Mobile Augmented Reality 2010

Author, Peter Meier, CTO, metaio GmbH

January 2010

Introduction

The first Mobile Augmented Reality (AR) systems using the GPS and compass as sensors are over 10 years old. For example, Feiner et al. created an augmented reality system for exploring the urban environment[1] and is similar to today's use case of mobile AR applications. Although the prototypes were technically superior to today's systems and is funded by the military or other large organizations, they did not become productive. Of course, one could argue that they were too expensive for the average consumer, but even then the military did not deploy them. The prototypes were not useful enough with the accuracy limitations of the GPS.

Today's mobile Augmented Reality systems have the same technical problems as the earlier prototypes. Certainly indicating wrong directions of a pizza place is not as dangerous as indicating wrong directions toward your allies or your enemies, but a map stays superior for now. The AR community must not rest, to avoid ending up as a nice gimmick after the current hype. We see two main tasks:

1. Making mobile AR useful, by improving the technology.
2. Until then, creating inspiring interactive experiences, which creatively hide the technical flaws.

Making mobile AR useful

The full potential of useful AR can be unleashed when many more technical details are integrated into the mobile platforms. metaio is leading the research on real-time markerless tracking. Figure 1 shows images of a system like that running on PC and the Unifeye SDK ™ mobile with its markerless tracking module.

---

[1] S. Feiner, B. MacIntyre, T. Höllerer, and T. Webster, A touring machine: Prototyping 3D mobile augmented reality systems for exploring the urban environment. *Proc. ISWC '97* (*First IEEE Int. Symp. on Wearable Computers*), October 13-14, 1997, Cambridge, MA. Also in *Personal Technologies,* 1(4), 1997, pp. 208-217

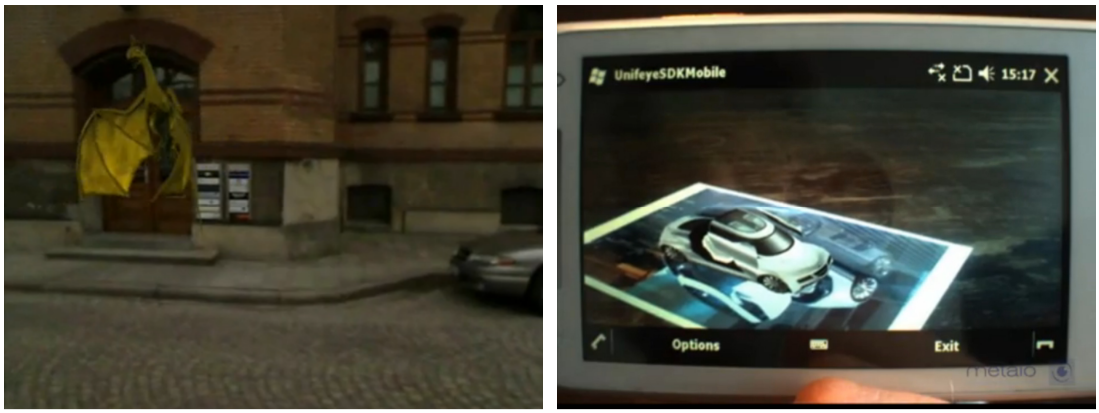

Figure 1 Realtime outdoor markerless tracking and markerless tracking on a mobile phone (no mockups). See also http://www.youtube.com/metaioAR#p/u/20/CWH3Qp_RYCk.

For better depth perception, objects should be hidden behind buildings. Another way for improving depth perception is a dynamic lighting model, which is adjusted to the surrounding environment as shown in Figure 2.

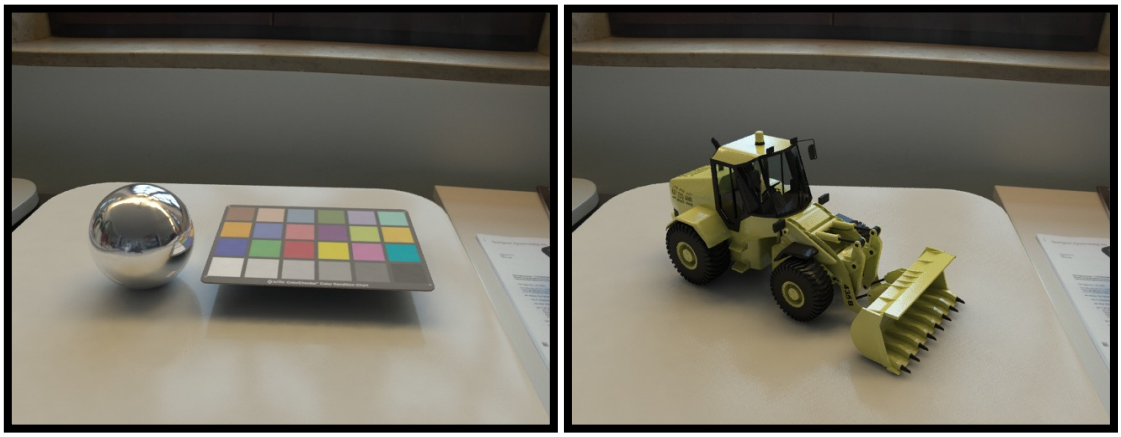

Figure 2 Inserting a virtual object after light-estimation and color-calibration.

For using AR outside in the sunlight, new displays need to be deployed, maybe even AR sunglasses.

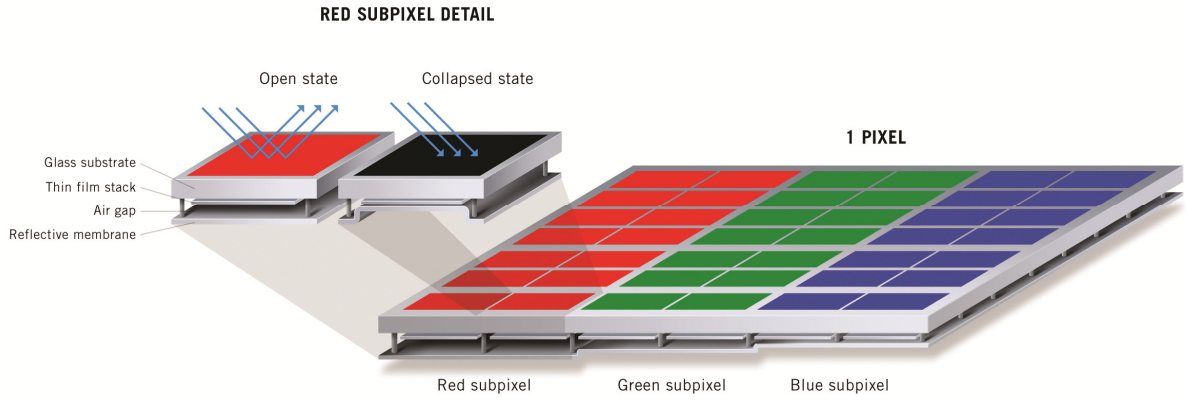

Figure 3 Qualcomm's Mirasol display is readable at sunlight (image by Qualcomm).

Some of these tasks will be partly solved in the coming months, some need a few more years to become reality.

Creating inspiring experiences

Until the technology is right, we can still establish AR as a valuable technology that is beyond a gimmick by making it a cool and engaging interface. Our mobile platform junaio[2], for example, allows users to create their own Augmented Reality scenes and place them in the real world. By focusing on placing objects in pictures, junaio enables every model to be perfectly aligned within the pictures to make it seem as if the object was in the picture in the first place and avoids the accuracy problem (See Figure 4)

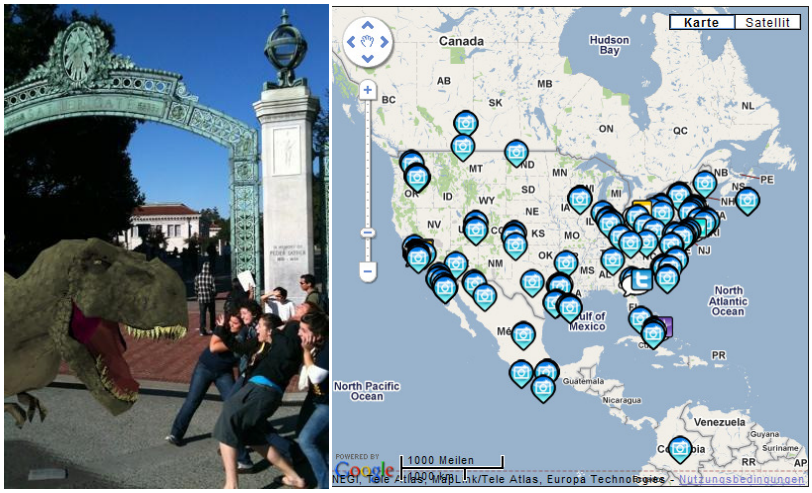

Figure 4: Placing 3D models in pictures on junaio and leaving contents in the real world

The application also allows people to see their scenes in 3D using the camera's live-view as an additional option (See Figure 5).

[2] More information available at www.junaio.com.

Figure 5: Live-view of the 3D T-Rex on junaio

The next step will be opening the junaio-platform for external developers, especially in the area of location based games (See Figure 6). The API does not only allow to receive location based information. It also enables users to interact with the game-logic, by interacting with the interactive 3D-models. Traditionally, gamers are willing to accept certain technical flaws, as long as these do not interrupt the game-flow. The client, which is able to communicate with game-servers, will be available in early March. To make the first steps easier, metaio will start an open-source game-server.

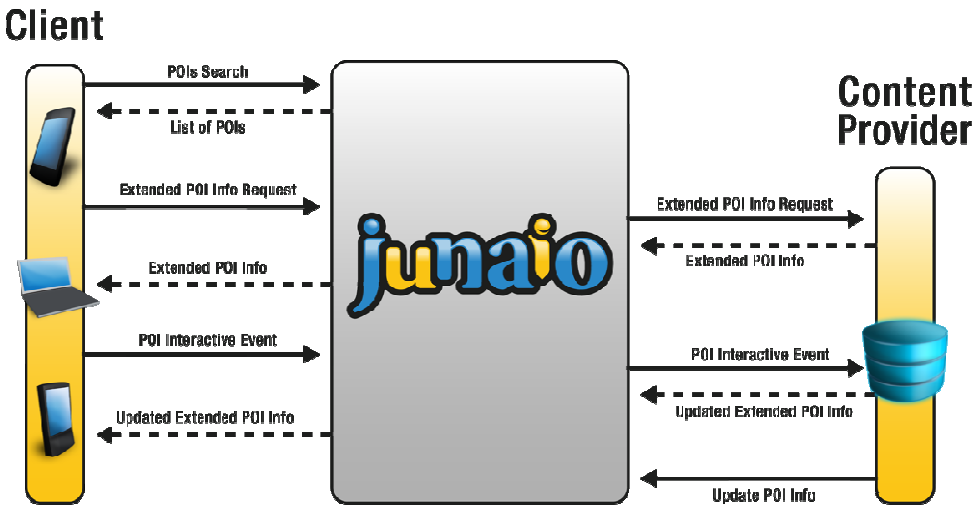

Figure 6: Server infrastructure of third party content and interface with client