On Site Reconstruction Experience

Imaging the Past Visitors of an archaeological site usually need to imagine its past appearance to understand its history of the space and the difficulty of this task limits the enjoyment of their experience. This Showcase presents an AR (Augmented Reality) system where visitors see virtual reconstructions of ancient monuments superimposed on the scene through AR glasses. This gives visitors and researchers a feeling for the original appearance of a site, and this experience is provided *in situ*.

The mobile unit is based on a Head Mounted Display, a camera and a laptop. Its optical tracking algorithm is capable of identifying the visitor's position among several pre-selected viewpoints.

This allows for the integration of real and virtual scene elements on the head-mounted display and facilitates the comprehension of the visited site.

User wearing the mobile unit

Sagalassos The system has been applied to the *nymphaeum* (ornamental fountain) at the upper agora of the ancient city of Sagalassos, about 100 km to the north of modern Antalya in Turkey. Sagalassos was a prosperous city from early Hellenistic times until it was struck by a devastating earthquake in the 7th century.

Since 1994, more than 90% of the building elements have been found during excavations, more often than not in a seriously damaged state. The finds have been documented by a large set of photos and drawings, used to build a photo-realistic 3D reconstruction.

While the visitor is standing on a selected viewpoint, the pre-rendered 3D model is superimposed on the user's real view to generate the on-site experience. The system tracks the visitor's head motion and the image is continuously adjusted to the actual field of view.

Technical details In this showcase ARCHEOGUIDE AR tools, developed by Fraunhofer IGD, combine with 3D modeling methods developed in MURALE by ETH and the University of Leuven, Belgium.

It uses a Fourier-based approach for markerless tracking, which is robust to changing lighting conditions, handles up to 60% of occlusion and works in real-time.

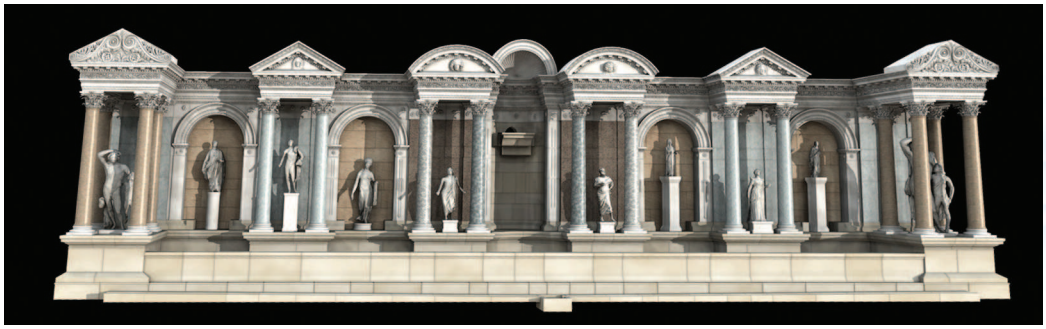
It also caters for head orientation.

ARCHAEOGUIDE and MURALE are EU-FP5 funded projects.

Nymphaeum in its current state

Partners The institutions collaborating on the realization of the showcase *On Site Reconstruction Experience*, to be tested at Sagalassos, Turkey, and Olimpia, Greece, are:

- ETH Zürich, Computer Vision Laboratory, Switzerland
- Fraunhofer Institut, Darmstadt, Germany



Virtual reconstruction of the nymphaeum

Augmented view of the nymphaeum

Interested?

Are you interested in this showcase? Do you think that this approach can help you in creating effective Cultural Heritage presentation projects or can be integrated in new research projects? Please contact Prof. Luc Van Gool (vangool@vision.ee.ethz.ch) of ETH Zürich at +41 1 6326578 or Dr. Didier Stricker (Didier.Stricker@igd.fhg.de) of Fraunhofer IGD Darmstadt at +49 6151 155188.

EPOCH is a Network of Excellence on Intelligent Cultural Heritage within the IST (Information Society Technologies) section of the Sixth Framework Programme of the European Commission. EPOCH showcases demonstrate innovative solutions and technological integration for target application areas in the Cultural Heritage domain. As they are created with real world content, they stimulate creative thinking about the use of the technologies in Cultural Heritage, and are used to validate new technological approaches with key stakeholders in the Cultural Heritage domain. For more details, visit the project web site:

www.epoch-net.org

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