

Design and Development of “Slow Art” Experience for Tapaya’s Earthly Desires

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Abstract: We describe the design and development of a “slow art” experience of Rodel Tapaya’s painting, *Earthly Desires*, which was developed for the Microsoft HoloLens. The painting is a mix of mythological and historical imagery and can be appreciated from multiple perspectives. The experience that we designed offers viewers on a particular thread, provided by the artist himself, in which he describes how the painting emanated from the image and theme of the *agimat* or talisman. The experience was implemented using the Unity game engine and the Vuforia AR plugin for Unity. Due to community quarantines associated with the COVID-19 pandemic, we were not able to gather feedback from museum visitors regarding the experience but will be performed in the future.

Keywords: Augmented Reality, *Earthly Desires*, Slow Art

1. Introduction

Studies have shown that the average museum visitor spends from 27 to 33 seconds looking at an individual piece of art (Carbon, 2017, Smith & Smith, 2001). In recent years, though, a movement called “Slow Art” has taken root. Phil Terry, the founder of Slow Art Day, explains that “Many people don’t know how to look at and love art and are disconnected from it... By slowing down, it helps us to see art in a new way that energises rather than demoralises...” The slow art experience is defined as a style of looking that involves “heightened attention to the experience of time unfolding” (Davis, 2017). It is an encounter between the visitor and the art piece, one that rewards lingering, attention, and thought.

It is within this philosophy of slow art that we situate the work that we report in this paper. In cooperation with Filipino artist Rodel Tapaya, we design and develop a Microsoft HoloLens experience of his painting *Earthly Desires*. In this paper, we describe the design and development process of the experience but are unable to report on deployment as user testing was halted because of community quarantines related to COVID-19.

2. Related Literature

In 1928, Robinson (1928) wrote of the need to cater to the casual visitor. It is not enough for museums to cater to the connoisseur. Those who are well-versed in art are able to identify important pieces without assistance. As the casual visitor wanders, museums should attempt to capture their interests and fan them “into overt enjoyment.” Indeed, catering to the casual visitor is, to some, a matter of social justice. Museums should extend beyond a privileged subset and try to build community relationships, lest visitors feel dismissed or intimidated (Kinsley, 2016).

One way to build greater inclusivity and promote deeper understanding is through the use of extended reality technologies. Extended reality is the umbrella term that covers augmented reality (AR), virtual reality (VR), and mixed reality (MR). These technologies can be used for a variety of purposes: to visit a remote collection or part of a collection that visitors cannot otherwise access; to provide additional sources of information; to provide immersive, interactive experiences; and to tell stories, among others (Sylaiou, et al., 2018). Several mixed reality experiences already exist to address these different goals.

The Kremer Collection VR Museum is an example of a virtual reality experience. The 74 pieces in the collection are available to visitors via virtual reality only. The owners of the collection decided against building a brick-and-mortar museum because they were having difficulty finding a location and the costs were prohibitive. Instead, they worked with Moyosa Media BV to produce a 3D, high resolution digital museum that showcases the collection of Dutch and Flemish masters (Moyosa Media, 2018).

Many extended reality applications are used to provide additional information about a museum's collection. ARtLens (Pollalis, et al., 2018), for example, is a HoloLens-based augmented reality application that provides visitors with audio, visual, and textual information about an artifact the visitor approaches. The information is superimposed on the work. The user then airtaps to navigate through the materials.

Examples of immersive, interactive experiences include Studio Drift's (2017) *Concrete Storm*. In this experience, viewers see concrete columns tilt and sway around them. The Tech Museum of Innovation in San Jose, California has an experience called *Birdly*. Visitors are given the experience of a bird in flight around the Manhattan skyline or above the clouds (Sylaiou, et al., 2018).

Extended reality applications have also been utilized in informal learning spaces such as museums, and studies have shown that learning capabilities of museum visitors were enhanced upon being subject to extended reality experiences. For example, utilizing AR in science museums (Yoon, et. al., 2012) and mathematics exhibitions (Sommerauer & Müller, 2014) resulted in enhanced learning capabilities for museum-goers, and incorporating AR onto art installations resulted in enhanced viewer's appreciation and learning of art works (Kolstee & van Eck, 2011, tom Dieck, et. al., 2018).

Finally, extended reality experiences can be used to tell stories. The paper of Sylaiou and colleagues (2018) identifies at least two applications of this kind: Microsoft, Datacom in New Zealand and an indigenous group called the Ngati Whatua Orakei worked together to build a HoloLens experience that made the groups myths and stories more accessible to visitors. In Australia, another HoloLens experience was used to tell the story of Namande, a spirit that inhabits Kakadu, an Australian national park.

The *Earthly Desires* project draws inspiration from these examples, where we use augmented reality via the Microsoft HoloLens to provide visitors with additional information as well as to tell one of the stories the artist wanted depicted in the painting. Furthermore, note that the examples mentioned above were situated in developed countries. This project hopes to illustrate how the same technologies can be used in museums in the developing world.

3. Experience Design

3.1 Target Painting

In a catalog about Tapaya and his work, Recidoro (2015) describes *Earthly Desires* (see Figure 1) as a "kaleidoscope of historical and mythological images that represent man's desires, principally for freedom or power." The painting draws on Filipino mythology to convey these themes: a figure waiting for a liquid from a banana flower to drop into its mouth to give strength; the mirror image of an unjust ruler who grew horns because of his thoughtlessness; revolutionary Andres Bonifacio and his followers meeting in a secret cave, and so on. Figure 2 shows some of the various elements of interest that can be found in the painting.

Interestingly enough, our consultation with Rodel Tapaya offered another perspective. The artist offers the *agimat*, a talisman or amulet, as the starting point of his inspiration. From this starting point, the other visuals grew. By adding visual animations and audio narration, the experience encourages viewers to give the painting a more considered viewing and offers at least one of the artist's perspective of the work.



Figure 1. *Earthly Desires* by Rodel Tapaya.



Figure 2. *Earthly Desires* Painting Annotated with Points of Interest.

3.2 Viewing Sequence

Following Tapaya's advice, the thematic element in the painting, the *agimat*, was chosen to be the starting point for the experience. The viewer is prompted to gaze at the *agimat* to start the experience, where they are first introduced to what an *agimat* is. From there, an animation showing one of its tendrils extending guides the viewer to the underground cave where Bernardo Carpio, a mythological hero of great physical strength and the cause of earthquakes according to legend, is trapped by the power of an *agimat*.

The appearance of the snake-like creature with a cannon for a head evokes the battles fought by Philippine freedom fighters during the Spanish and American occupations. Andres Bonifacio, the man on the tree branch above the *agimat*, was one of the founders of the Katipunan, a Philippine revolutionary society that fought against Spanish colonial oppression. Like many other Katipuneros, he may also have carried an *agimat* with him.

Narration on the various powers of *agimat* continues as the viewer is guided by animations through other sections of the painting related to stories about objects of power and demonic trickery, such as the tale of the Leader with Horns, where a barber not only discovered that the town mayor was

actually a demon in disguise but also indirectly told the rest of the townsfolk via a rumor which turned into a children's song.

The experience continues by showing other creatures associated with protection in the painting and talking about people buying *agimat* from street vendors in Quiapo, a district in the city of Manila and home to Quiapo Church, where the feast of the Black Nazarene is held annually. The viewer's gaze is then guided back to the area near the underground cave before revealing the Katipuneros near the underground cave, referring to the fact that both the story of Bernardo Carpio being trapped and the Katipunan's secret meetings took place in the caves in the mountains of Montalban.

3.3 Design Decisions

To reduce both the risk of fatigue for viewers and the average waiting time if a queue forms, we initially set a maximum of 3 minutes for the experience's duration. Since many visitors to the Ateneo Art Gallery might not be familiar with the controls for augmented reality applications (such as gazes and gestures), the experience was designed to require almost zero interaction from the viewer except for the initial gaze to ensure the viewer was facing the right direction before starting the experience.

The whole experience was also designed while borrowing concepts from theater design with the guidance from one of our consultants, such as splitting the painting into "scenes", gradually fading scenes into view and fading scenes out from view, and using sound effects to drive the narrative, among others. He mentions that viewing a painting rich in various cultural references, such as Tapaya's *Earthly Desires*, can be an overwhelming experience, especially when viewed without any clues as to where to start looking. As such, Augmented Reality in this context helps greatly in viewing the painting since it is possible, to an extent, to use AR to dictate which elements are in view at any point in time, which can help guide the viewer to understand the painting better.

4. Implementation

4.1 Hardware and Software

We intended the experience to be viewed with the Microsoft HoloLens (first generation), an AR head-mounted display (HMD) where the viewer wears the AR display like glasses. While it was possible to present the AR experience via a mobile device such as a smartphone, we opted for an HMD instead to not make viewers feel fatigued from holding up a mobile device for a prolonged period of time, allowing them to fully focus on viewing the experience.

We developed the AR experience using the Unity game engine (version 2019.2.13f1) paired with Microsoft Visual Studio 2019, which provides various tools to easily deploy apps to the HoloLens. Since the viewer is required to gaze at the *agimat* in the painting to start the experience, we used the Vuforia AR Library plugin for Unity to enable the HoloLens to detect whether the viewer gazed at the *agimat* to start the experience, as well as to establish an anchor point for the coordinate space where all the AR content will be positioned relative to. Due to potential errors in the registration process when tracking the marker, the coordinate space may not be aligned properly with the painting itself, thus minor adjustments need to be performed whenever the application is started. This can be improved by utilizing the World Anchor feature provided by the HoloLens development kit, wherein adjustments to the position and orientation of the coordinate space can be stored and can be loaded every time the application opens. We plan to incorporate the World Anchor feature for the next iteration of the application.

4.2 Implementation Details

Once the viewer gazes at the *agimat*, the experience starts by slowly revealing a semi-transparent fog glass texture that covers the whole painting, with the intention of blurring the painting such that the animated elements in the experience pop up from the background due to contrast. We originally

intended to use a semi-transparent black texture for the overlay to make the painting appear darker. However, due to technical limitations of the HoloLens where darker colors appear more transparent, we opted for a semi-transparent bright texture instead to blur the painting. The experience ends with the fog overlay slowly disappearing to gradually transition the viewer out of the experience, from the mixed reality world back to the real world.

The whole viewing sequence was divided into seven (7) parts or scenes, where each scene represents different sub-regions of the painting that tells a part of the overall narrative behind the painting. Figure 3 shows snapshots of the different scenes featured in the experience.



Painting Bur at Start of Experience



Introduction of the Agimat (Scene 1)



Introduction of Bernardo Carpio (Scene 2)



Introduction of Andres Bonifacio and the Freedom Fighters (Scene 3)



Stories about Objects of Power and Demonic Trickery (Scene 4)



Introduction of Leader with Horns (Scene 5)



Story of People Buying Agimat (Scene 6)



Story of Katipuneros in the Caves of Montalban (Scene 7)

Figure 3. Snapshots of the Progression from the Start to the End of the Experience.

A scene consists of image pieces that are involved in the sub-region's narrative. The image pieces were extracted from the digital version of the painting, which was provided by the Ateneo Art Gallery, using GIMP (version 2.10.20), an open-source image editing software. The image pieces were extracted by cropping the image of the painting to the bounding rectangle describing the position

and size of the area of the image piece, wherein the position is relative to the upper-left corner of the painting. The bounding rectangles for each image piece were determined during the design phase. The cropped image pieces were then processed further by manually removing unnecessary parts from the image pieces (e.g., background color, foliage) via GIMP. The final textures for the image pieces were then imported to Unity and were positioned to match their original location in the painting. Given that the position and size of the image pieces' bounding rectangle are expressed in pixel coordinates, a conversion scheme was necessary to convert them from pixel coordinate space (expressed in pixels) to the physical painting's coordinate space (expressed in meters). Given the size of the painting in pixels (painting_size_{pixels}), the size of the painting in meters (painting_size_{meters}), the location and size of the image piece in pixels (piece_offset_{pixels} and piece_size_{pixels} respectively), we calculated the location and size of the image piece in physical coordinate space (piece_offset_{meters} and piece_size_{meters} respectively) using the following equation:

$$\begin{aligned} \text{piece_offset}_{\text{meters}} &= (\text{piece_offset}_{\text{pixels}} / \text{painting_size}_{\text{pixels}}) * \text{painting_size}_{\text{meters}} \\ \text{piece_size}_{\text{meters}} &= (\text{piece_size}_{\text{pixels}} / \text{painting_size}_{\text{pixels}}) * \text{painting_size}_{\text{meters}} \end{aligned}$$

Each image piece is then animated individually by hand using Unity's built-in animation system. Some of the image pieces were animated by modifying their corresponding transform properties (position, rotation, scale) over time, while some were animated by controlling what parts of the image piece are visible over time. For the latter, a custom shader that accepts a base texture image, a mask image, and a cutoff value was written to achieve the intended effect. The base texture image is the texture for the image piece itself, while the mask image is a grayscale image with a transparency channel that represents which parts of the image piece are visible based on the progression of the animation. For example, a pixel value of 0 (black) means that it is visible at the start of the animation, a pixel value of 1.0 means that it is visible at the end, and a pixel value of 0.5 means that it is visible halfway through the animation. Pixel values with an alpha (transparency) value of 0 are automatically discarded to enable the creation of mask images with complex shapes. Note that the size of the mask image does not necessarily have to be equal to the size of the base texture image, for all computations are done in the shader where texture coordinates are from 0 to 1, and in-between values are interpolated. Finally, the cutoff value ranges from 0.0 to 1.0, and controls how far into the animation the image piece currently is. Internally, the cutoff value controls which pixels are visible at a given point in time, such that areas in the mask image where the pixel value is greater than the cutoff value are discarded. For example, given a cutoff of 0.5, all areas in the mask image where the pixel value is higher than 0.5 will not be visible when rendering the texture of the image piece. The cutoff value was then animated over time through the built-in animation system to produce the effect of the image piece being slowly revealed over time. Figure 4 shows an example of the image mask used to show the *agimat* at the start of the experience, as well as the effects of different cutoff values. The center region of the mask is mostly black (0 pixel value), and smoothly transitions into white in a radial manner. All the mask images were all created by hand using GIMP as well.

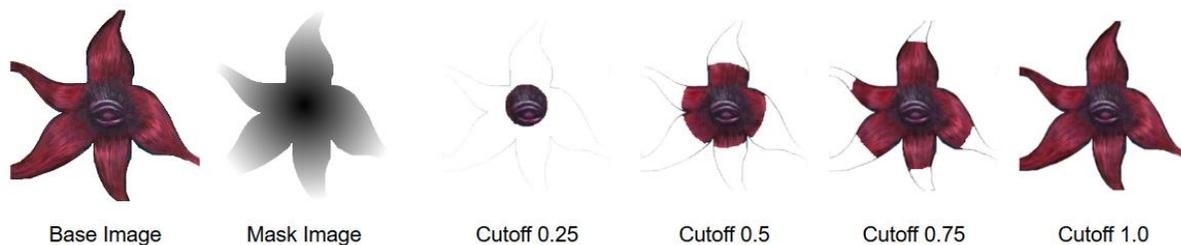


Figure 4. Example of an Image Piece with its Corresponding Mask, and the Effects of Different Cutoff Values.

Once the individual image pieces were animated, they were then grouped into their corresponding scenes. Each scene also contains an audio track for the voice narration that describes what is happening in the scene, a set of audio tracks for accompanying sound effects, and a set of

animated image pieces. Particle systems were also utilized to enhance the visual animations in the scene. For example, during the scene where the freedom fighters were introduced, smoke particles were emitted from the tip of the cannon when the cannon fires a cannon ball. Particles were also displayed on the location of the *agimat* towards the end of the experience to further emphasize that the *agimat* is the central theme of the whole experience as well as the painting. The timings as to when the image pieces appear, animate, and disappear, when the particle systems are displayed, and when a specific audio track plays were all orchestrated using Unity's built-in timeline system. Each scene has their own timeline component and are called in succession by another script that manages the progression of the experience.

From start to finish, each scene is automatically played in succession with a two (2) second delay in between scenes. The scenes are played automatically to minimize the amount of interaction required from the viewer, and the delay between scenes serves as a way for the viewer to settle down after all the animations and the narration in the scene has finished, as well as to internalize the narrative presented in the scene. The choice for the duration of the delay was arbitrary, with the intention of making it long enough such that the viewer has a bit of time to reflect on the events that happened during the scene, but short enough as to not confuse the viewer whether the experience is already finished or if there is still another scene that follows. As the viewer progresses through the experience, previous scenes gradually fade out of view as to not overwhelm the viewer with all the visuals, and to avoid confusion on the side of the viewer as to where exactly to look. This design choice drew inspiration from theater design, where props used in a previous scene are subtly removed while the next scene is in view. The *agimat*, however, is constantly visible throughout the experience to emphasize that the *agimat* is the central theme of the experience and the painting. Finally, we also expected the viewer to look around the painting and its surroundings while viewing the experience, thus to make sure that the viewer does not miss the transition to the next scene, the application first checks whether the viewer is looking in the general direction of the painting before transitioning to the next scene. This was done by checking whether the angle between the view direction and the normal vector of the surface of the painting is less than or equal to 60 degrees.

Finally, during the design phase, there was also consideration of constructing the animations via a video editor software, and then presenting the whole experience by simply playing a series of video clips that are superimposed on top of the painting. We decided to adopt the current approach of constructing all the animations using Unity since it minimizes the amount of software needed to design the whole experience, and that constructing the animations and controlling the timing for the animations and the audio tracks inside Unity makes it easier to perform minor changes, and to test and see the changes instantly, instead of having to re-render and re-import the video clips every time a change has been made.

4.3 Narration and Audio Effects

To accompany the visuals, a narration of the scene accompanied the experience. In dramatic fashion, the narrator provided the viewer with a verbal explanation of the unfolding elements, with the narration delivered as if the narrator is a village elder telling the story to other members of the tribe. The narration begins with the explanation of what an *agimat* is and progresses to tell brief stories about Bernardo Carpio, Andres Bonifacio, and so on. Additional audio effects such as water drops, bird song, and wind provided the atmosphere to the experience and also act as cues to control pacing by filling in the delays between scenes.

5. Conclusions and Future Work

In conclusion, the project was successful in implementing the slow art experience. Feedback from our consultants and the artist himself was positive. They approved of the way the experience was designed and implemented, and they believe that the AR experience provided by the application will greatly help the art gallery visitors understand the cultural references presented in the painting better. They are also

convinced of the benefits that AR technology provides for enhancing the appreciation of paintings in general and are thrilled with the idea of incorporating AR technology to provide a similar experience for other paintings.

In the introduction and the review of literature, we mentioned that part of the goal of museums should be inclusivity and that the use of extended reality technologies was one way to achieve this goal. This project illustrates how indeed these technologies can be used even in developing countries, with local artists such as Rodel Tapaya.

Because of the COVID-19 pandemic and its associated community quarantines, we were unable to test the work. The next step, therefore, is to actually have museum visitors try the experience, ask them for their feedback to see whether the experience actually did provide them with a deeper appreciation for the painting, and modify the experience accordingly. While slow art is a widely encouraged method of enhancing visitor engagement, more research is needed to verify what benefits this approach brings (Chamberlain & Pepperell, 2020). Researchers have yet to ascertain the extent to which slow art enhances visual thinking strategies, art appreciation, and/or the museum experience in general.

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