# The Use of Augmented Reality to Enhance Customer Experience in Museums

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## INTRODUCTION

The term "Augmented Reality" (AR) refers to a technology that adds digital content to the physical world, such as pictures, videos and 3D models. In the context of museums, AR can be used to enhance the visitor experience by providing additional information about the artefacts on display, bringing them to life and making the visit more engaging. For example, an AR app can be used to display virtual overlays of historical context, translations of inscriptions, or even virtual reconstructions of how the artefact may have looked in its original state. There are various ways that AR can be implemented in museums, such as through mobile apps, and projection-based systems

## RESEARCH

I visited several museums to research the potential usage of AR in museum exhibits. I was specifically looking for problems a common visitor would usually experience, how the use of AR can be used to solve these problems, enhance the visitor's experience and provide additional and insightful information about the artefacts on display.

Some museums I visited are:

- The Victoria and Albert Museum
- The British Museum

## Inspiration

Various times I visited the museum, I observed many times with artefacts having a foreign language or inscriptions, visitors are usually intrigued to it and would want to understand what those inscriptions or writings mean as it could provide more knowledge and valuable meaning of the artefact to the visitor.

Example of these types of artefacts are:

- The Egyptian hieroglyphics
- Islamic design and calligraphy
- The Rosetta Stone



**Figure 1. Egyptian Hieroglyphics at the British Museum.**



**Figure 2. Islamic Writing Scribe at the Victoria and Albert Museum**

## Ideation

I collected information mainly through observations and taking notes. I went to the museum to observe visitors and gather sample pictures for referencing, visited academic sites and YouTube to get more understanding of inscriptions on artefacts in order for me to create a more interactive design idea. I analyzed the data gathered by categorizing the different types of AR experiences that could be applied on artefacts and noting the overall effectiveness of each one.

I also found out that in Egyptian hieroglyphs, many people have wondered not only who deciphered the symbols but also what they mean and how they sounded in ancient Egypt. This was also a common interest among people admiring foreign artefacts involving a foreign language.

This was when I got the idea of using audio to listen to how the writings and inscription on an artefact would be pronounced and visual translation to provide a visitor with more meaning to an artefact with a foreign or historical language or writing system.

It also enables visitors to engage with the artefacts in new ways, such as by viewing translations.

This would ultimately provide the visitor with more valuable knowledge about the artefact and a greater experience in a museum.

## CONCLUSION

Overall, my research and design idea aim to provide museum visitors with a more immersive and educational experience by leveraging AR technology to enhance their understanding of foreign or historical languages and writing systems found on artefacts. This ultimately enhances their knowledge about the artefacts and provides a greater overall experience when visiting the museum.

## DESIGN CONCEPT

The AR application would be used to translate and provide an audio to listen to the pronunciation of the writings or inscriptions on museum artefacts that have inscriptions or foreign writings on them. The AR solution would also be applicable and reusable on similar language artefacts.

For this concept, I would be using the Rosetta stone from the British Museum, an ancient Tombstone with classical Arabic writings from the British Museum, and an ancient Leave Model with Quranic inscriptions from the Victoria and Albert Museum.



**Figure 3. The Rosetta Stone at the British Museum.**

Part of the principles that would be used in this project are:

- Visibility
- Feedback
- Discoverability
- Reliability

Using a mobile device, the visitor would have access to these key features:

- options to view more details of the target object.
- inspect a virtual model of the object for a complete 360 view
- view translation of inscriptions,
- and listen to audio of the inscriptions on the model.

Furthermore, I also took into consideration the technical aspects of the implementation such as the cost and the devices that need to be used and how it will integrate with the museum's setup and infrastructure. I also evaluated the potential impact of the design on visitor engagement, education, and overall museum experience.

Below are pictures of my initial design



**Figure 4. Design Concept – Initial Home Screen**

From the figure above, all the models in view would be highlighted with a brief description of the model.

I observed that the design concept could be better improved as the previous designs have overlays that displays too much information, taking most of the view of the user on a mobile device.

Below is a design I created, to avoid too much overlays obstructing the view of the actual museum object leading to a much better user experience when using the mobile application.



**Figure 5. Design Concept – Home Screen**

This design is more precise with less overlay which leads to a better user experience.

On clicking of a model from the home screen, the 'details' screen is displayed and the various sections of the model in view gets highlighted with some more details for translation and a button to play or mute an audio recitation.
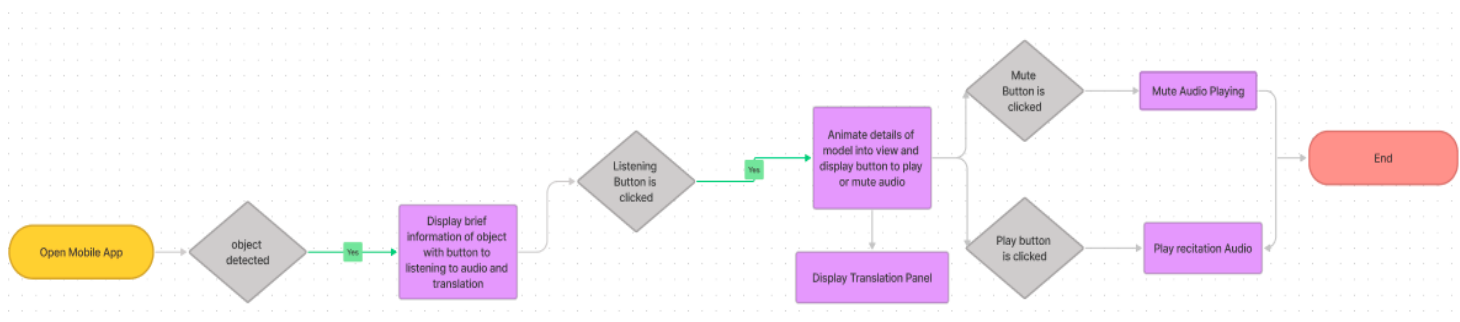


**Figure 6. Flow Chart Diagram of the AR application**

**PROTOTYPE**

The developed prototype is targeted towards museum artefacts with foreign inscriptions and writings on them. The application prototype allows the visitor to:

- view additional information about the selected object.
- Examine a 360-degree virtual representation of the object.
- Read translations of any inscriptions on the model.
- Hear audio recordings of the inscriptions on the model.

**Implementation**

In developing the application, I used the Vuforia package to help detect object and loading the AR application. I created models similar to the actual museum objects I want to augment and scanned them into 3D models.

The major artefact I was going to be using for this prototype are:

- The Rosetta Stone having 3 different languages written on it.

Using the scanned 3D models I generated, I exported the models into the Vuforia Model Target Generator which is a tool I used to create a database with a model target to be used in the Unity application.

With Unity, I developed my application and 3D objects using my design structure as a guide.

**Figure 5. Prototype – A model of the Rosetta Stone with overlays to display more information about the model.**

From the image above, detailed, well aligned overlays are projected around the model to display more information about the model with a button to read the translation and listen to audio of the inscription.

Using a Box Collider and a C# script, A button with a 'Read More' text acts as a listener for a click event, when the button is clicked, a C# script is executed which displays more details and a smaller virtual model of the Rosetta Stone and hides the button. The virtual model of the Rosetta Stone gets animated into view and its function is to enable a user

examine a 360-degree view of the model. The figure below shows the view that is displayed on click of the 'Read More' button.

**Figure 6. Prototype – A virtual model gets animated into view showing more details on the right-hand side with a button option to view translation**

The virtual model can be inspected and is constantly hovering on itself in view using the Animator component in Unity. On click of the 'View Translation' button, a C# script is triggered which dismiss the details view on the right-hand side and removes the virtual model from the view and displays three main sections:

- A translation tab on the right-hand side
- An option to Play/ Mute recitation Audio
- The three different sections of the Rosetta Stone separated from each other.

**Figure 7. Prototype – Translation tab on the right-hand side, three sections of Rosetta Stone separated with options to Play and Mute recitation audio.**

I made three models to demonstrate that the application of this design concept can be applied across various type of museum artefacts with inscriptions and writings.

**Figure 8. Prototype – Two other artefacts with foreign inscription using the same design concept.**