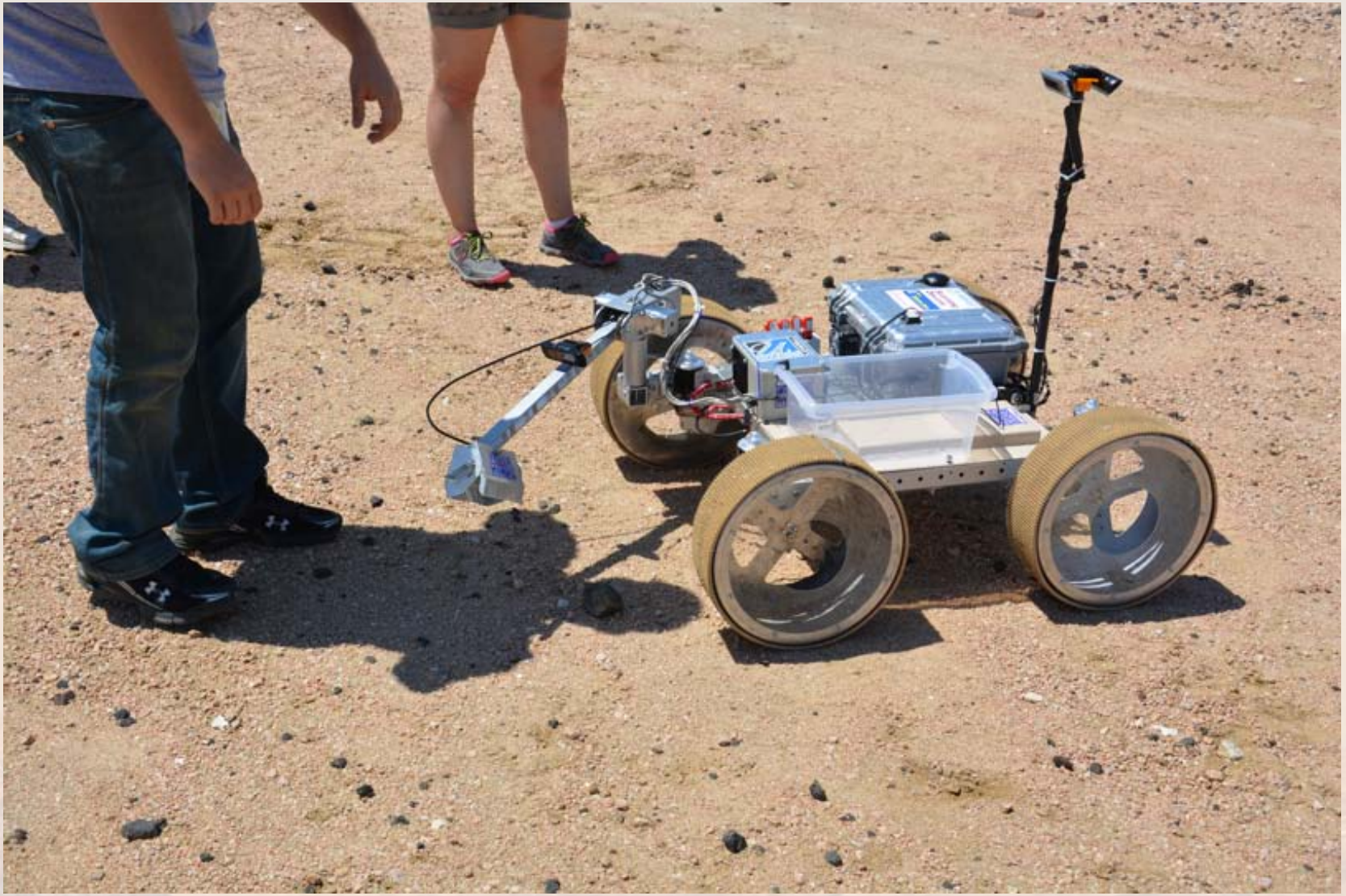
UMd Entry 2013 - Demeter



Arizona State University 2013

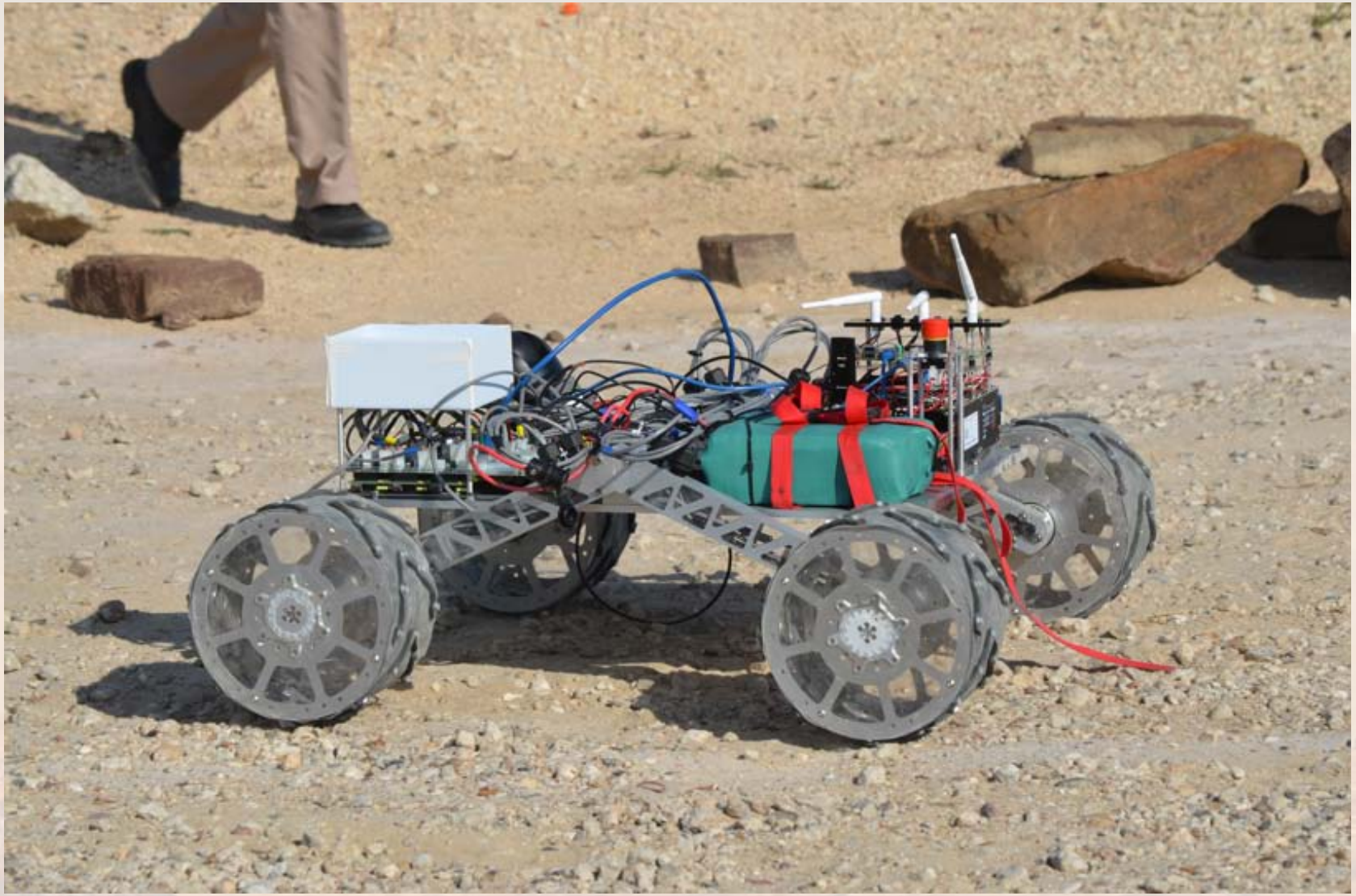
Florida State University 2013

University of Massachusetts-Lowell 2013



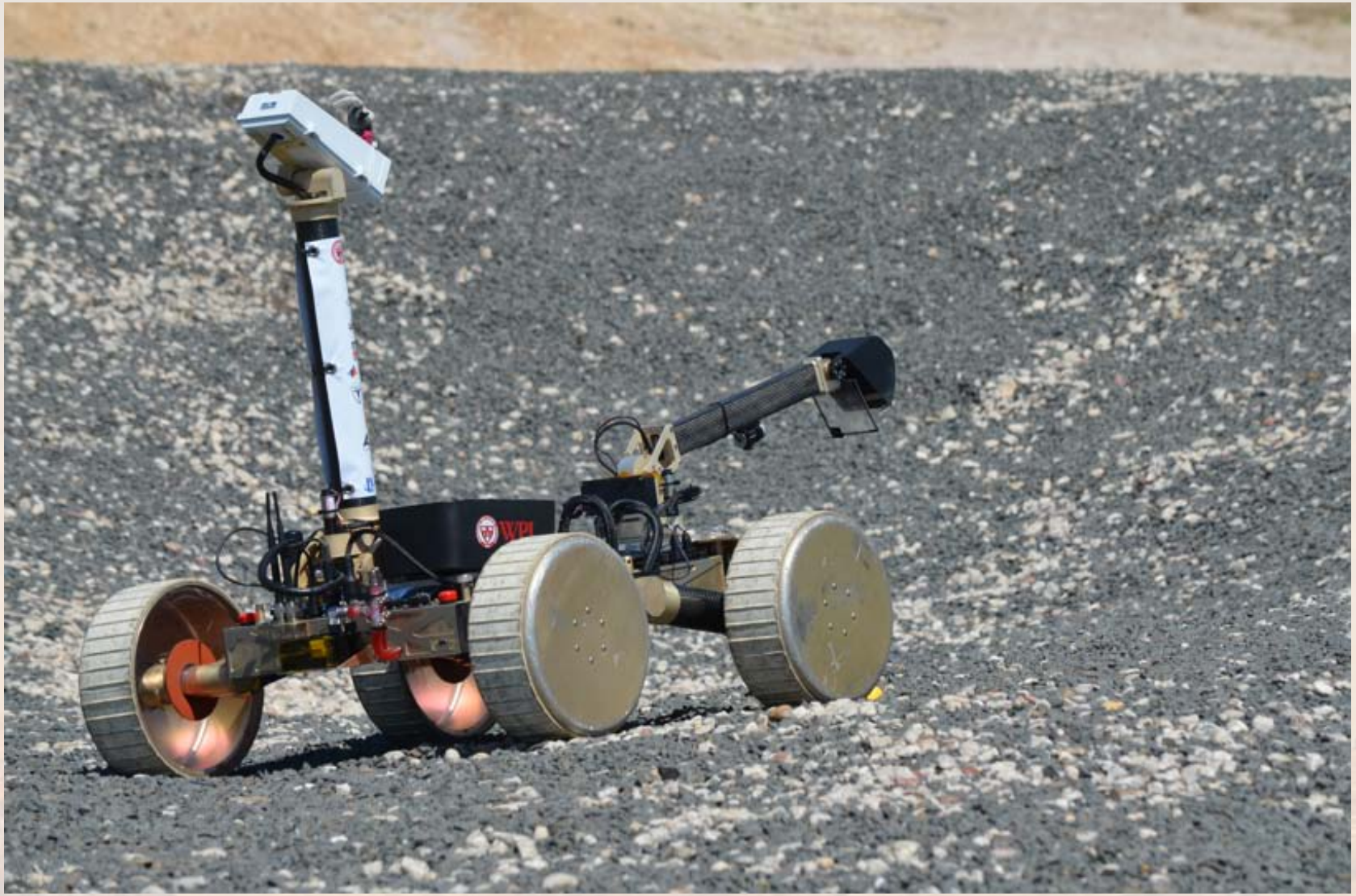
University of West Virginia 2013

University of Nebraska-Lincoln 2013

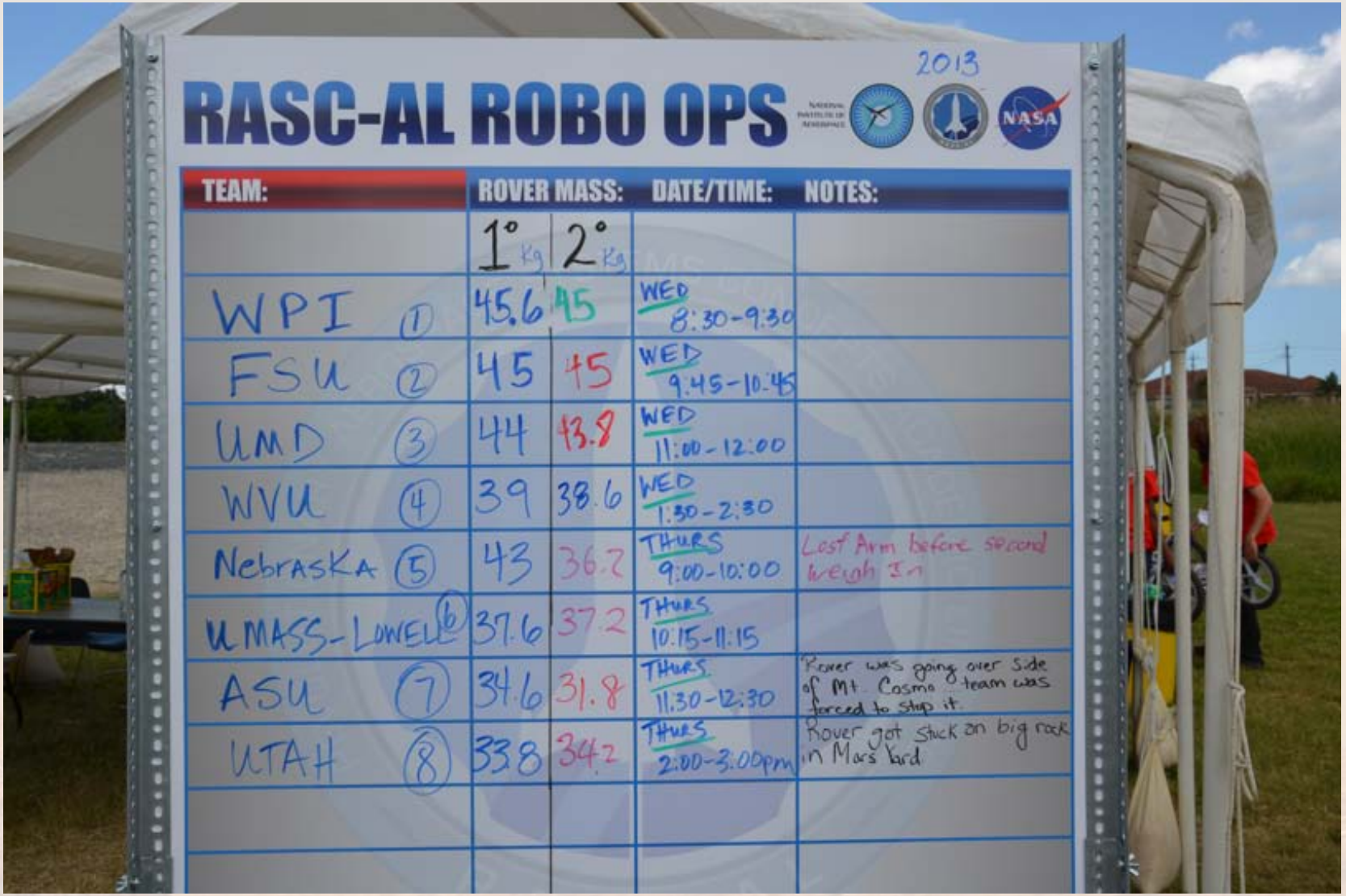


University of Utah 2013

Worcester Polytechnic Institute 2013



RoboOps 2013 Weigh-In



TEAM:	ROVER MASS: 1° Kg	2° Kg	DATE/TIME:	NOTES:
WPI (1)	45.6	45	WED 8:30-9:30	
FSU (2)	45	45	WED 9:45-10:45	
UMD (3)	44	43.8	WED 11:00-12:00	
WVU (4)	39	38.6	WED 1:30-2:30	
NebraSKa (5)	43	36.2	THURS 9:00-10:00	Lost Arm before second weigh in
U MASS-LOWELL (6)	37.6	37.2	THURS 10:15-11:15	
ASU (7)	34.6	31.8	THURS 11:30-12:30	Rover was going over side of Mt. Cosmo team was forced to stop it.
UTAH (8)	33.8	34.2	THURS 2:00-3:00pm	Rover got stuck on big rock in Mars Yard

Absolute Must-Change Items

- Larger wheels
- Smaller (lighter) battery
- Rugged computer
- Vibration isolation
- Encoders in drive wheels (active traction control)
- More robust, cleaner kinematics arm
- Encoders in arm (inverse kinematics/cartesian)
- Scripted automation
- Better cameras

Non-Negotiable Groundrules

- No legs, tracks, or other weird mobility systems
- Demeter will be returned to and kept in operating condition as software and crew training testbed
- Persephone weight target: 35 kg
- Persephone absolute weight limit: 40 kg
- Software will implement and use ROS (Robot Operating System - open source)
- Test early, test often. When in doubt, test.
- System must be in competition configuration by end of Spring term (May 21)

Paths to Winning

- Robust design - no failures at the last minute
- Light weight - go as late as possible
- Well tested - skilled operators and proven code
- Fast speeds - get from place to place easily
- All terrain - if you can make it through the loose sand and on hills, you have it made
- Fast sampling - spend your time driving, not picking up rocks
- Two communication paths - one dedicated to survey and planning, one to rover operations
- Test in bright sunlight! Test! Test! Test!