

# V-Horus

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Figure 1: The Roman Mummy.

## ABSTRACT

V-Horus aims to reconstruct archaeological artefacts from the Egyptian collection of the National Museum in Rio de Janeiro - Brazil, that were destroyed in the fire at the museum in 2018, using digital technologies and to visualize them through immersive experiences in Virtual Reality.

The main goal is to create a new type of interaction between the audience and the artefacts in order to involve and thrill the public. The final result, above all, has great symbolic value in enabling the digital reconstruction of a lost collection.

## CCS CONCEPTS

• **Computing methodologies** → **Virtual reality.**

## KEYWORDS

Roman Mummy, Egypt, Museu Nacional - RJ

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## 1 INTRODUCTION

The V-Horus Project is a collaborative work carried out by a multidisciplinary team, composed of designers, mathematicians, archaeologists, bioarchaeologists and historians with the objective of creating digital experiences from the Egyptian collection of the National Museum in Rio de Janeiro.

The piece shown at the VR Theater is the result of an initial experiment that encompasses the three-dimensional reconstruction of an Egyptian mummy and a presentation in virtual reality through the HTC Vive glasses. (See Fig. 1)

The process of developing the experiment involved 12 researchers from laboratories of the following institutions: National Museum; PUC-Rio; IMPA; and Fiocruz. This group selected a mummy from the Roman period (30 BC to 395 AD) that was around 2000 years and was chosen because of its historical importance.

Kherima, or Priestess of the Sun, are nicknames given to this Egyptian mummy of a woman who lived in the Thebes region, between the 1st and 3rd centuries. Her real name is not known, and almost all information about her life is hypothetical or conjectural in nature. Nevertheless, her mummification process made it extremely rare. The mummy was brought to Brazil in 1826 and was purchased at an auction in Rio de Janeiro by Emperor Pedro I and donated to the National Museum. Since then, Kherima has come to occupy a prominent position in the museum's collection, both for its rarity and scientific value and also for its fascination with visitors, being even associated with reports of parapsychological experiences.

On September 2, 2018, a major fire at the National Museum destroyed the Kherima mummy, as well as most of the institution's Egyptian artifacts.

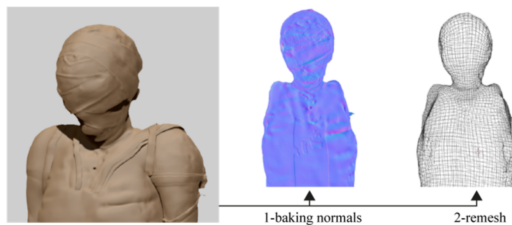
## 2 RECONSTRUCTING THE MUMMY

The digital reconstruction of the Roman mummy was performed based on records of previous research carried out within the Egyptian collection. These records include the following data: tomographic images (CT Scan); photographs of the artifacts; and notes from researchers on the mummification process.

Tomography has been used by the National Museum since 2003 as a non-invasive method of scientific investigation. Thus, in particular, complete data of the Kherima mummy survived even after its destruction in the fire.

Using these tomographic images, a 3D model of the artifact's surface was extracted from the tomographic volume. This allowed to generate a geometric reconstruction with the exact proportions of the mummy. The resulting polygonal model was exported in high resolution, allowing its manipulation in modeling and texturing programs.

This initial model was simplified, generating an adapted mesh to enable VR viewing. The details from the original geometry were projected onto normal maps, to simulate reliefs and details ( Fig. 2).



**Figure 2: high poly; normal texture maps; lowpoly model.**

For producing textures with color and PBR material, a detailed process of restoration and digital painting was carried out in which parts of the artifact were cut out of projected photographs and applied to the model's surface.

Finally, this model was placed in the virtual environment using the Unity platform.

## 3 DESIGNING THE VIRTUAL EXPERIENCE

The next step was the construction of an attractive narrative, focusing on the history and details of the artifact so that an immersive experience could involve the audience. For this purpose, the curator of the Egyptian collection, Antonio Brancaglioni Jr., wrote an initial script based on the visualization of the Unity prototype.

The VR piece was designed to create an experience with emphasis on the presence and observation of the artifact. It consisted of a virtual tour guided by the voice of the curator, with the aim of generating credibility to the experience.

In this process, cinematographic and game techniques were used in order to engage the user in the experience. For that, dynamic lighting was choreographed in synchronization with the narrative, so that the viewer would focus attention on the main aspects of the mummy as they were being mentioned in the narration.

Intentionally, a three-dimensional scenario was not built, since it could divert attention. The soundtrack was inspired from Egyptian instrumental songs.

This process resulted in a total experience of 3' 50".

## 4 DEPLOYING AND TESTING

In order to deploy and test the experiment, an installation was constructed that consisted of a table set up in the experiment site. On the table, a glass box similar to the one in which the Roman mummy was exhibited at the National Museum, but empty, representing the absence of the artifact. In the virtual environment, the showcase and the table served as a physical reference and had the function of making the experience more realistic, since the participants could touch them while viewing the mummy on a table in the virtual environment. In this setting, only one person at a time participated in the experience. (See Fig. 3)



**Figure 3: Installation set up.**

Two cycles of experiments were carried out for the public. In the first, during the 7th National Museum of Egyptology Seminar, between September 30 and October 4, 2019, with 200 participants. The second cycle took place at the Department of Arts and Design of PUC-Rio, between November 4 and 7, 2019, with 150 participants.

Some references about the project are: Alevato's MS. Dissertation [1]; the HDRio paper [2]; and the project web portal [3].

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