



Using Virtual and Augmented Reality for Presenting Cultural Objects

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Presentation Outline

- Objectives of end-user AR interface
- Functionality
- Architecture and implementation
- Virtual models vs. real artefacts
- Demonstration



Objectives of End-user AR Interface

- Browsing virtual exhibitions
- Visualization of virtual representations of cultural objects in an augmented reality environment
- Interaction with the virtual models
- Examination of the virtual objects in the context of the real artefacts
- Two groups of target users:
 - Museum Visitor
 - Researcher



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Functionality of End-user AR Interface

- Browsing functionality implemented as a typical web browser capable of displaying HTML pages and VRML scenes retrieved from the ARIF X-VRML server
- AR functionality implemented with the use of ARToolKit library that based on a video scene allows to:
 - Calculate camera position based on predefined markers placed in the scene
 - Superimpose virtual objects aligned with the markers

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Architecture of End-user AR Interface

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Implementation of End-user AR Interface

- Windows application comprised two main sub-components:
 - Web Browser (browsing database of cultural objects)
 - AR Environment (mixing natural and virtual object views)
- Both interfaces based on X-VRML templates
- Switching between the sub-components
- Configurable set of predefined markers (a configuration file)
- Monitoring marker states (a toolbar)



Web Browser Component

- Browsing ARCO exhibitions using a standard web interface
- Web browser embedded directly in the end-user application
- Same contents as in Web-based End-user Interfaces
 - Web Local domain
 - Web Remote domain
- Typical web browser functionality for navigation
- Both 2D and 3D contents may be visualized
- Keeping track of currently displayed media objects



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AR Environment Component (1/2)

- Registering object for AR
 - Assigning media objects to markers
 - Retrieving necessary VRML data from the ARIF X-VRML server
 - Storing the retrieved models in local data structures
- Visualising objects in AR
 - Capturing video input frames from a camera
 - Detecting and identifying markers
 - Calculating positions and orientations of markers relatively to the camera
 - Positioning and superimposing virtual objects corresponding to the identified markers



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AR Environment Component (2/2)

- Model manipulation: rotation/translation/scale
- Transparency so as to compare real artefacts with their virtual equivalents
- Techniques implemented to improve realistic registration of the virtual models in the real world
 - Shadows
 - Virtual cutting surfaces
- Removing associations between virtual models and markers
- Full screen mode
- SpaceMouse for user interaction



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Virtual Models vs. Real Artefacts

• A virtual representation next to a real artefact



• A translucent virtual model superimposed on a real artefact



Future Works

- Dynamic assignment of media objects to markers
- Advanced X-VRML visualization templates one template for a set of media objects
- AR-based user interface
- Usage of other haptic devices and projection hardware

Demonstration



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