NASA/NSTA Symposium:
Mapping the Moon: Simulating LOLA in the Classroom
Friday, March 28, 2008

1:30 PM – 1:55 PM
Welcome, Introductions, Goals of the Symposium

Al Byers, Assistant Executive Director of Government Partnerships and e-Learning, NSTA
Flavio Mendez, Symposia and Web Seminars Director, NSTA
- About NSTA Symposia
- Agenda/Goals/Forms/Logistics/Introductions

Dr. Susan Hoban, Senior Research Scientist, University of Maryland Baltimore County *Goddard Earth Science and Technology Center*
Don Higdon, Senior Instructional Designer, University of Maryland Baltimore County *Goddard Earth Science and Technology Center*
Dr. Marci Delaney, Assistant Research Scientist, University of Maryland Baltimore County *Goddard Earth Science and Technology Center*
Brittany Hamolia, Education Specialist, University of Maryland Baltimore County *Goddard Earth Science and Technology Center*

1:55 PM – 2:15 PM
Mapping the Moon's Surface with NASA's Lunar Reconnaissance Orbiter

Dr. Susan Hoban

Learning Outcomes:

After participating in the presentation, participants will:
- Describe in their own words aspects of NASA's Lunar Reconnaissance Orbiter (LRO) Mission.
- List the main goals of the LRO mission.

2:15 PM – 2:45 PM
Building Topographic Maps with Satellite Data

Don Higdon

Learning Outcomes:

After participating in the presentation, participants will:
- Explain what a topographic map is.
- Explain how topographic maps are used on Earth and in space.
- Explain how satellites can be used to make topographic maps.
- Compare LIDAR vs. SONAR.
- Explain how LIDAR can be used to map the surface of the Moon.

2:45 PM – 2:55 PM
Break

2:55 PM – 4:35 PM
Four 25-minute Rotations:
Activity #1: Topography with the Motion Detector: Simulating LOLA in the Classroom

Don Higdon

Learning Outcomes:

After participating in this activity, participants will:

- Operate an ultra-sound motion detector.
- Simulate a satellite LIDAR mapping mission of the Moon.

Activity #2: Introduction to LIDAR Mapping with LOLA

Dr. Marci Delaney

Learning Outcome:

After participating in this activity, participants will:

- Explain how the Lunar Orbiter Laser Altimeter (LOLA) will help achieve LROs goals.

Activity #3: Robot Calibration

Dr. Susan Hoban

Learning Outcomes:

After participating in this activity, participants will:

- Explain why a robot must be calibrated.
- Discuss how to calibrate a robot.
- Compute calibration data for robotic rover mission.

Activity #4: Tennis Ball Topography

Brittany Hamolia

Learning Outcome:

After participating in this activity, participants will:

- Simulate LIDAR mapping using tennis balls.

4:35 PM – 5:30 PM

Activity #5: Robotic Mission Planning (in groups)

All facilitators

Learning Outcomes:

After participating in this activity, participants will:

- Plan a robotic mission using a topographic map and robotic rover calibration data.
- Execute the robotic mission using a robot.

5:30 PM - 5:40 PM

Robotic Mission

Dr. Susan Hoban and Don Higdon

Learning Outcomes:

After participating in the presentation, participants will:

- Predict the motion of the robot.
- Discuss the results of mission planning.

5:40 PM – 6:00 PM

Final Words

- Post-assessment form
- Evaluation form/Survey/Credit info
- NSTA Web Seminars
- Drawing of door prizes

National Science Education Standards Addressed:

Content Standards, 5-8

Content Standard E:
Science and Technology
As a result of activities in grades 5-8, all students should develop

- Abilities of Technological Design
- Understanding about Science and Technology
  - DESIGN A SOLUTION OR PRODUCT. Students should make and compare different proposals in the light of the criteria they have selected. They must consider constraints--such as cost, time, trade-offs, and materials needed--and communicate ideas with drawings and simple models.
  - IMPLEMENT A PROPOSED DESIGN. Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.

Content Standards, 9-12

Content Standard E:
Science and Technology
As a result of activities in grades 9-12, all students should develop

- Abilities of Technological Design
- Understanding about Science and Technology
  - PROPOSE DESIGNS AND CHOOSE BETWEEN ALTERNATIVE SOLUTIONS. Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.
  - EVALUATE THE SOLUTION AND ITS CONSEQUENCES. Students should test any solution against the needs and criteria it was designed to meet. At this stage, new criteria not originally considered may be reviewed.

Professional Development Standards

Professional Development Standard A:
Professional development for teachers of science requires learning essential science content through the perspectives and methods of inquiry. Science learning experiences for teachers must:

- Involve teachers in actively investigating phenomena that can be studied scientifically, interpreting results, and making sense of findings consistent with currently accepted scientific understanding.

Professional Development Standard B:
Professional development for teachers of science requires learning essential science content through the perspectives and methods of inquiry. Science learning experiences for teachers must:

- Address teachers' needs as learners and build on their current knowledge of science content, teaching, and learning.
- Use inquiry, reflection, interpretation of research, modeling, and guided practice to build understanding and skill in science teaching.