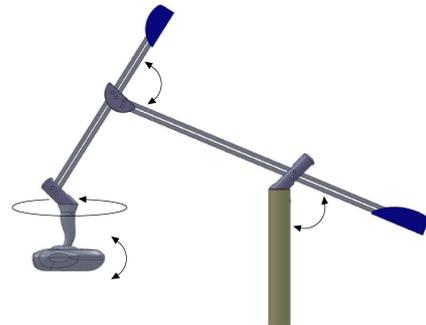


# Visorama 2.0: a Platform for Multimedia Gigapixel Panoramas

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## 1 Panoramas

Panoramas have been around as early as one started to capture images of our surroundings. While photography was still becoming a regular process for taking live stills, painters were already creating immersive panoramic canvases. In fact, the word panorama was patented by Robert Barker, who, at the end of the 18th century painted building-sized landscapes that were placed in cylindrical murals. His successful innovation included platforms and stairways along the frame, allowing viewers to immersively walk around and experience his work as if they were in the middle of it.

The computer vision and graphics community developed image-based rendering tools and systems to create, visualize and interact with panoramic images. Virtual reality systems with panoramic visualization (such as Apple's QuickTime VR) and stitching softwares (such as Autopano, from Kolor) are some of them.

To fully explore the immersive and interactive possibilities of panoramas, we should avoid common interfaces. A setup of a large 360 degrees projected image, mimicking Robert Barker's work, may be plausible to construct. While too expensive, interaction issues would still be left to be addressed. Another approach would be virtual reality devices. Head mounted displays and totem based systems, such as Boom, from Fakespace, attempted to accomplish the issue. But the extensive degree of freedom confuses the user and turns out to be a dizzy interface.

The Visorama System, demonstrated as an experimental work at SIGGRAPH 98, introduced a natural and immersive interface for interactive panoramas. Constraining the degrees of freedom while maintaining the user as the center of the visualization, the authors presented a system where one uses natural physical movements to interact with virtual panoramas. As many technology issues have been developed since then, we can now introduce Visorama 2.0, a full platform for multimedia gigapixel panoramas.

## 2 Visorama 2.0

We have been experiencing an enormous increase in image resolution. While megapixel images became a common feature in point and shot cameras, giga and nearly terapixel panoramas may be created with stitching software and robotic capturing devices, such as Gigapan. Although the technology has still open issues, the idea of a very large panorama with a very high level of detail is already a fact. At the same time, temporal resolution is also increasing as

panoramic video capturing devices, such as Point Grey's Ladybug, is available.

### 2.1 Hardware

At the hardware level, we were able to integrate most components in a compact binocular-like device, leaving just the cpu at the side. Panoramic images can freely be observed through an OLED stereoscopic display as the user tilts the device up and down and pans it around his axis. Sensors capture the user movements while the system accordingly updates the image. The design solution incorporates a top-mounted counter-balanced pair of arms that allows the user to frictionless manipulate the Visorama, giving the sense of freedom as if it was a lightweight binocular. Especially for a virtual reality system, this is a very important feature, as the user has no disturbing feedback other than from the immersive environment that he is in charge. An audio jack socket, zoom and command buttons complete the hardware, resulting in a direct manipulation device for viewing and interacting with panoramas.

### 2.2 Software

Multi-resolution panoramic images are managed by the system's visualization engine, guaranteeing a high real-time frame-rate, independent of it's size. We developed an authoring scripting language based system, allowing one to create complex multimedia applications. Cylindrical, spherical and cubic gigapixel panoramas can be integrated with multimedia elements, such as text, video, 3D audio, animations, 3D meshes and lighting. All of them can easily be placed along the panoramas and rules for their behavior are determined with the event-based scripting language. These events can be of many types, including temporal, button-based, dependent on user viewing parameters and programmatically created. Hot spots and transitions, among other multimedia narrative features, let many different applications and uses of the Visorama platform.

## 3 The setup

Attendees will be able to experience the Visorama platform, interacting with multimedia gigapixel panoramas. Users that have their own panoramas will be previously invited to bring their work and visualize it with the Visorama. Multimedia elements, such as audio tracks and animations will be available for those users, allowing them to create simple but effective scripts to experience with the Visorama platform.