**ENGAGING STUDENTS OF ALL AGES WITH RESEARCH-RELATED ACTIVITIES: USING THE LEVERS OF MUSEUM REACH AND MEDIA ATTENTION TO CURRENT EVENTS.** S.H. Williams[1] and J.R. Zimbelman[2], [1]Education Division, National Air and Space Museum, P.O.Box 37012, Washington, DC 20013-7012, williamss@nasm.si.edu, [2] Center for Earth and Planetary Studies, National Air and Space Museum, P.O.Box 37012, Washington, DC 20013-7012, jrz@nasm.si.edu.

**Introduction:** Our mission at the National Air and Space Museum (NASM) is to educate and inspire the next generation of planetary scientists with engaging activities linked to our fabulous collection of aviation and Space artifacts and/or the research conducted by our Center for Earth and Planetary Studies. NASM is the most visited museum in the world (over 10 million visits last year and that many hits monthly on the NASM website), and we enjoy extremely high name recognition and public approval, so we can be a powerful "lever" in the "marketing" of such activities to a large number of students of all ages. Our activities can gain even broader reach if we use two additional tactics: partnering with organizations that augment our content expertise, and exploiting the attention various media outlets give to current events in order to promote our programming activities.

**Tactile Models for Museum Use:** Last year, we reported the initial results of a collaboration between the Goddard Spaceflight Center and NASM. Money from the Goddard Director's Discretionary Fund was used to create a few high-quality plastic models of portions of the martian and terrestrial surfaces, both at the same horizontal and vertical scales to facilitate comparison. We have used these models to support museum tours for the visually handicapped; being able to feel planetary landforms directly has proven to be a big aid in visitor understanding. We also use the models as a base for exploring the relationship between data quantity and quality using a "pin box" toy (see picture below left). Since our last report, we have augmented this lesson with a series of images that have been artificially degraded to allow investigation of how high a resolution is actually needed to answer different interpretive questions, and with pin boxes modified to have fewer pins with larger heads (i.e. degraded spatial resolution). We were also successful in pursuing another round of Goddard DDF funding, which will allow the creation of additional terrain sections. The tactile models are a great example of a partnership between a research organization (the content provider) and a major museum. While they are a direct consequence of data derived from spacecraft exploration (particularly MOLA), they are not linked to a current events mission like MER, but we do use them to support programming relating to Mars exploration in general.

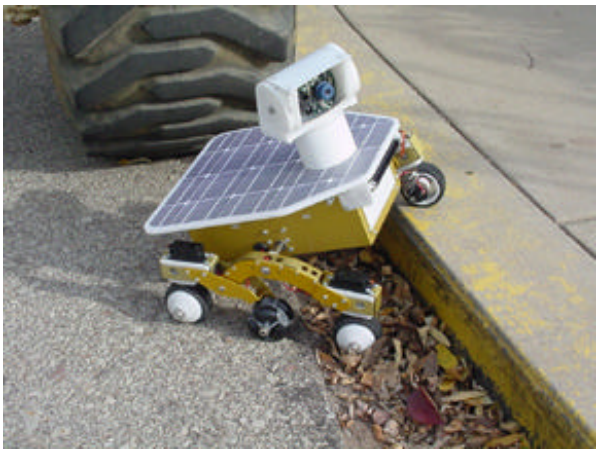
Pin box toy atop human hand. The pin size and spacing allow details, such as the ring being worn, to be resolved. Now imagine what the "image" would look like if the pins had larger heads and were further apart…

**Earth Attacks!:** Pathfinder/Sojourner was the first mission to have full Internet support, and everyone concerned was astonished at the intense level of public interest in seeing the latest results on line. Mirror sites had to be set up to handle the crushing data demands of information seekers worldwide. The MER website is no different, with huge numbers of hits daily. In fact, the site is receiving so much traffic that large images and videos have had to be removed in order to manage the load on the servers. Public interest in Mars roving is intense, and the recent failures of U.S. and ESA attempts to explore Mars only heighten the focus. The media are in the business of playing off of public interest, so it should not be surprising that they have run numerous Mars-related stories the last few weeks. Ongoing rover activities "over the horizon" will maintain interest by providing high quality images of new places every day.

We have used collaboration and media attention to support interest in all things martian. The NASA-funded Personal Exploration Rover program is a case in point. NASA-Ames funded the Robotics Institute at Carnegie-Mellon University to make robotic rovers modeled after Sojourner and develop a simple software interface in order to realistically "drive" them over a simulated martian surface (see picture next page). A local high school built a 10'x10' "Mars

Yard" based on Pathfinder data, for rover operations. Sixty students from art, industrial arts, and science classes collaborated; kids that would otherwise never see/talk to one another during the school day. At the Yard, our younger visitors are tasked with planning a roving sequence in the quest for evidence of biological activity. They upload navigational commands via a wireless link to a rover, which then executes that command autonomously. The rover goes to the location ordered, then uses an on-board IR rangefinder to find the nearby rock target. It then knows how to reposition itself, approach the rock (but not too closely!), and then illuminate it with a black light. The rocks have been daubed in places with fluorescent paint in order to simulate the glow observed when some biologic materials are lit with UV. The rover continuously scans with its rangefinder to search for obstacles, and it has the good sense to stop and ask the operator for further instructions if it encounters an obstacle too large for it to surmount. As it traverses, the Mars Yard supervisor (NASM staff and/or volunteer) can discuss the need for rover autonomy in Mars exploration at a level appropriate for the rover operator. Each mission experience takes about three minutes, and we have been operating at maximum capacity any time we have the Mars Yard in operation. For more information on the Personal Exploration Rover project, see:

http://www-2.cs.cmu.edu/~personalrover/PER



One of CMU's Personal Exploration Rovers, about the size of Pathfinder's Sojourner, during testing. PERs are presently in use at the National Air and Space Museum, both at the Mall building and at the Steven F. Udvar-Hazy Center, as well as at NASA-Ames and other selected museums. CMU photo.

**Coming Up:** NASA and Nature have conspired to offer us several other soon-to-be current events from which we can build engaging educational programming: Mars Express, the Cassini mission to Saturn and June's transit of Venus. Most media attention on Mars Express has focused on the fate of its Beagle 2 lander, but the orbiter is healthy (at this writing) and NASM has a scientist on the MARSIS instrument team, so we plan to create programming that allows our visitors to understand radar sounding in terms of things more familiar to them, like MRI/CAT scans and drilling for oil (both probe areas that cannot easily be accessed directly). Saturn and its rings are universally identifiable; that and the oddness of a moon with an atmosphere will give us several useful entry points to stimulate learning. Programming based on the (failed) role of past Venus transits in the determination of the actual size of the Solar System allows intellectual connections to be made with a wide variety of disciplines. For example, we can link to the voyages of Captain James Cook, who was tasked with setting up an observatory on Tahiti to witness and measure a transit, and whose voyages had an impact far beyond that initially intended. We will continue to showcase planetary research in a way meaningful to the general public, and we will increase our use of leverage to maximize the scope of our outreach activities.