

Periscope: A virtual browser for the real world

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Abstract

Periscope is a browsing device that allows a user to explore the physical world by navigating its digital shadow via an intuitive physical interface. The media player in Periscope 2.0 finds images and web pages "located" at the places they represent.

Periscope is built into a Rembrandt Model II 5x7 view camera mounted on a tripod with pan head. It uses the Wherehoo Server, an Internet service developed by the Software Agents Group at the Media Laboratory, which binds digital representations of physical entities to their locations. The server facilitates software agents that either *provide* or *query* geographically-situated data. Accessible through a TCP socket, the Wherehoo service accommodates *long-lived* records (representing buildings or other permanent features) and *transient* records (representing short-lived events and objects in motion such as subway trains, travelers, or vehicles).

The camera serves as an intuitive pointing device for navigation of the electronic world stored in Wherehoo. When the camera is rotated, or the range or search width is changed via controls on the camera, an LCD screen that replaces the camera's "viewfinder" provides a real-time view of the digital world at that same heading and range.

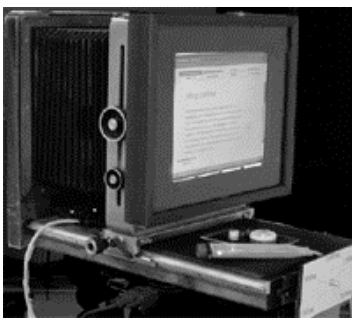


Fig. 1: Periscope

The camera and its frame are augmented with an electronic compass, 1MB Java-based CPU with Ethernet and serial I/O, I/O and power backplane, and several one- and eight-bit input and output channels.

Periscope 2.0, completed in November 2000 includes enhancements to the tangible interface: user control of search radius, new front and side-mounted controls to replace the original joystick distance selector, and a "shutter

button" allowing the user to control the rate of exploration. A schematic diagram (Fig. 2) of the search distance and radius, relative to the Periscope's location, helps users visualize the search process.



Fig. 2: Search schematic

In use, we may point the camera toward the corner of Newbury Street and Massachusetts Avenue in Boston, and set the range to 1200 meters. An optical camera would have an obstructed view of this place from the camera's location in the Media Laboratory. The digital view, however, sees through obstructions. After scanning the Wherehoo Server for digital artifacts near that place, the screen displays web pages or other images from the Tower Records store, JP Lick's ice cream shop, and other things near that corner.

A user can explore digital representations of the physical world through the Periscope's virtual window. Exploration is controlled in near-real time by the user's manipulation of the camera and its controls. Future versions of the browser will detect and display messages, audio, video, applications, and other rich media on a variety of devices ranging from mobile telephones to PDAs and wearable technologies. We will also add *time browsing* - allowing the user to explore the changes to one place over time.

For more information

A Web interface to the Wherehoo server, and technical documentation are available at <http://wherehoo.media.mit.edu>

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