

# Plants and Zombies: Two Use Cases for On-Location Panorama Viewing in Handheld Mobile AR

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## ABSTRACT

Panoramas, as a medium, have traditionally provided viewers with an encompassing experience of distant locations. In recent years, this experience has been augmented by combining handheld orientation sensors with digital panoramas to create mixed reality experiences that transform mobile devices into windows to the remote. Less explored, have been the mixed reality opportunities afforded through the viewing of mobile panoramas non-remotely, at or near their real world epicenters. This paper presents two handheld AR web applications, running on publicly available hardware and software, that utilize panoramas to facilitate both remote and on-location AR experiences. It explores how the experience and the utility of a panorama differ depending on the location in which it is viewed.

**KEYWORDS:** augmented reality, panorama, transmedia.

**INDEX TERMS:** H.5.1 [INFORMATION INTERFACES AND PRESENTATION (e.g., HCI)]: Multimedia Information Systems—Artificial, augmented, and virtual realities.

## 1 INTRODUCTION

The Augmented Environments Laboratory at the Georgia Institute of Technology has developed two mobile web applications that explore the role of a user's location when viewing panoramas. These applications have been developed to run within the Argon AR browser platform and facilitate the experience of exploring cubic panoramas via device orientation [1]. Users are free to view the panoramas from any location they choose, however, the applications are designed to provide additional affordances to those users who view the panoramas on-location, where they may be surrounded both physically by the real-world subject matter represented in the panoramas, and virtually by the panoramas themselves, including the digital content overlaid within them. This dual experience of location allows the user to effectively experience the two ends of Milgram's virtuality continuum at the same time: the real-world environment and a virtual representation of that same environment [4].

The first of the two applications presented in this paper is an AR trail guide, designed to assist with navigation and discovery within natural parks. The second application is an AR transmedia companion for the fictional series, *The Walking Dead* that allows the user to experience a combination of television and comic book content overlaid in a panoramic context of the real world. Both applications offer tour experiences that take inspiration from past AR tour projects [8, 9].

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## 2 AUGMENTED REALITY TRAIL GUIDE

The Augmented Reality Trail Guide provides users with two separate views for locating and experiencing points of interest (POI's) within a natural park: an overhead map view and a surrounding AR space (Figure 1).

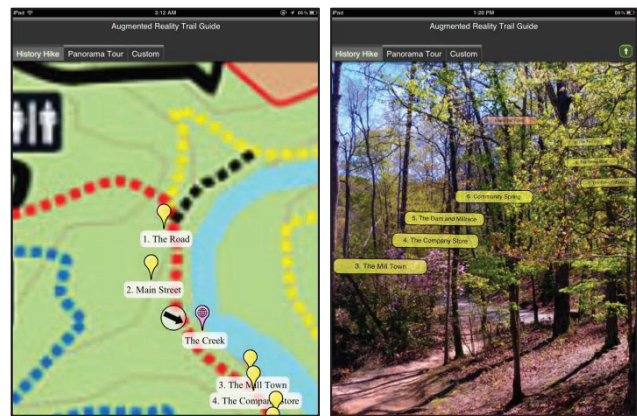


Figure 1: The two views of the Augmented Reality Trail Guide. Left: Overhead map view. Right: Surrounding AR space.

Both views feature a collection of placemarks that represent the POI's within the park. Some placemarks provide the user with a presentation of static, un-augmented text and imagery about a given POI. Other placemarks go further, offering unique, on-location panoramic experiences.

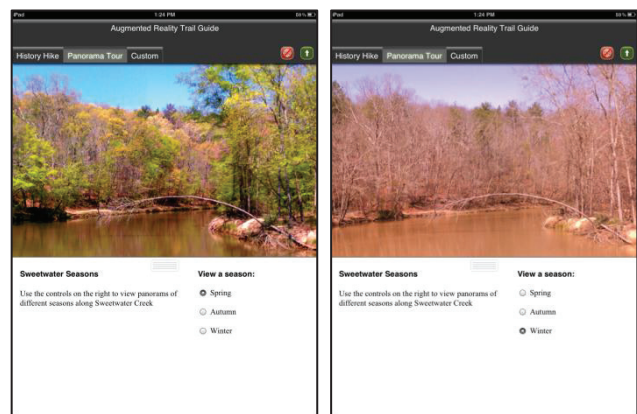


Figure 2: A comparison of seasons within a natural park. The user stands at the real world geo-location of the panoramas and cycles between the seasons using their mobile device.

In one case, a series of seasonal panoramas is made available, turning the user's mobile display into a "magic lens" that transforms the environment around the user, allowing them to experience that location from two seasons at once (the real and the virtual) as illustrated in Figure 2.

In a second use case, the user is given the opportunity to view a video of a historically high flood within the park, overlaid upon a panorama of the location where the video was originally recorded. Current generation tracking technology limits the accuracy of AR content registration over a device's see-through video. To correct this, a panorama is used as a proxy for see-through video, allowing accurate registration between the foreground video and the background panorama.

A third use case for on-location panorama viewing in the AR trail guide application transports visitors into the center of a ruin site that is often only visible from afar, as the interior of these ruins is usually off-limits to visitors (see Figure 3).

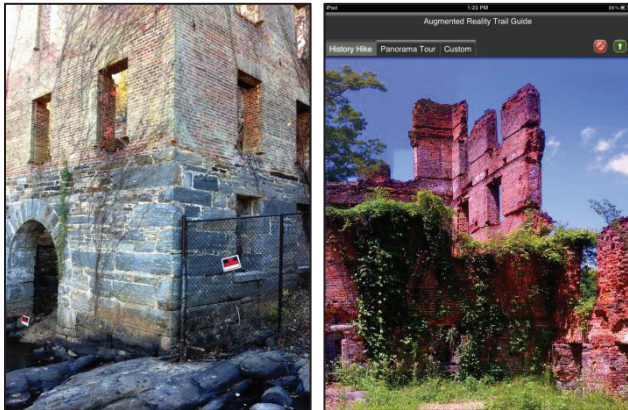


Figure 3: Panorama as a portal into inaccessible park locations. The ruins featured on the left are usually off-limits. The panorama on the right affords visitors an experience of the inner ruins.

### 3 AR TRANSMEDIA COMPANION

A second application developed in the Augmented Environments Lab that features on-location panorama viewing is *The Walking Dead* AR Transmedia Companion. This experience combines content from *The Walking Dead* television and comic book series with real world panoramas taken in Atlanta, Georgia, USA; a location featured within the storyline of the fictional series. This experience provides a transmedia presentation that blends fictional and real-world content, taking inspiration from Wither's and colleague's *The Westwood Experience* [6].

The transmedia companion provides users with a marked-up Google Map containing POI's that relate content from *The Walking Dead* to the series' real-world locational counterparts. The POI's on the map open panoramas overlaid with scenes from the television and comic series. As with the trail guide application, these panoramas are used as a proxy for see-through video in order to improve registration of content over the location where the user is standing, when they are standing near the epicenter of a panorama. In Figure 4, The Atlanta skyline is overlaid with a fictional scene from the television series, which can be juxtaposed with an analogous image from the comic book series. This allows fans of the story to draw comparisons between the series' different media forms while simultaneously inhabiting the real-world space from which the series takes inspiration. This design is intended to facilitate a mixed reality experience on several levels [2].



Figure 4: Transmedia panorama series. Left: unaltered panorama. Center: Television overlay. Right: analogous comic book overlay.

In addition to static imagery, other panoramas from *The Walking Dead* application insert videos from the television series into the panoramas, affording users the approximation of being in the presence of characters from the fictional world.

### 4 CONCLUSION

On-location panorama viewing may be used to facilitate unique mobile AR experiences. Panoramas may be used as a proxy for see-through video when more accurate registration is needed than is possible with current-generation technology. Panoramas may be used in natural parks to provide a window to alternate views of the park (the seasonal and historic video overlays), or to experience inaccessible areas. Panoramas may also be used to blend real-world and fictional elements together, affording the user an experience of a fictional world from within their own.

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