

ANNETTE: Immersive AR Telepresence for Cultural Heritage

The Oracle Dodona Experience

Introduction

Transforming digital cultural heritage means moving from passive observation to deeply engaging, interactive, and inclusive experiences. The ANNETTE project delivers a next-generation AR telepresence application for the Oracle Dodona archaeological site. This solution leverages immersive technologies and state-of-the-art HCI, enabling users—regardless of location or mobility—to virtually explore the sanctuary through advanced 3D reconstruction, photorealistic avatars, and adaptive, user-centered interfaces. Integrating with the SPIRIT platform, the application demonstrates how cutting-edge AR and edge-cloud technologies can democratize access to culture and support both structured and free-form exploration for all audiences

Key Features and Innovations

- **Immersive Telepresence:** Real-time photorealistic avatar guides users through a 3D reconstruction of the Oracle Dodona, providing narration, responding to questions, and contextual information.
- **Multimodal Interaction:** Supports text, image, audio, and video content, triggered by user actions or adaptive paths.
- **Accessibility & Inclusivity:** Features clear visual cues, audio descriptions, and navigation aids; designed for diverse audiences, including those with disabilities or low digital literacy.
- **Edge-Cloud Split Rendering:** Offloads 3D rendering to the cloud, ensuring high visual fidelity and low latency even on standard mobile devices.
- **Adaptive Navigation:** Offers suggested thematic routes and personalized guidance based on user interests or needs.
- **Real-time QoE Monitoring:** Tracks latency, frame synchronization, and bandwidth for robust performance, even in multi-user settings.

Technical Approach

Integration with SPIRIT Platform: Utilizes SPIRIT's edge-cloud infrastructure for efficient delivery of complex AR scenes and avatar animations.

Real-World Testing: Validated on 5G-enabled testbeds, ensuring seamless operation under diverse and demanding conditions.

Replicability: The ANNETTE platform's architecture and HCI methodology are designed for rapid adaptation to other cultural, educational, and tourism contexts.



Fig.: ANNETTE mobile app

Results and Impact

Enhanced User Experience: Users can enjoy highly interactive and personalized cultural tours, regardless of physical ability or geographical location.

Cultural Democratization: Broadens access to cultural heritage and enables new forms of participatory exploration and storytelling.

Scalability: Validated platform scalability and robust operation, with actionable feedback for further improvement.

Key features

To realize its vision of accessible, engaging digital heritage, the ANNETTE solution combines advanced AR technologies, real-time avatar guidance, and robust accessibility features. The following table provides an overview of the platform's key functionalities, illustrating how each element supports a richer, more adaptive, and user-friendly virtual tour experience.

Feature	Description	Benefit
Photorealistic Avatars	Lifelike, real-time digital guides for narration	Engaging, intuitive user experience
Edge-Cloud Rendering	Offloads intensive 3D processing to the cloud	High fidelity on standard devices
Multimodal Content	Text, images, audio, video, triggered by user	Enriched, interactive exploration
Accessibility Features	Visual/audio aids, simple navigation	Inclusive for all user groups
Adaptive Navigation	Personalizes routes and suggestions	Tailored visitor experience
Real-time QoE Monitoring	Tracks performance for robust operation	Consistent, reliable usage

Deployment

The ANNETTE platform's deployment at Oracle Dodona highlights how smart, immersive technologies can make cultural heritage accessible to all. Its scalable, user-friendly approach is easily transferable to other sites, enabling new forms of interactive, inclusive, and engaging "smart culture" experiences across diverse cultural and educational contexts.

Contact

Anastasios Manos
 DOTSOFT, Managing Director
manos@dotsoft.gr

Dr Despina Elisabeth Filippidou
 DOTSOFT, R&I PMO Manager
elizabeth@dotsoft.gr

www.dotsoft.gr



www.spirit-project.eu