

Outreach Activities of the Polar Radar for Ice Sheet Measurements (PRISM) Project

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Abstract- The PRISM project at the University of Kansas has developed a multifaceted outreach program designed to interest students and the general public in research conducted in harsh polar environments. This outreach program involves K-12 students and teachers, undergraduate students from a minority institution, undergraduate journalism students with an interest in science and technology reporting, and the general public.

I. INTRODUCTION

The Radar Systems and Remote Sensing Laboratory at the University of Kansas (KU) is currently designing and developing intelligent radar sensors that will measure key glaciological parameters. This project, known as Polar Radar for Ice Sheet Measurements (PRISM), is developing technology to more clearly understand the response of polar ice sheets to global climate change and the resulting ice sheet contributions to sea level rise. In particular, a synthetic aperture radar (SAR) is being developed to provide two-dimensional maps of ice sheet bed conditions, and a wideband, dual-mode radar is being developed for measuring ice thickness and internal layers in both shallow and deep ice. These systems will be deployed on two vehicles – an automated rover and a tracked vehicle driven by project personnel. To broaden the impact of this project beyond the immediate engineering and scientific communities with interests in polar regions, an extensive array of outreach activities has been developed and implemented to go beyond the traditional university-based research functions.

II. OUTREACH ACTIVITIES

Capitalizing on a strong interest of students and the general public in robotics, polar regions, and climate change, the PRISM project has organized an ambitious multi-component outreach initiative. Scientists, engineers, and graduate students involved in the PRISM project are enthusiastic to

share the excitement of their research endeavors with those outside of the research community. We also view outreach as an important responsibility, and a significant challenge to successfully convey a sense of excitement of scientific exploration and discovery. The outreach areas in which the PRISM project is involved include:

- K-12 education;
- Participation of a minority institution;
- Promoting science and technology journalism;
- General public education.

The strategies to accomplish our outreach goals include partnering with successful education programs, and striving for wide dissemination of activities, information, and lessons via the Internet where possible.

A. K-12 Education Outreach

A primary goal of the PRISM K-12 outreach activities is to capture the imagination of young students, and prompt them to consider an educational path that will lead them to scientific or engineering careers. These activities are being conducted in collaboration with an established group associated with the KU School of Education. The Advanced Learning Technology Program (ALTec) of the High Plains Regional Technology in Education Consortium (HPR*TEC) has developed and hosts web tools (along with the necessary oversight) to enable teachers nationwide to network, collaborate, and share resources with other teachers. Using an innovative and successful web interface called TrackStar (<http://trackstar.hprtec.org>), teachers develop interactive, resource-based lessons (called tracks) on-line for their students. Once developed, tracks are added to the TrackStar database and can be accessed and modified (if necessary) by teachers everywhere. More than 500 existing tracks on robotics, polar exploration, and climate are now available. Development of new online lessons is an ongoing activity that is guided by a K-12 teacher advisory group from around the United States.

Most of the K-12 education outreach activities are made available through the PRISM project web page

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(<http://www.ku-prism.org>). In addition to providing general information to the public about the PRISM project, we have developed several web-based lesson design tools and resources for K-12 educators and students. These tools and resources include:

- Polar Scientists and Explorers, Past and Present: Transcribed newspaper articles covering the travels and/or unknown fate of polar explorers and scientists.
- Polar News: Links to current news articles related to polar regions.
- Letter of Global Concern: A tool to help students draft a letter to a politician, government official, or business leader.
- Graphic Sleuth: an online utility that allows teachers to make lessons for student use.
- Bears on Ice: Students in grades K – 6 follow the adventures of two stuffed bears that travel with scientists into polar regions.
- K-12 Polar Resources: a resource for teachers that contains images, information, TrackStar lessons, and a search engine designed to identify polar related lessons.

B. Minority Institution Participation

Faculty and undergraduate students at neighboring Haskell Indian Nations University, in Lawrence, KS are directly involved in the PRISM project through the Haskell Geographic Information Systems (GIS) Laboratory. Haskell Indian Nations University is the only Federally supported intertribal university for American Indian and Alaskan Natives in the United States offering a bachelor's degree and a key goal of this collaboration is to interest Haskell students to pursue careers in science and engineering. PRISM has assisted Haskell in updating the hardware and software in their GIS laboratory, and has provided a Graduate Research Assistant to offer a GIS course and to interact with Haskell students and faculty. Haskell students with an interest in GIS, earth science, math, or computer science are participating in various aspects of the project, such as mapping, geospatial analysis, and display of existing glaciological and remote sensing datasets.

C. Promoting Science and Technology Journalism

We have instituted a journalism internship program for undergraduate students in the KU School of Journalism with a goal of fostering an interest in scientific and technical reporting. This project mentors the journalism interns, who work directly with scientists and engineers to develop both short articles, and in-depth articles related to science and technology. Journalism interns are free to choose their own stories, and feedback on these stories is provided by project personnel. A component of the PRISM project web page, Virtual PRISM, is an online forum for journalism interns to feature their stories. Students are encouraged to submit their completed stories to newspapers and magazines for publication, and several PRISM journalism student interns have been successful in publishing their articles in local and regional newspapers.

D. General public outreach

We are developing a reach back communications infrastructure that will allow the general public, as well as students and teachers, to join the PRISM polar field expeditions in Greenland and Antarctica through the Internet. During late June and early July 2003, we will test the capability of multiplexed Iridium satellite data modems to transfer images and data from a robotic vehicle on the Greenland ice sheet back to the University of Kansas, where it will be uploaded to our project web site. Images and data will be presented to the public through a Java-based application called the Robot Drivers Seat (Figure 1). This application will display rover status information, GPS position, time, ice depth, and weather information (temperature, wind speed, wind direction, pressure) on a *virtual dashboard*. A camera will provide a near real-time panoramic view of the ice sheet terrain through a *virtual windshield*. The web page will also provide complete project information, publications, archived data, maps, and images. Through our K-12 outreach efforts, teachers will be encouraged to not only participate in the real-time webcasts, but to also use the archived data to have students map the rover movements, analyze terrain and weather characteristics, and to graph and analyze the data.



Figure 1. An example of a web-based Robot Drivers Seat display that is being developed by the PRISM project to present near real-time from a remote polar region over the Internet.