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## Augmented Reality Technology Spreads Information about Historical *Graffiti* in Temple of Debod

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### Abstract

Learning can occur at anytime and anywhere, even when you are travelling. In this article, we explain how augmented reality (AR) can be used to better educate tourists and visitors about the sites they choose to visit. Using the Temple of Debod in Madrid and its structures as an example, we focus on applying AR to the engravings on the walls of the temple. Through AR, these engravings take on a new life, giving visitors a more interesting and interactive experience that better educates them about the temple itself and about the different historical periods in which the ‘graffiti’ were engraved. Augmented reality, combined with audio commentary in different languages, will help visitors to locate the different graffiti more easily and appreciate the true wonder of the site and the motives behind the engravings.

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### 1. Introduction

This paper describes a didactic tool, based on a recently developed piece of technology that is relatively unknown. This technology will be made available by the team signing this article to help disseminate information about the Tahut scientific research project called Proyecto Tahut<sup>1</sup>. This project focuses on studying the surfaces, inscriptions, engravings and graffiti in the Temple of Debod and, by extension, the body of documentation about the

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structure.

The Universidad de La Laguna and the Museo de San Isidro in Madrid are the institutions spearheading this project, which has also been financed in two phases by the Government of the Canary Islands through public calls for proposals.

It is a well-known fact that the temple was located in the town of Debod, 14 kilometres south of the first cataract of the Nile. As a sign of gratitude for the help Spain provided Egypt in the 1960's in its campaign to save the monuments and archaeological sites of Nubia, this temple was given to the people of Spain by the Egyptian government. It was reconstructed stone by stone in a public park in Madrid, and has been standing in the same location since 1972. According to recent statistics, it has become one of the city's leading tourist attractions and museums, receiving over 400 thousand visitors every year. This places the Temple of Debod one of the most-visited monuments in the city, together with the Prado Museum, the Reina Sofia Museum and the Royal Palace.

For several reasons, the temple presents itself as the perfect site in which to test didactic projects such as ours. Firstly, there is a clear social interest in providing reliable information about the structure and its history; secondly, the sheer volume of visitors allows us to gain more relevant data sets for later analysis; and thirdly, the diverse socio-cultural demographics of visitors allows us to study the effectiveness of our methodology and dissemination methods across different cultures and languages.

From its earliest stages, the Tahut Project was characterised by a methodology based on the use of new technologies for the recording and epigraphical documentation of Debod: digital epigraphy, RTI and 3D reconstructions, amongst others. Since the methodology used to date has been technology-based, it follows that the dissemination phase is also based on the use of the latest state of the art computer technology.

This project has been possible thanks to a multi-disciplinary team and collaborations between Egyptologists, architects, graphic designers, I.T professionals, and specialists in image processing. In its beginnings, the project began with a team of Egyptologists - one of whom is specialised in museology, however, new professionals have joined in response to the project's changing demands that arose in response to expanding objectives. So, what was initially solely a team of Egyptologists transformed into a multidisciplinary team.

## **2. Augmented Reality Technology**

Augmented Reality (AR) involves creating a combination of images in a device, such as a smartphone, tablet, or pair of glasses, that has a camera. Applying AR through said device allows the user to simultaneously perceive the real-world environment and complementary virtual elements in real-time.

This paper describes an AR app designed, created and used to explain the temple's graffiti to visitors. The use of AR technology has proven a great opportunity for our work group to explore more attractive and appropriate tools for disseminating information about our work and research projects. In this case, it has allowed us to focus on an almost unheard of aspect of the history of Debod, which had not been studied previously. The wealth of historical information this could potentially provide is astounding; in other words, the use of AR provides us with a tool through which it is possible to present visitors with new and interesting academic information stemming from our research in a format that is easily accessible to them. The key concepts here are 'user-friendly design' and 'engagement'. The advantages of AR in comparison to more traditional dissemination methods are:

- a) exploiting new mediums offered by digital technology to communicate information and engage with users;

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