Magic Lens Augmented Reality: Table-top and Augmentorium: SAP_0577

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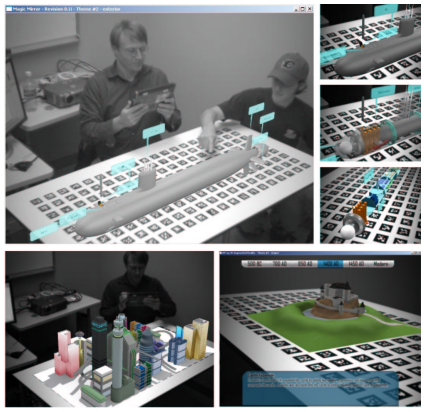
1 Introduction

Augmented Reality (AR) brings virtual objects into the real world instead of making people go into the computer world. With AR, virtual objects appear to coexist with the real in the user's real environment [Bier et al. 1993].

In our *Magic Lens* AR system, one holds up a tablet PC or camera cell phone and "looks through" seeing virtual content that appear on a table surface or inside a room area. Virtual objects are overlaid over the video input on the hand-held computing device, the alignment of the virtual and real cameras provide the coexistence illusion. This system is entirely implemented in software, and uses computer vision technology and only the video imagery itself to determine pose.



Our system uses the video image necessary for the magic lens application to calculate the pose of the hand-held device. In this way software can calculate an accurate pose in real-time without an external tracking system. We use our ARTag [Fiala 2005] fiducial marker system and place markers in the area where the augmentations are to appear. We have created two deployment schemes: a smaller table-top, and larger and more immersive room-based "augmentorium" setup.

2 Table-Top and "Augmentorium" Schemes

The table-top magic mirror system can be deployed simply by placing a printed panel or large sheet of paper on a table. However, in this case the augmentations can only be seen above the table and one cannot tilt the hand-held device too far back since the software needs to see markers to determine position. To create a larger environment where the user can move around freely and see more virtual content, we created the *augmentorium* room (Fig. 1) with markers on the walls, ceiling, and floor surfaces. Large and small markers were arranged such that the hand-held device can determine its position at any reasonable point in the room (where the camera is at least 10 cm from the nearest surface).

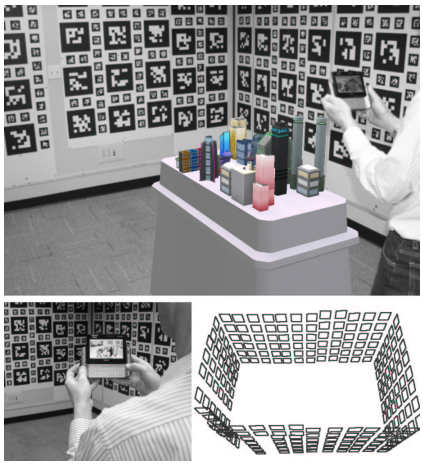


Figure 1: The pedestal and miniature city are virtual objects in the *Augmentorium*, visible only through the hand-held tablet *magic lens*. A 3D model of the marker locations is used for positioning (lower right).

Other AR systems use fiducial marker systems that can only accomodate a few markers. However, with ARTag's 1001 possible markers, it becomes possible to cover all surfaces of a room. We have constructed and networked together two 10'x15' rooms at remote sites for collaborative design projects. Virtual content can be both inside the room boundaries, and beyond, depending on the 3D content scale and position.

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References

http://www.artag.net/ (artag webpage).

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