EventScope: Bringing Remote Experience of Mars to the Public through Telepresence

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ABSTRACT

Telepresence, experiencing a place without physically being there, offers an important means for the public experience of remote locations such as distant continents or other planets. EventScope presents one such telepresence visualization interface for bringing scientific missions to the public. Currently, remote experience lessons based on NASA's Mars Exploration Rover missions are being made available through the EventScope framework to museums, classrooms, and the public at large.

CR Categories: I.3.7 [Computer Graphics]: Three-Dimensional Graphics and Realism – Virtual Reality; J.2 [Physical Sciences and Engineering]: Astronomy, Earth and Atmospheric Sciences; K.3.1 [Computers and Education]: Computer Uses in Education – Collaborative Learning, Computer-assisted Instruction

Keywords: telepresence, public interfaces, remote experience, visualization

1 INTRODUCTION

Most people experience space exploration missions through the data that is transmitted back to Earth from those missions. Telepresence, remotely experiencing a place without physically being there, presents an important framework for the design of a public interface to space missions. NASA has made a plethora of content (pictures, stereo images, scientific data, articles and other material) available from the current Mars Exploration Rover (MER) missions, and EventScope seeks to visualize that content in the context of a telepresence experience.

EventScope brings mission data to the public in a tangible, three-dimensional virtual environment, placing content within a physical context and providing an interface for navigation and interaction. In addition, EventScope provides a content Authoring Tool so that educators, amateur scientists, school children, and others can create custom content.

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2 WHAT IS EVENTSCOPE?

EventScope is a freely downloadable suite of computer programs that enables the experience of remote locations through 3D virtual environments constructed directly from scientific data and exploration of the remote sites [3]. For instance, EventScope is currently focused on NASA's Mars Exploration Rover missions [5]. Using data from various NASA missions to Mars, including Viking, Pathfinder, and Mars Global Surveyor, along with the data returned from the Mars Exploration Rovers themselves, the EventScope lab reconstructs that data into 3D models of Mars and the rovers' immediate vicinities. These models can be navigated freely through the EventScope Viewer, or they can be incorporated in remote experience lessons via the EventScope Authoring Tool.

Figure 1: EventScope Viewer Screenshot Showing the Interior of the Gusev Crater on Mars

The Authoring Tool offers a number of features designed to allow quick and easy creation of remote experience lessons, which are similar in structure to hypertext documents. Using "pages," links, annotations, and other tools, authors construct lessons. Data, such as photos or charts, can be directly incorporated into the environments or juxtaposed through a split-screen feature. In Figure 2, a photo of Endurance Crater taken by one of the Mars Exploration Rovers is shown to the left of a 3D model derived from the rover's navigational cameras. In Figure 3, a scale model of the rover provides context while an arrow and text are drawn directly on the surface with the Authoring Tool's annotation features.

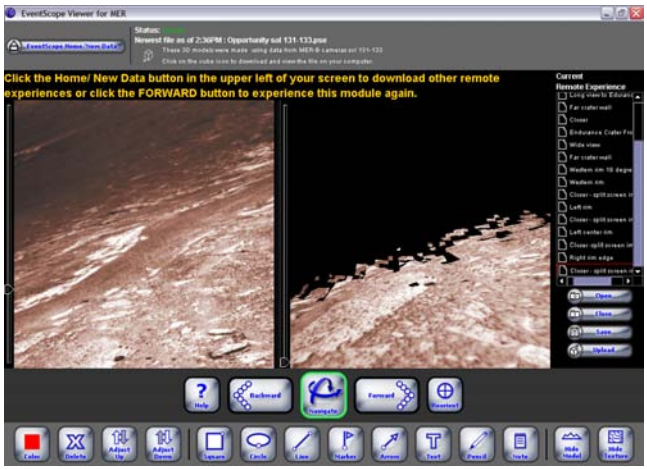

Figure 2: EventScope Viewer Screenshot

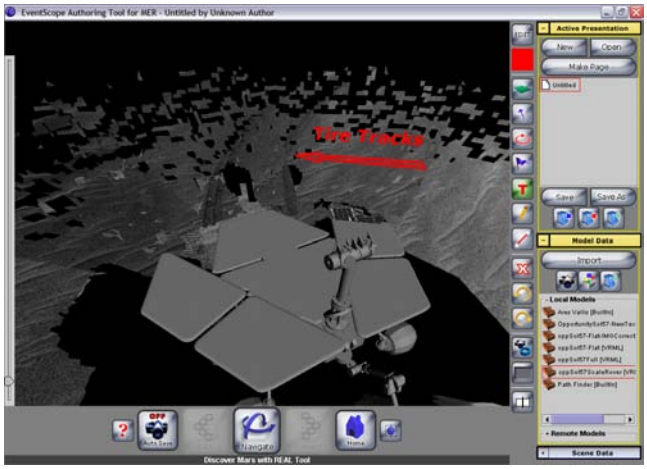

Figure 3: The EventScope Authoring Tool Showing an Arrow and Text Annotation

3 Reaching the Public

As a public interface, EventScope has been, and continues to be, developed to be flexible in order to serve the public in a number of ways. The downloadable Viewer and Authoring Tool bring remote experiences into museums, classrooms, and homes via the Internet, as seen in Figure 4.

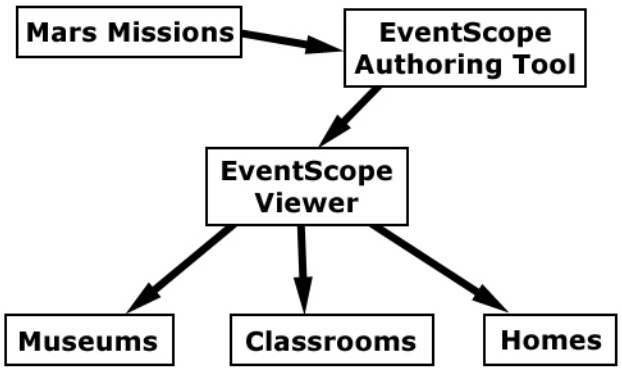

Figure 4: The Flow of Data from the Mission to the Public

In addition, for museums, the Wide-Angle Viewer, in conjunction with an Elumens VisionStation [2], creates an immersive Mars Exploration exhibit, as in the CyberSpace Gallery installation at the Adler Planetarium & Astronomy Museum, shown in Figure 5 [1]. A kiosk version of EventScope offers museums an easy way to set up EventScope stations without specialized knowledge or equipment. Through these various methods of distribution, EventScope serves the public in museums, classrooms, and homes.

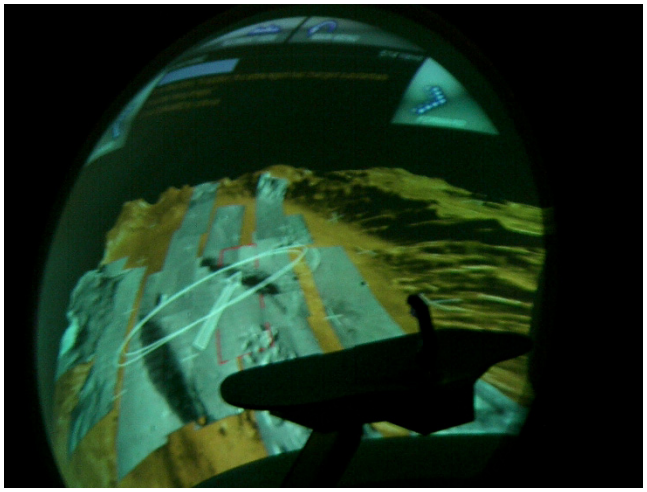

Figure 5: The EventScope Wide-Angle Viewer Projected on an Elumens VisionStation at the Adler Planetarium

4 Future Work

There are a number of desired enhancements to EventScope. The Viewer and Authoring Tool will be combined and refined for use as a mission control interface. By tying the technology of mission control to the public interface, EventScope will provide an unprecedented level of guided public access to mission events and data. Likewise, for the same reasons, EventScope is being modified for use as an interface for scientific analysis of remote sensing data. In fact, EventScope will be deployed as the science interface for the upcoming NASA ASTEP Life in the Atacama (LITA) mission [4]. In addition, technology is being implemented to allow various levels of detail to exist seamlessly within a single remote experience. A user will be able to zoom smoothly from a view of an entire planet all the way down to a microscopic view. All of these enhancements are aimed directly at providing a high level of access, fidelity, and immersion for the remote experiences offered through EventScope.

References

[1] Adler Planetarium Website: http://www.adlerplanetarium.org
[2] Elumens Website: http://www.elumens.com
[3] EventScope Website: http://www.eventscope.org
[4] NASA's ASTEP Life in the Atacama Mission Website: http://www.frc.ri.cmu.edu/atacama
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