

Co-Designing Virtual Heritage Experiences for Archaeological Sites based on the novel AR Paradigm World-as-Support

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ABSTRACT

The goal of this study is to address the challenges of archaeological sites by exploring the potential of a recently emerging projective AR approach, namely the World-as-Support interaction paradigm. We present the initial design stage of a Virtual Heritage experience for the guided visit of a Spanish bomb shelter, called Refugi 307, which currently belongs to the History Museum of Barcelona (MUHBA). Our results point towards opportunities to complement the guided visit through an interactive learning experience that promotes activities to foster (1) *context awareness* between the learning content and the cultural heritage site, (2) *environment awareness* in relation to missing objects in the physical space and (3) *social awareness* to embody feelings related to solidarity and empathy.

CCS CONCEPTS

H.5.2. Information interfaces and presentation (e.g., HCI):
User Interfaces; Interaction styles.

KEYWORDS

World-as-Support, Full-Body Interaction; Learning; Virtual Heritage; Augmented Reality.

1 INTRODUCTION

Designing for outdoor archeological sites often implies the consideration of very specific requirements and constraints, e.g. spatial configurations of the heritage site, the effect of weather conditions on using certain technologies, heritage conservation policies, social-cultural aspects on-site, etc. These constraints shape the ways in which technology is designed for and employed in these spaces. The goal of this research is to address the challenges of archaeological sites by exploring the potential of a recently emerging interaction paradigm called the World-as-Support (WaS) [2]. This paradigm is based on projective AR; i.e. augmentation is achieved by projecting the digital content on the physical world surrounding the user via a handheld device. This portable system based on a pico-projector and a mobile device dynamically recognizes the surrounding physical world (i.e. topography, objects, users, gesture and motion) and projects the context-aware digital information directly onto it. We outline how we defined requirements for this paradigm in the context of the guided visit of a Spanish bomb shelter, called Refugi 307, which currently belongs to the History Museum of Barcelona (MUHBA) [3]. Furthermore, we present preliminary

results of a first design iteration of the Virtual Heritage (VH) experience.

2 The Study

We conducted an ethnographic study of the guided visit and Participatory Design workshop with 40 students (girls = 18; boys = 22; age mean = 10.78 years old) and three teachers from a local school. We interviewed a curator, a visit guide and a museum educator. The goal was to analyze different aspects of the requirements and include multiple needs and viewpoints of the involved stakeholders. Furthermore, we tested a mid-tech prototype of the VH experience with a total of 20 children (girls = 11; boys = 9; age mean = 9.95 years old).

3 Preliminary Results

Our findings showed that due to the spatial constraints of the shelter and specific learning context that the guided visit could benefit from the WaS paradigm as follows. (1) *Context awareness*: users can be made aware of historical events of the local context by projecting (e.g. a testimonial of a person who constructed the shelter close to pickaxe marks on the wall). (2) *Environment awareness*: projective AR content allows to draw children's awareness to specific features in the environment and augment missing information of objects in their original locations (e.g. the signs of behavior rules can be projected on the empty holes on the walls). (3) *Social-awareness*: the system can split content between multiple users, each having a WaS device, and foster movement-based collaborative activities (e.g. two users project each a different half of an object that needs to be recomposed through their collaboration). A first evaluation of a mid-tech prototype showed that the WaS system allows enriching the visit at appropriate times and places without being intrusive or altering the physical space. Using projective AR and collaborative learning activities permit visitors to explore the physical environment in meaningful ways and to construct meaning by discovering new layers of the learning experience.

REFERENCES

- [2] L. Malinverni, J. Maya, M.-M. Schaper, N. Pares, The World-as-Support: Embodied Exploration, Understanding and Meaning-Making of the Augmented World, in: Proc. 2017 CHI Conf. Hum. Factors Comput. Syst. (CHI '17), ACM, New York, NY, USA, 2017. doi:<http://dx.doi.org/10.1145/3025453.3025955>.
- [3] M.-M. Schaper, M. Santos, L. Malinverni, N. Pares, Towards the Design of a Virtual Heritage Experience based on the World-as-Support Interaction Paradigm, in: Proc. 35th CHI Conf. Hum. Factors Comput. Syst. (CHI '17), 2017.