

MARA – Sensor Based Augmented Reality System for Mobile Imaging Device

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ABSTRACT

This paper outlines some of the features and functionalities of MARA, Sensor Based Mobile Augmented Reality system, demo. The MARA system implements hand-held, video-see through augmented reality for Nokia S60 mobile imaging devices equipped with additional sensors, shown in Figure 1. The system utilizes sensors as follows: position is provided by a GPS receiver, accelerometers provide relative orientation and a tilt compensated magnetometer is used to determine heading. The device's on-board camera is used for image acquisition and the on-board screen for rendering, including annotations. All the annotation data and additional map images are downloaded from external services on the Internet via cellular network connection. The system is based upon a light-weight and portable standard platform. It requires no additional devices beyond the sensors. The platform also has excellent capabilities for network connectivity and great potential for multimodality.



Figure 1. Mobile imaging device equipped with additional sensor HW.

Keywords: Sensor based, mobile augmented reality, mobile imaging device

1. DEMO

Given that the demo will be indoors, the location of the device will be artificially fixed to an appropriate GPS coordinate with simulated error for ensuring an authentic user experience. Nearby objects of note (other demonstration stands, exits etc) will be added to the external server database of objects, and have appropriate GPS coordinates and annotation data associated with them. If applicable, a user with a second device will go to a nearby outdoors location and share GPS information via the external server

with the device indoors to demonstrate communication between, and the locating of, moving devices with our system. Additionally, screen capture videos of the prototype in use will be on display to further illustrate the experience offered.

2. USER INTERFACE

We have developed a simple user interface that allows users to interact with their surrounding environment using the standard mobile device inputs, i.e. the soft keys, the navigation key, and the numerical keypad. The user interacts with the device as if they were taking a photograph of the person, object or landmark of interest. The user points the device at the object, and if annotation is available, it is overlaid upon or beside the object in the viewfinder. One interesting feature enabled by the excellent connectivity provided by the platform is the ability to annotate real world objects with hyperlinks, allowing the user to “click” upon real world objects, and navigate to relevant information or services. Our system allows users to place a hyperlink at their current location, potentially engendering user-created content, not limited to text. Additionally, we take advantage of the systems' understanding of it's orientation to provide different UI metaphors depending on the manner in which the user holds the device. If the device is held flat, we switch to a top-down map view of the user's surroundings, centered on the user and aligned to his view as shown in Figure 2.



Figure 2 See Through Mode on left and Map View Mode on right.

More information can be found at
<http://research.nokia.com/projects/MARA/>