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Mobile Augmented Reality in Museums: Towards Enhancing Visitor's Experience

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ABSTRACT: It is documented that augmented reality (AR) improves and supports learning. Previous research compares AR applications to existing methods. Published research generally focuses on an AR in general. However, there are different ways to use AR. This article provides additional insight into how to use AR as a learning tool for a museum experience. It focuses on augmented reality via smart phones, where the phone's sensors measure the world and content is displayed on the device's screen. This abstract presents the results of a comparative study between two types of AR: Inworld space and screen space. The space in the AR world makes the virtual content recorded on the physical exhibition. The AR screen space makes the content virtual on the phone screen and uses the exhibit's physical space as an index retrieval point. The discussion that emerges from this study aims to assist in the development and design of AR applications in museums, by giving curators a better understanding of design options in AR spaces. Qualitative results suggest that the Inworld space benefits from learning.

KEY WORDS: Augmented Reality, In-world space, On-screen space, learning, short-term memory, interaction, museum, localization, Smartphone

I. INTRODUCTION

AR has been the subject of experimentation by museums since the early 2000s, with the promise of transforming the traditional mode of interaction between collections and visitors. AR's main feature of superimposing virtual content on the surrounding physical environment has the potential to merge the observational and interpretative aspects of the experience of a cultural object or site. AR possibly overcomes some of the limitations of exhibition space by introducing up-to-date content, delivered in a novel and captivating way, without the need for a physical renovation, thus being a resource-minded tool. It also affords the coexistence of the antiquated and contemporary, providing flexibility to suit different audience preferences. It does not compromise the emphasis on the museum collections, as the virtual overlay is dependent on and connected to the tangible exhibition.

By adding AR and studying the Visitor Experience in such an exhibition, one that through neglect was frozen in the past, this research reflects on the temporal and spatial tensions that are exposed in museums today when 21st-century technology and disruptive museum practices are revitalizing spaces and replacing traditional methods as a way to respond to visitor expectation.

Because most social networks provide shorten service on URLs inside messages it is difficult to identify the content without visiting the site.



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II. SIGNIFICANCE OF THE SYSTEM

The Purpose of the system is to overcome some of the limitations of exhibition space by introducing up-to-date content, delivered in a novel and captivating way, without the need for a physical renovation, thus being a resource-minded tool. It also affords the coexistence of the antiquated and contemporary, providing flexibility to suit different audience preferences. It does not compromise the emphasis on the museum collections, as the virtual overlay is dependent on and connected to the tangible exhibition.

III. LITERATURE SURVEY

Examples of Interactive Exhibits With Augmented Reality

- **Story of the Forest at National Museum of Singapore**

Bringing art and history to life is one of the main objectives of museum conservation. At the National Museum located in Singapore, there is an immersive "History of the Forest" exhibit that transforms 69 images made by the William Farquhar collection of natural history drawings - the museum's most popular collection - into three-dimensional digital animations.

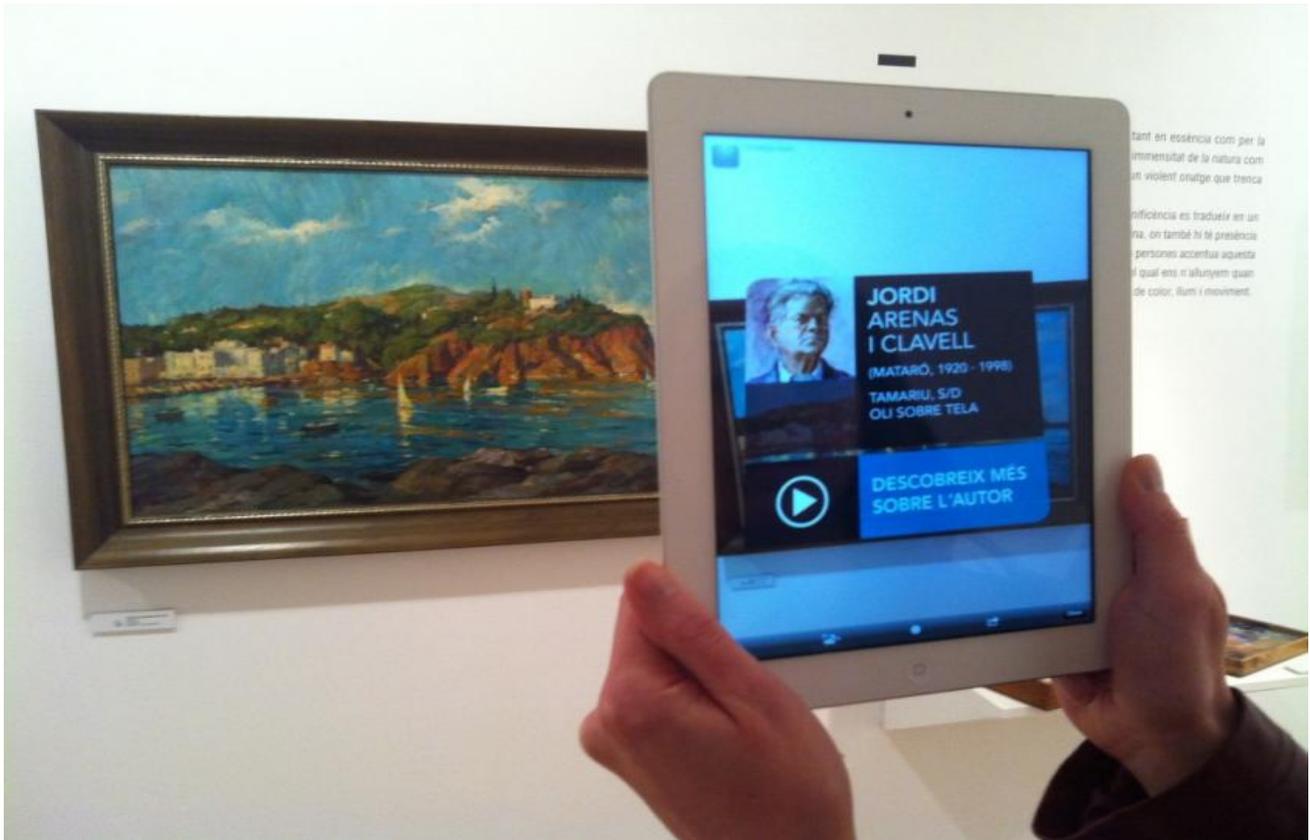
The exhibit features interactive elements designed to appeal to visitors of all ages. The little ones can interact with the animated fauna from Singapore. At the same time, the older visitors can download a mobile application that allows you to "capture" the fauna and flora (Pokemon Go style) of the exhibition and learn from it. More about them in the AR experience.

- **Heroes & Legends, Kennedy Space Center**

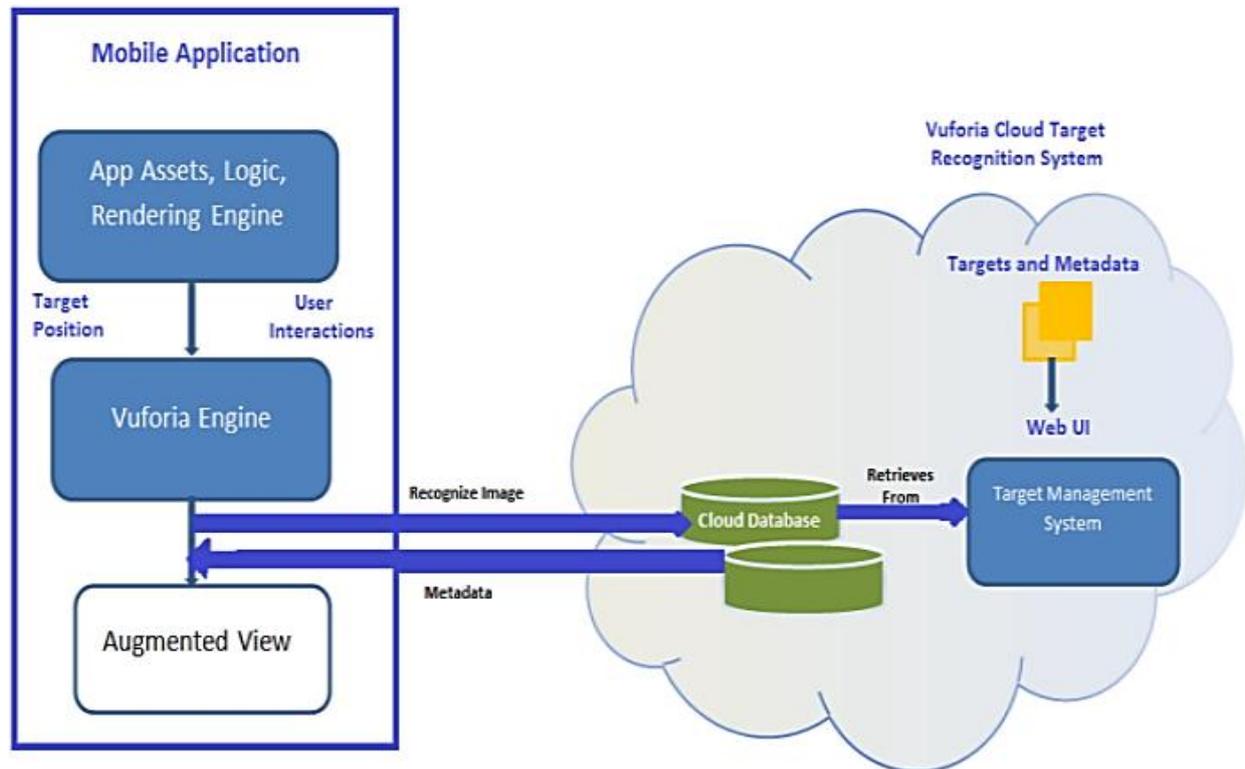
The Kennedy Space Center presents the incredible story of NASA's space exploration, from moon landings to spacewalks. It has numerous exhibits of NASA objects. With the addition of Heroes and Legends, visitors are entitled to a combination of virtual and augmented reality presentations with astronauts telling their stories in their own words. With this integrated visual experience, visitors are taken beyond facts and figures to get a real taste of space exploration.

- **Guerilla AR**

Just outside the new PTC World Headquarters in Boston is an interactive exhibit highlighting the history of the neighborhood and the discovery of a wreck that dates back to the 19th century when the building was constructed. Created by Skanska, the open-air museum presents sculptures and an immersive augmented reality experience powered by Vuforia.



Augmented reality technology can tell and enhance essential stories from our past, present, and future. It is also becoming a powerful learning tool with various applications. Museums are using it to improve the way visitors experience art and history, while manufacturers are implementing technology to improve the, improve training and reduce errors. However, these use cases can be distilled to something that is universal: education. AR provides learners with a transparent way to view and absorb information.

IV. METHODOLOGY**Fig2 – Proposed Architecture**

The system uses a client-server architecture, where the mobile application communicates with the Vuforia Cloud. Scanned AR Markers are sent to the cloud as requests, and the corresponding metadata is returned as a response. Fig. Shows the relationship between all the system modules. The mobile application was implemented as an Android app using Java as the primary programming language.

Description

This component is responsible for controlling the camera viewfinder for scanning quick response codes (ThingMark) and augmented reality (AR) markers, recognizing ThingMark codes, providing appropriate interpretation, sending requests based on the digitized AR markers, sending these requests to the cloud for recognition in order to obtain metadata and display the information interpreted from the metadata as augmented information on the phone screen. Vuforia Cloud Target Recognition System (VCTRS) is an enterprise-class image recognition solution that allows developers to host and manage image targets online. It acts as a recognition system which compares requests from the mobile application with targets saved in the cloud database to find a match, once a match is found, the appropriate metadata related to the target is returned in response to the client.

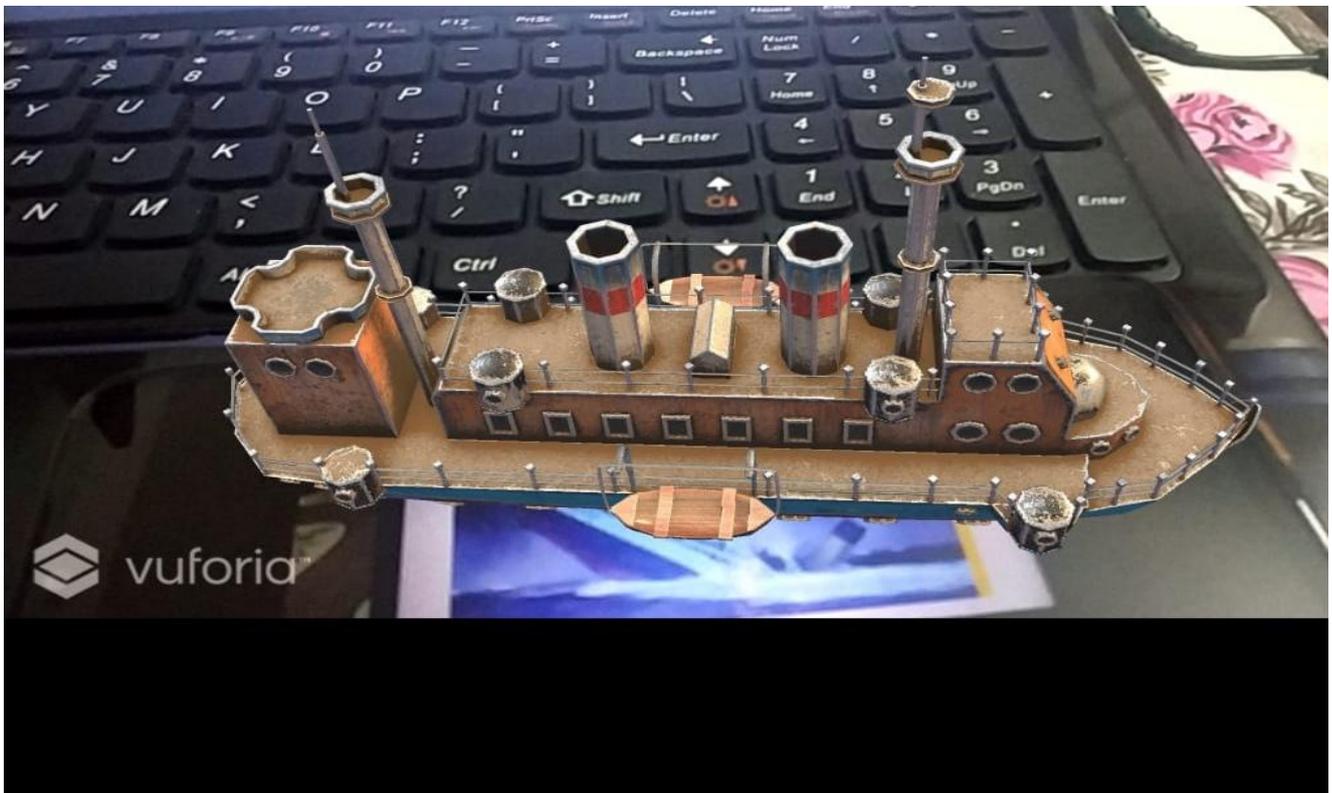
V. EXPERIMENTAL RESULTS

Fig3-Result

VI. CONCLUSION AND FUTURE WORK

Augmented reality in education has enormous potential, which remains to be discovered. With the current adoption of different mobile technologies and recent advances in hardware, AR is becoming more accessible and widely used. Therefore, the time may have come to take the first steps in this direction. The main motive is to overcome some of the limitations of exhibition space by introducing up-to-date content, delivered in a novel, without the need for a physical renovation, thus being a resource-minded tool. It also affords the coexistence of the antiquated and contemporary, providing flexibility to suit different audience preferences. It does not compromise the emphasis on the museum collections, as the virtual overlay is dependent on and connected to the tangible exhibition.

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