

Chacha XR

An immersive experience through Chachapoya archaeology based on spatial documentation

Introduction

This paper is based on the Master's Final Project "*Chacha XR. An immersive non-fiction experience for Chachapoya archaeology*" presented at the Master of Visual Arts and Multimedia of the Polytechnic University of Valencia in December 2023.

This study presents research focused on the development of an immersive audio-visual experience. The work explores the innovative use of multimedia technologies to digitally document and disseminate the archaeological heritage of the pre-Inca culture called Chachapoya, which inhabited the northeastern Andes of Peru between the 5th and 15th centuries AD. Despite the archaeological importance of the Chachapoya, physical access to many archaeological sites is limited by their remote locations, rugged geography, constructions in half of rocky cliffs, and adverse environmental conditions. This project aims to overcome these barriers by developing a digital platform that archives and offers immersive and interactive experiences of these heritage sites through a multiplatform application (for mobile phone, desktop and VR Lens) and a web portal, as products derived from the digital documentation of different speleo-archaeological projects of sites in the region. Our thesis is that leveraging extended reality (XR) technologies can improve both documentation and public engagement with archaeological heritage, making it more accessible and understandable to a diverse audience.

Data

The basic material of this project includes spatial documentation (XR) on 7 unique cultural heritage sites: Diablo Wasi, La Petaca, Kuélap, Karajía, Laguna de los Cóndores, Revash and Tingorbamba; most are necropolis built on cliffs between the 10th and 15th centuries AD. This documentation includes 4 different types of files which, combined, make up the application:

- 1) 360° panoramic images;
- 2) photogrammetric 3D replicas;
- 3) high resolution gigapixel images; and
- 4) 360° VR videos.

These formats are suitable for later interactive visualisation and integration in immersive digital environments.

Methodology

The applied methodology integrates elements and principles from virtual archaeology (Lopez-Mencheró, V.M. and Grande, 2011)) to the production of an immersive non-fiction experience. As a result, this research operates at the intersection of two lines of work: archaeological documentation

and multimedia artistic practice. In particular for this project, the archaeological documentation includes the particularities derived from the application of speleological and vertical rope access techniques for archaeological work, in what we define as vertical archaeology or speleo-archaeology.

This hybrid methodology involves the collection of field data through non-invasive archaeological documentation, with advanced post-production and multimedia development techniques and software.

Non-invasive archaeological documentation

For the documentary record we apply a wide spectrum of variants and modalities: terrestrial, aerial or vertical progression, in short or long range, always using photography and video as primary formats, with a series of files from which, after processing and editing, we will obtain the desired multimedia elements. With this aim, we used programs such as Agisoft Metascape, Blender, PTGui, Lightroom, Premiere or Photoshop, among others.

Multimedia development

From the digital elements obtained with the spatial documentation, we have developed a web portal and a multi-platform application, making up a hypermedia system, where these isolated elements are interactively interrelated in a logical way within a narrative framework.

For evaluation, design and production purposes, we used the analysis model proposed by A. Gifreu for interactive documentaries (Gifreu Castells, 2013). In computer development, we have used programs such as Pano2vr, Flutter, or Wordpress.

Results & Conclusions

This project has led to the creation and publication of the multi-platform app “ChachaXR” and the web portal “chachapoya.org,” successfully achieving the objectives of digitally studying and documenting the Chachapoya cultural heritage and making it accessible and comprehensible through new technologies and audiovisual media. We obtained 91 panoramic 360° images, 37 3D models, 9 gigapixel images, and 6 360° videos, which are integrated into the app's hypermedia system and serve as invaluable resources for ongoing archaeological research.

We developed ChachaXR for Android, iOS, Windows, Mac, and VR Lens, and published them on Google Play, App Store, Microsoft Store, and Mac App Store. Additionally, the XR resources are available on online repositories like Sketchfab (3D models), Gigapan (gigapixel images), and YouTube (videos and 360° videos). This extensive distribution in both Spanish and English ensures accessibility from a wide range of devices and systems, enhancing user access. The content allows virtual access to physically inaccessible sites, such as cliffside tombs and aerial views, and provides rigorous scientific information often restricted in specialised publications.

Discussion

The work before you is a hands-on project of a multifaceted nature, which intentionally explores the hybridizations, connections and convergences between traditionally separate fields of knowledge, such as archaeology, speleology, visual arts, and informatics. This research has been carried out

using emerging technologies and digital tools, and presents results that, beyond their playful component and their artistic interest, aim to contribute knowledge and influence society, defining themselves as a project as an Arts, Science, Technology and Society project.

In this project we have experimented with the use of extended reality (XR) and interactive documentary applied to cultural heritage, proposing a new way to experience and learn about the radically different and innovative Chachapoya culture of this heritage, where the physical sensations are in first person, rather than cognitive ones. On the other hand, the added value of the application in relation to traditional museums, resides in the possibility of "teleporting" the viewer to the archaeological sites and allowing them to spatially explore the space, and putting in direct relation, virtually, the movable material assets within their archaeological context.

References

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