An Augmented Reality Virtual Museum ‘Takeout’ Interaction

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2.0. OVERVIEW

The app presented in this Interactions Gallery exhibit is an augmented reality version of photo-realistic 3D artefacts from the World Museum in Liverpool. The app was designed as a research prototype to elicit stakeholder opinions and to explore ways for citizens and scholars to access, experience and interact with small artefacts and to explore their all around surfaces in detail, more intimately than would normally be possible for museum artefacts.

2.1. The 3D Artefacts

The virtual 3D artefacts include a small ancient Egyptian ‘shabti’ figurine previously owned by Florence Nightingale\textsuperscript{1} and palm-sized Mesopotamian clay ‘cuneiform’ tablets.

The 3D models were acquired in 2018 and 2019 from Liverpool World Museum (courtesy of National Museums Liverpool (World Museum)) using the Virtual Cuneiform Tablet Reconstruction Project photogrammetric turntable system and an Einscan-SP 3D scanner with Discovery Pack.

2.2. Exhibit Experience and Example Imagery

Figures 1 - 4 show example images and alternative artefact views of the AR app that exhibit visitors will be invited to explore. Physical 3D prints of some of the artefacts will also be provided for visitors to explore and they will be invited to share and contrast their experiences and sense of the artefacts (Jung and tom Dieck 2017).

2.3. The Research Context

The iOS AR app was created for a Virtual Museum ‘Takeouts’ and DIY Exhibition project (Woolley et al. 2020) for which an Android app was also created. The initiative was part of the overarching Virtual Cuneiform Tablet Reconstruction Project virtualcuneiform.org whose original ambitions included support for virtual access to museum artefacts and whose on-line interactions were first developed for the 2017 BCS Human-Computer Interaction Conference Interactions Gallery (Collins et al. 2017) to accompany and demonstrate a virtual interaction and reconstruction interface (Woolley et al. 2017). The iOS AR app was intended as a proof-of-concept technology demonstrator for a participatory design process to inspire ideas and recommendations for future development from different users and stakeholders. Participatory design is a best practice co-design methodology for the development of apps and systems. However, with many user groups unfamiliar with AR technology, working prototype demonstrators can usefully supplement open co-design efforts by inspiring ideas and recommendations that inform requirement elicitation and the design process.

\textsuperscript{1}Florence Nightingale Museum, London: https://www. florence-nightingale.co.uk/egyptian-shabti/
2.4. About the iOS AR App Development

The app was developed using Version 11.7 of the Apple iOS Xcode Integrated Development Environment (IDE) and ARKit, Apple’s library for iOS augmented reality development. ARKit supports motion tracking, surface detection and light estimation and uses the smartphone’s camera to identify and track features in the environment and estimate ambient light so that it can position and illuminate selected objects in the camera view. When running, ARKit extracts features from the camera images and builds a topographic map of the real world. A collection of features located on a horizontal or vertical plane is known as a ‘trackable’ and can have virtual objects attached to it using an ‘anchor’. The app was coded using SwiftUI (iOS 13) which supports the creation of user interfaces for any Apple device using just one set of tools and APIs.

2.5. Interface Design

A tabbed view interface was created with SwiftUI to allow the user to navigate from the main home screen to the AR Camera activation page. The AR app also offers the user further (web-based) information via a ‘more info’ tab and access to simple settings. The app also includes the option to share via email, messaging and social media; request features; report a bug; and discover more about the project and its contributors.

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