Documentation: Gallery Plus

AR Experience Prototype

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Chosen Topic: Tourism in Australia

Target User: Australia International tourists who are going to visit galleries.

Primary Problem Space: No APP or installation to View Gallery Content in Different Languages.

Usually, the description of most artworks in Australian galleries are using local language like English (Figure 1,2,4,5), some major galleries like Art Gallery of NSW might have one or two other languages (Figure 3). Therefore, International visitors with no knowledge of these languages will only appreciate arts visually. Although they might understand the artworks by the digital audio devices in some galleries like National Gallery of Victoria, but it might be more straightforward if they can simply use their phone.

Figure 1 & 2: White Rabbit Gallery, NSW

Figure 3: Art Gallery of NSW

Figure 4 & 5: Victoria Art Gallery

Secondary Problem Space: No Convenient Device to Enhance, Save and Share Artworks.

Although there might be some devices like a guide audio player for international visitors, the interaction and connection created between international visitors and artworks are only based on verbal understanding. As they will have to return the device when they exit, the detailed information they heard and the artworks they like might not be memorized, shared or saved. In order to create more engagement between international visitors and gallery artworks, a special program system can be designed to suit the need.

Background Research: Our Target User Are Tech Savvy and Need the Guidance in the Gallery.

According to Museums and Galleries of NSW in 2011, almost half of the international gallery visitors are aged between 15-35 (Figure 6), which indicates that our target audience are most likely technology savvy, so that using an AR mobile APP will be efficient for these visitors. Besides, most international gallery visitors are the first-time visitors to the gallery, which raises their need for guidance in the gallery.

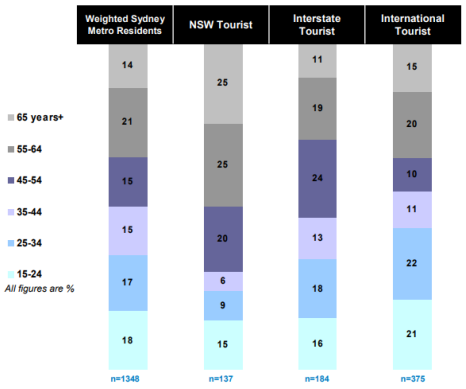


Figure 6: Age Distribution of Gallery Visitors

Figure 7: Visit Frequency of Gallery Visitors

Aim of the Project:

Help the international visitors to understand the artwork exhibition held in Australia easily and conveniently by presenting content with various of languages and providing fun and engaging experiences to raise international visitors' interests in gallery artworks in Australia.

Description of the Prototype

A platform that enables tourists to scan and check details of artworks in the gallery with various of languages in order to develop a deeper connection and understanding of the artworks. Some famous artworks can be animated in AR to enhance the engagement.

Structure of the Prototype

- **Gallery Searcher:** Search and Locate the current library to load the artwork data.
- **Recognition:** Use image target in Vuforia to recognize the image.
- **Animation:** Parallax effect or animation can be applied to famous artworks.
- **Information:** The UI panel showing information will appear if function triggered.
- **Storage:** The recognized artworks can then be stored in their own digital library, no matter the APP is closed or not.
- **Visual:** I will URP in unity to apply post-processing effect and reduce the lag in the app.

My Components and Classes Diagram

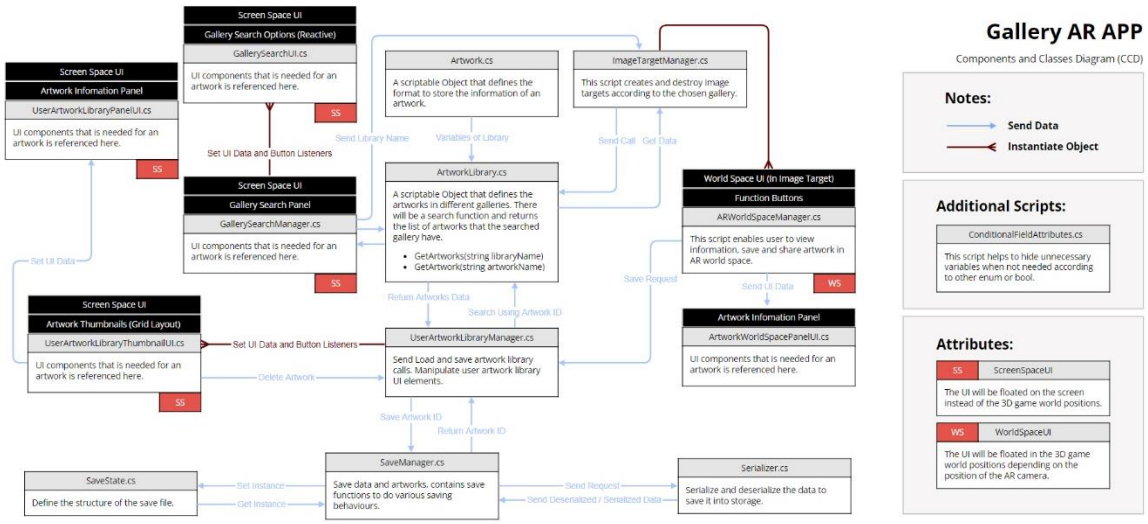


Figure 8: My Components and Classes Diagram for the Gallery AR APP

Motivations

I went to the National Gallery of Victoria in Melbourne a lot within 4 years, and I started to realize the limitation of the physical description panel next to the artwork. As the language is either English or Chinese, international visitors who do not speak these languages will not understand the content written on the panel. Therefore, I decided to design an AR app that they can download and use easily on their phone instead of looking it up on the internet or asking for a special device from the gallery.

Design Process

I. After designing the program and scripts using components and classes diagram, I started to created C# scripts in Unity. Surprisingly, I found it a lot faster and clearer to code with the help of the diagram.

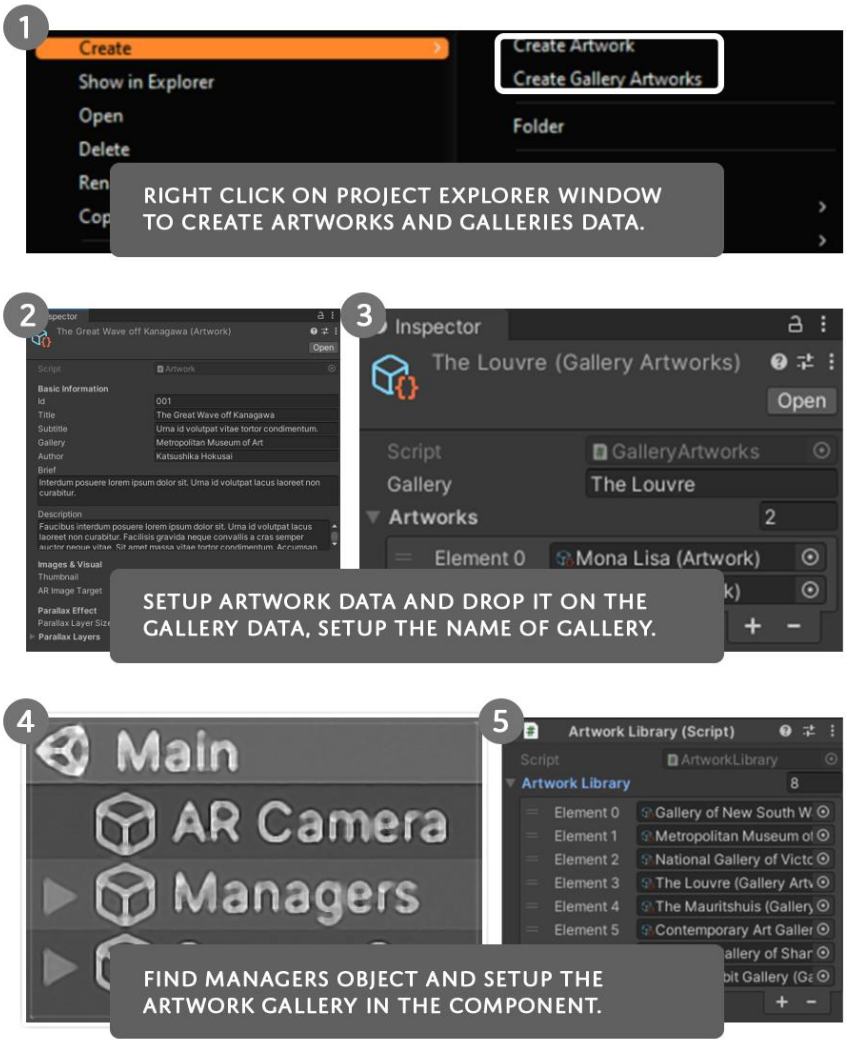
II. According to the diagram, I created the artwork and gallery classes using scriptable objects in Unity, which will enable editor to access the option to create dataset in project window.

III. Then I started to add some initial draft UI objects in the scene. And after a few tweaks, they worked perfectly.

IV. I imported the Universal Render Pipeline and added some post effect to my visual style. In case someone want to see the image without effect, I setup a toggle button for it.

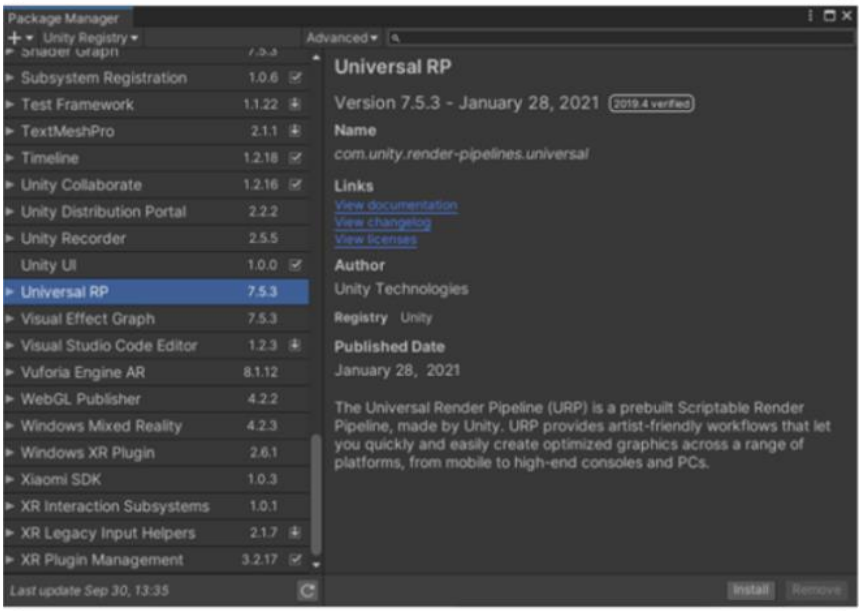
V. After the setup of functionalities in the app, I started to design and refine my UI and experience. I added a start screen to guide the user and also gives them the sense of logic and progress. I chose black, white and orange as the main color theme for my app in order to give a clean and modern look of my app.

Here is how to setup new artworks and galleries in the database:

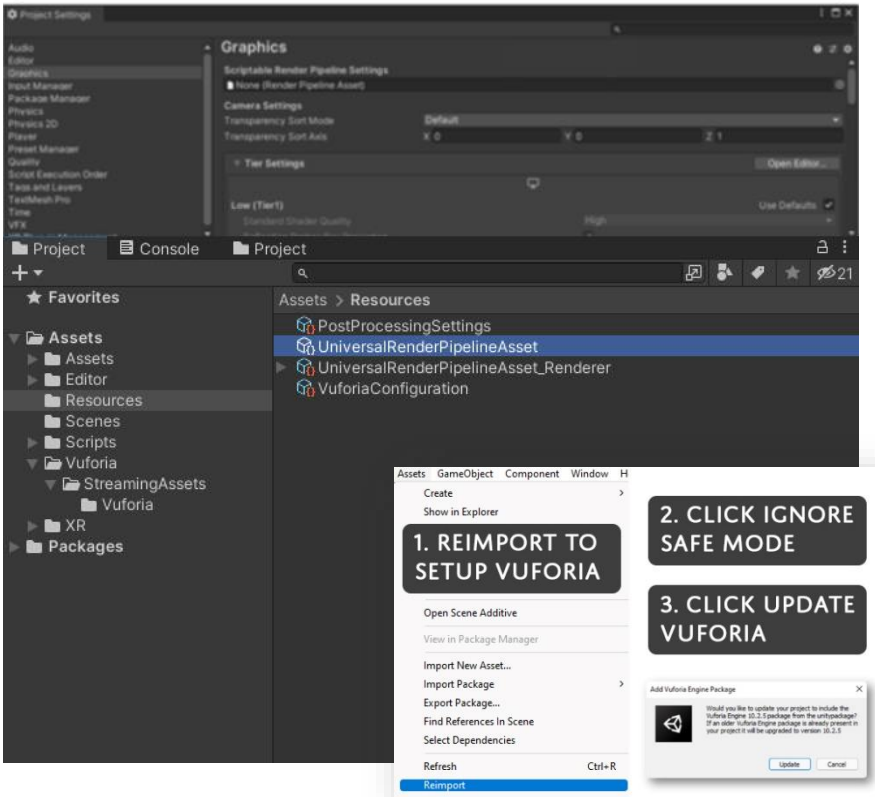


Guide 1: Before You Start

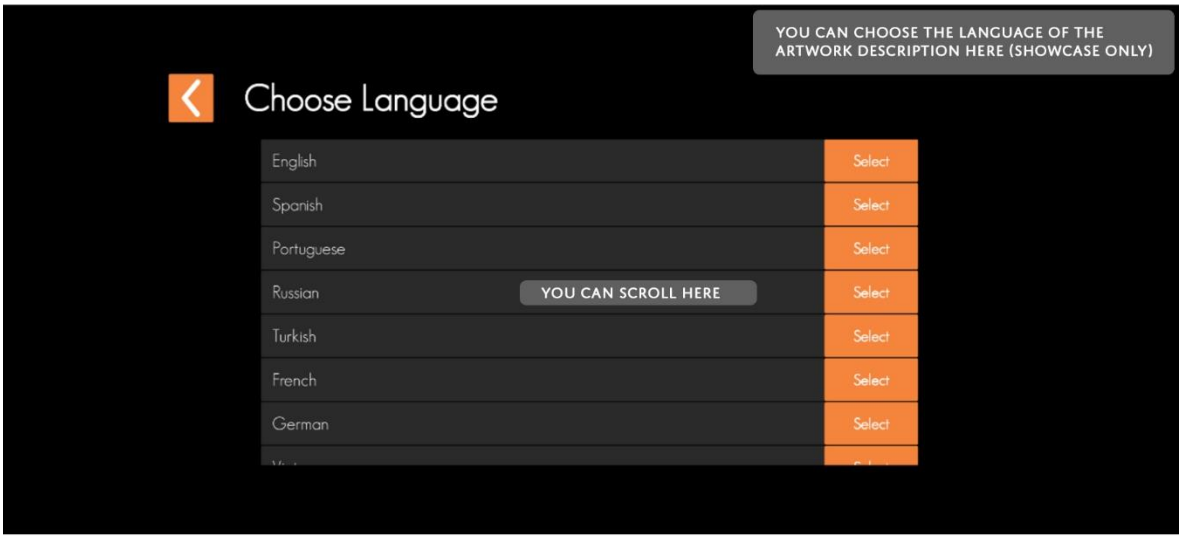
INSTALL THE UNIVERSAL RENDER PIPELINE IN THE PACKAGE MANAGER.

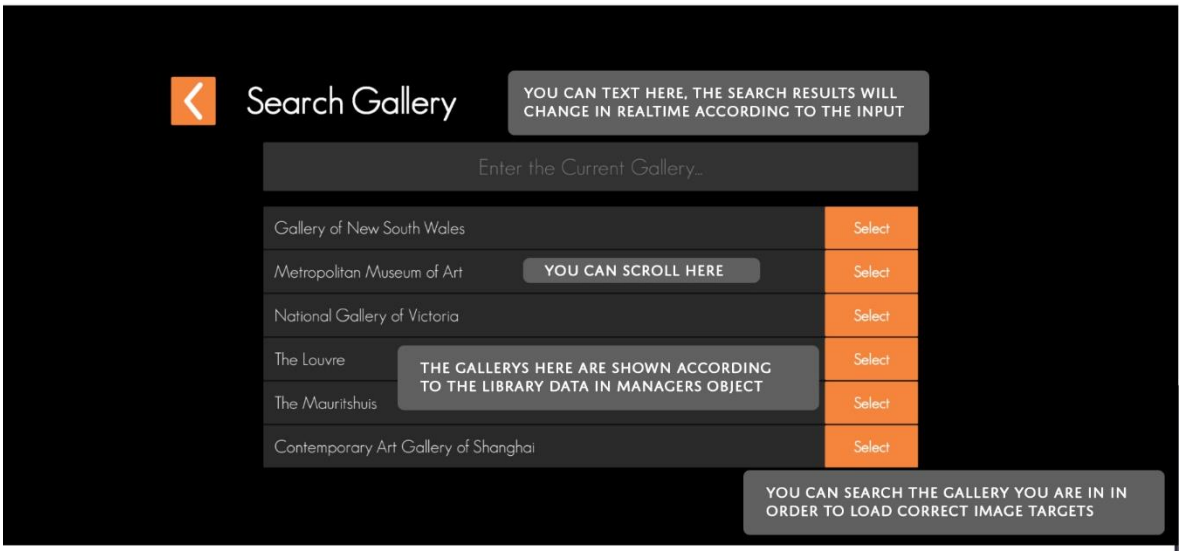


DRAG AND DROP THE ASSET FILE IN PROJECT SETTINGS TO APPLY AND ACTIVE THE PIPELINE

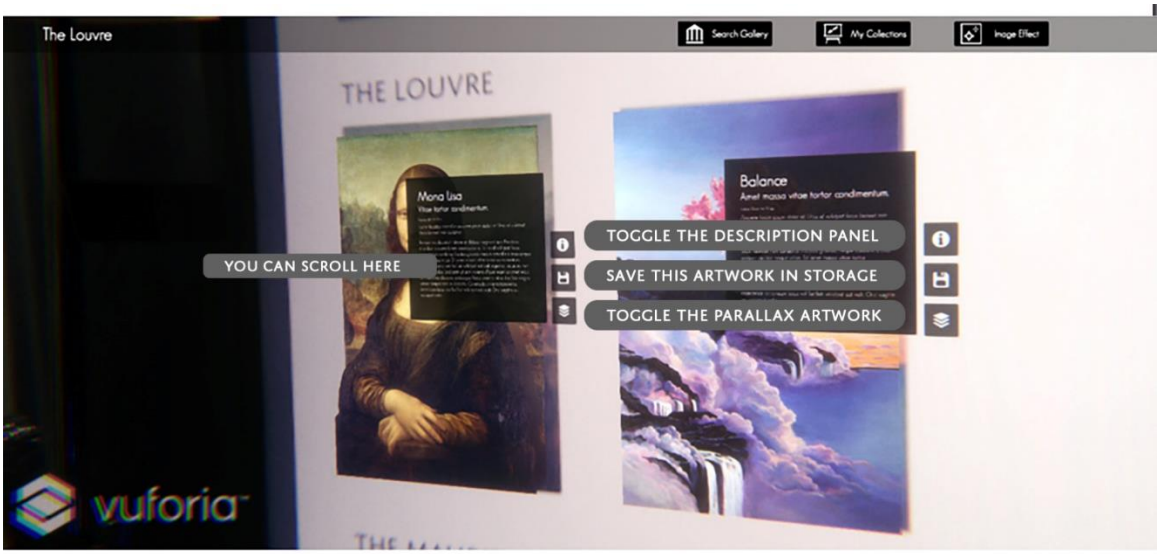


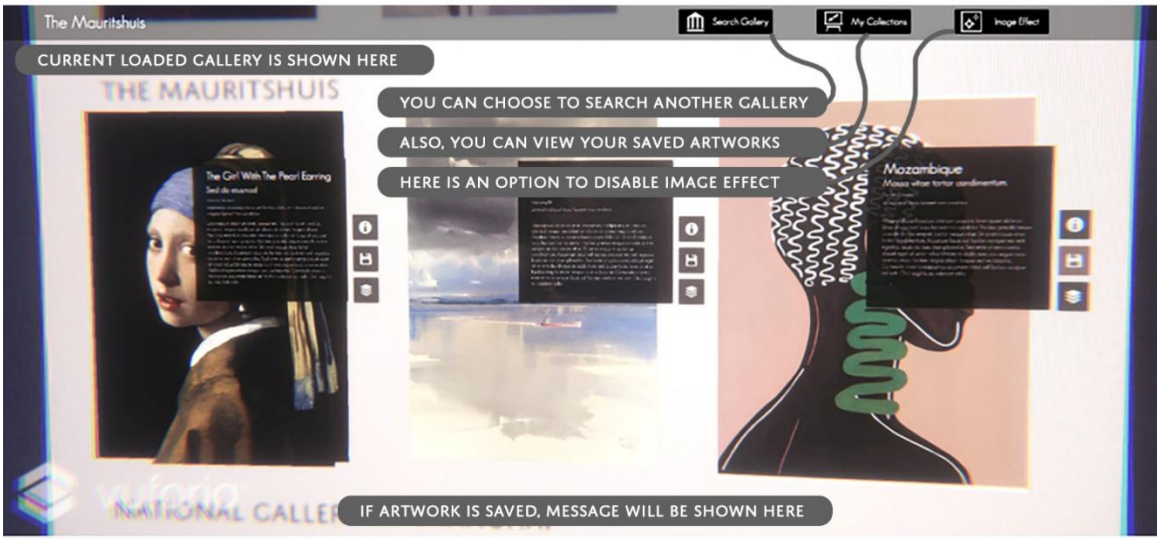
Guide 2: How to Get Started

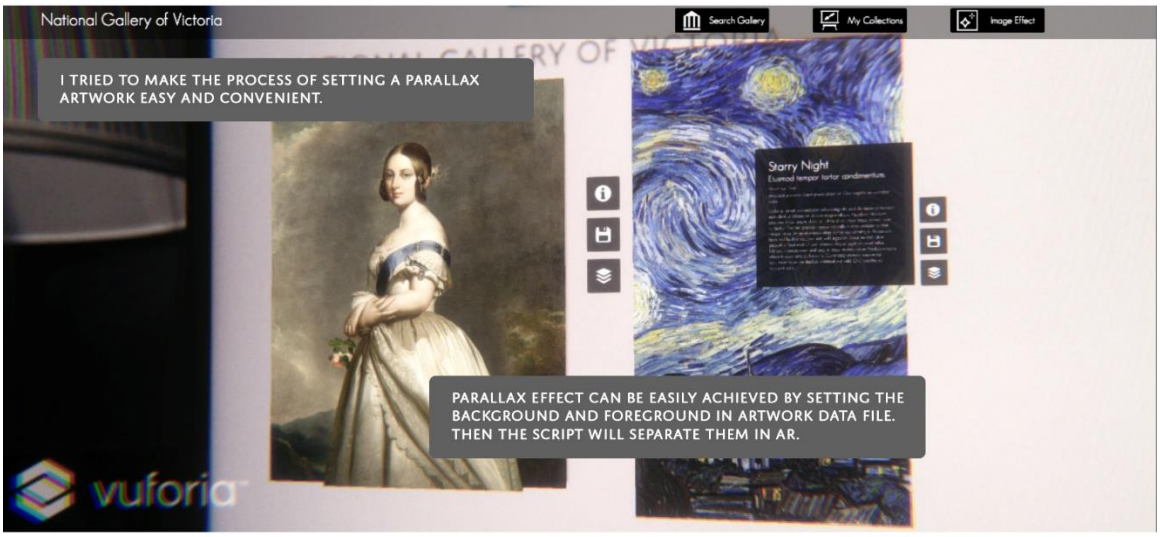




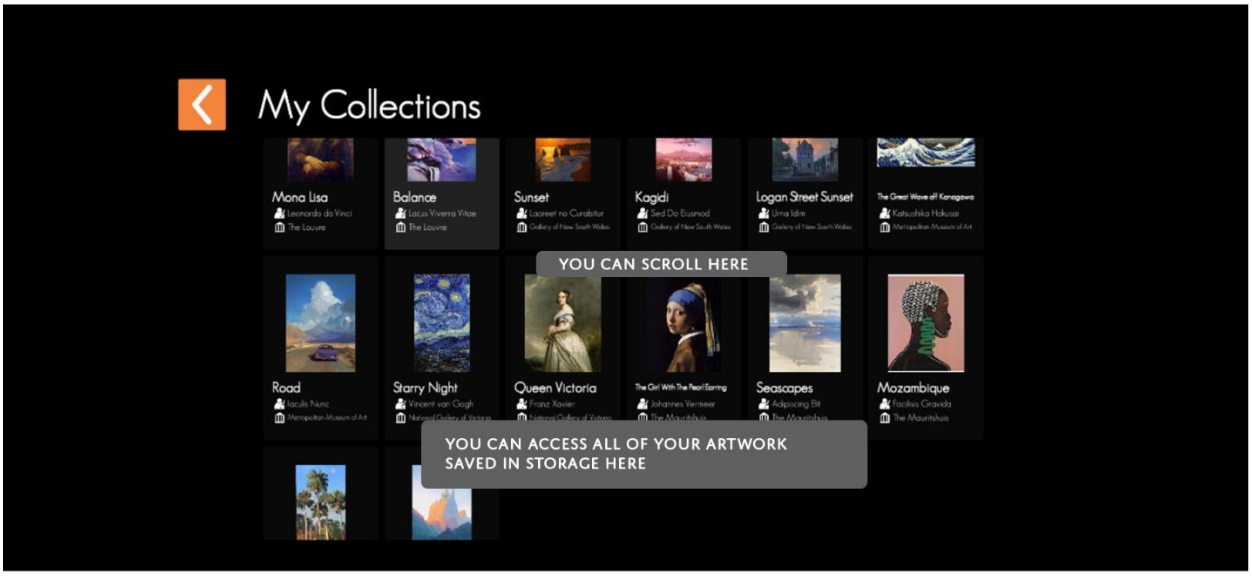
Guide 3: How to Use AR Functionalities

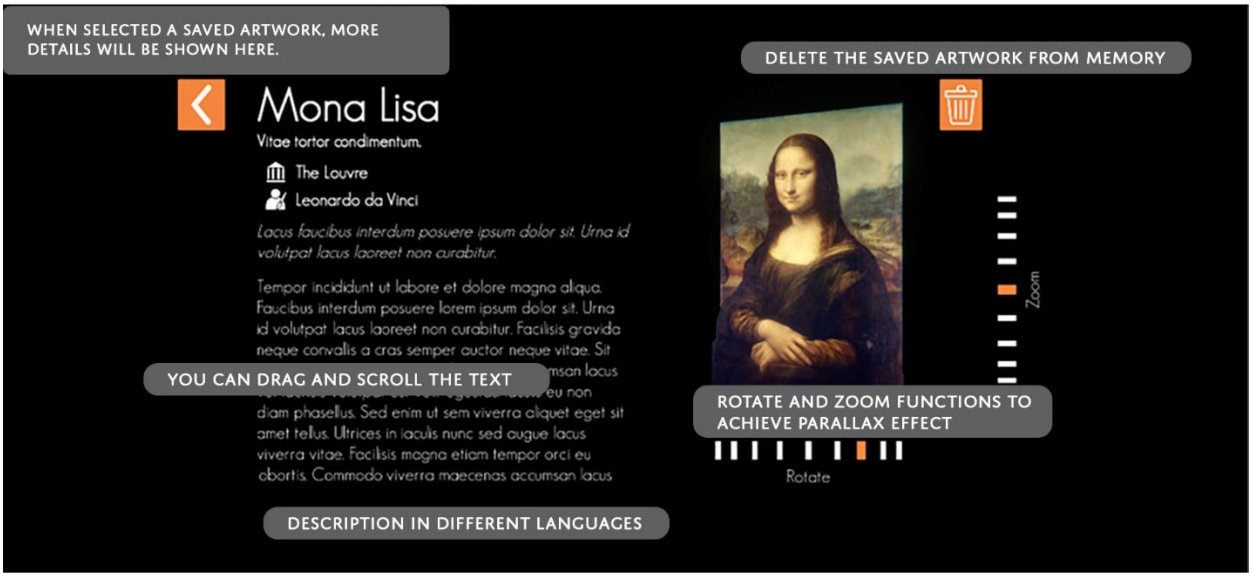






Guide 4: How to View the Artworks That You Saved





Evaluation & Summary

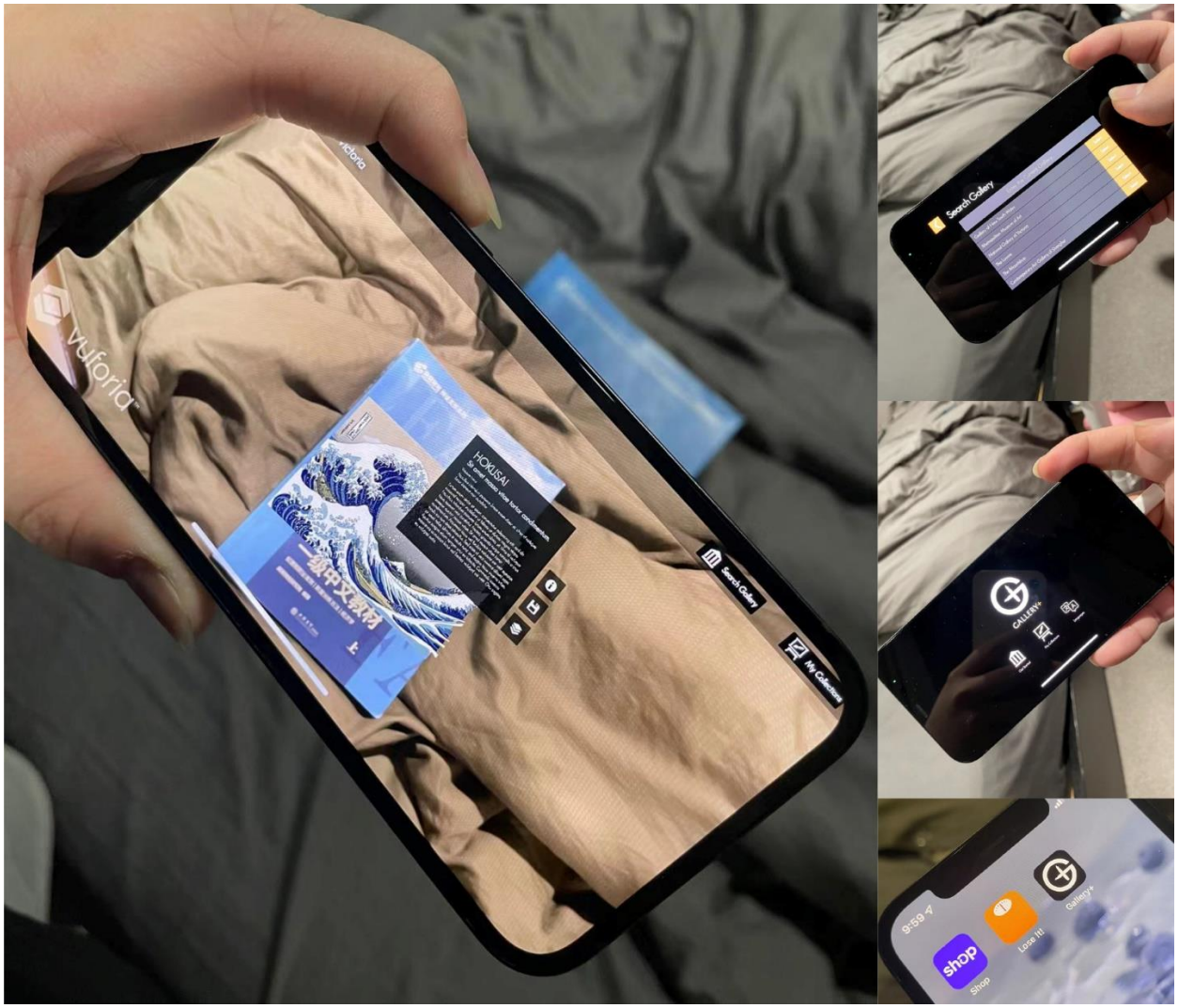
•**Information overload is avoided** by displaying only three separate function buttons. Detailed information can be view later in the collections if saved.

•**Depth perception cues are used** by creating parallax effects for the artworks.

•As the **physical environment** for the experience is gallery, the size of the control panel is related with the size of the actual artwork in the gallery. The UI will follow the actual artwork, making the AR experience **tangible.**

•In the project, the artworks become the markers, and they are different in each gallery. **These markers are loaded** according to the selected gallery.

User Testing



I installed the app on my iPhone and did the user testing with Danni, who usually goes to the gallery and have insightful suggestions on artworks. The overall UI interaction is fluent with the help of icons, text and the start screen. The feedback from her is quite positive, but there are still a few suggestions. She said that she can see how it could help international visitors, but they might need more motivations to download the app. She suggests adding more functionalities, such as rewards like NFT or badges after collecting certain number of artworks. Also, the app could show the feature of each artwork. For instance, user can zoom in and see the specific paint used. In this way, the user can have a more interesting experience in the gallery.

Future works

I added a fake language selection option at the start screen to demonstrate the functionality of adapting different description languages for foreign international visitors. I will add this feature in the future but it will need much more resources and data for each artwork, which would be the challenge for me when developing the system.

Issues and Bugs

•The preview image in my collections does not always match the size of the boundary, so I had to use a zoom scroll control to let the user adjust by themselves.

•When deleting an artwork, there is no confirm window popup, which make cause unintentional deletion.

•In IOS, sometime I cannot load any image target though the gallery search script. I checked the log in XCode, it seems to be caused by an internal error in Vuforia when it tried to convert image target to pixel buffer.

Asset Bundles Used

- Vuforia AR Package, Vuforia Engine (2021), https://developer.vuforia.com/downloads/sdk
- Universal Render Pipeline, Unity Engine (2021), https://docs.unity3d.com/Packages/com.unity.render-pipelines.universal@11.0/manual/index.html

Icons Used

- https://icon-icons.com/icon/layers/111168
- https://www.iconfinder.com/icons/2639912/save_icon
- https://icon-icons.com/icon/effect-preset-tool-edit-selector/196304
- https://www.mcicon.com/product/information-icon-13/
- https://www.shutterstock.com/search/delete+symbol
- https://www.dreamstime.com/artist-artist-icon-image146985061
- https://www.shareicon.net/gallery-pin-museum-maps-and-flags-map-pointer-map-location-map-point-644230
- https://iconscout.com/icon/back-arrow-1767507

Artworks Used

- https://edition.cnn.com/style/article/most-famous-paintings/index.html
- https://www.pinterest.com.au/pin/713046553506741769/
- https://www.pinterest.com.au/pin/675258537871951136/
- https://www.pinterest.com.au/pin/50102614594260028/
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- https://www.pinterest.com.au/pin/12103492723197156/
- https://www.pinterest.com.au/pin/14073817574607699/
- https://www.pinterest.com.au/pin/590464201138344223/

References:

Art Gallery of NSW Annual Reports, Art Gallery NSW (2020), https://www.artgallery.nsw.gov.au/about-us/corporate-information/annual-reports/agnsw/

Guess Who's Going to the Gallery: Sydney metro report, Museums and Galleries of NSW (2011), https://mgnsw.org.au/sector/resources/online-resources/research/guess-whos-going-gallery-sydney-metro-report/

Sydney Art Galleries, Sydney.com (2021), https://www.sydney.com/things-to-do/arts-and-culture/art-galleries

Interview With David Williams from White Rabbit Gallery, Giles Colliver (May 5, 2017), https://www.culturescouts.com.au/stomping-ground-blog-source/2017/5/5/interview-with-david-williams-from-white-rabbit-gallery

The Grand Courts, FRD.com (2021), https://www.frd.com.au/the-grand-courts

Create and Load Targets in Unity, Vuforia Engine (2021), https://library.vuforia.com/objects/create-and-load-targets-unity

Appendix - Abandoned Concept: **More thoughts on the problem space need to be considered.**

Target User: International Sydney visitors and tourists that comes for the first time

Problem Space: Tourist that arrives at Sydney might not have guidance

Concept: An online platform that projects the whole Sydney map in AR reality and allows people to explore different tourist attractions on the 3D map. Chosen locations will then be stored in the library and can be scheduled on the visitor's calendar.

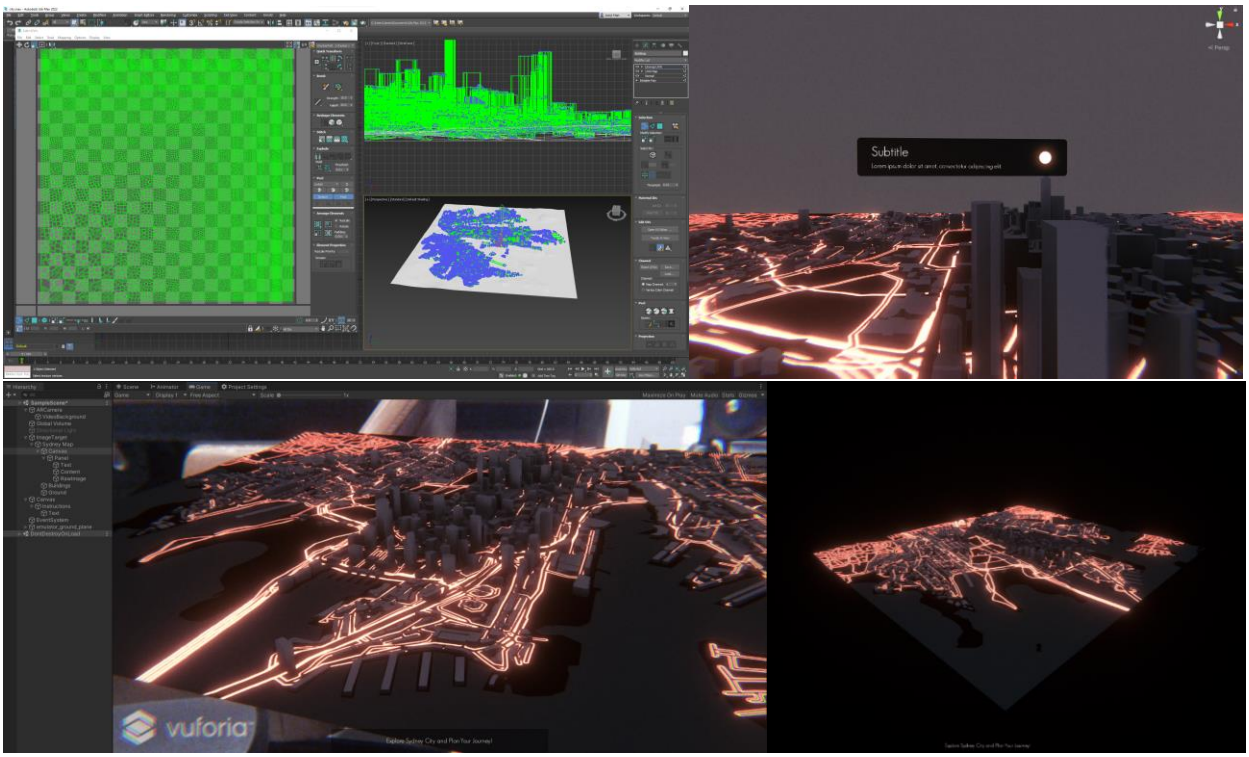
Prototyping Process:

1. Get the 3D map of Sydney and optimize it as much as possible, reduce the polygons to acceptable area. Then put it in the scene and setup the material.
2. Put buttons on the map. These buttons are meant to show different locations of tourist attractions.
3. Create a scroll list that contains all the locations that the tourist stored, when the tourist clicked the button, information panel will show up, providing all the information about the location.

I found it very hard to retrieve a high-quality Sydney map at low cost. Unfortunately, the only map I could found that is free is broken. Here is the link: https://sketchfab.com/3d-models/sydney-australia-19402dd9c2ba41588712574b0b211baa When I imported it to Unity, I found out that the model has errors in its normal as the ground is not visible. It is also not optimized for mobile phone as there are too many triangles.

I inverted the normal of the ground in 3dsmax. As the model has so many vertices, I will have to optimize a little bit by preserving only a part of the city. The Unity LOD tool only support reducing triangles on a single object, so I have to split each single building into different objects. I don't know how to do it in 3ds Max quickly so I will leave it unoptimized. Also, when I tried to bake light, it does not work properly, so I realized that the model has not unwrapped the UV. So, I unwrapped the UV map in 3dsmax.

I processed the map in photoshop and cut out the road as grayscale and applied it to the model as emission map. Added a little bit of post-processing. I tried to adapt the real time light from the real world to the scene but the exposure sometimes becomes so high and unstable. Because it could affect our experience, I will abandon the functionality. Here is the original forum: https://developer.vuforia.com/forum/unity-extension-technical-discussion/light-matching



User Testing:

The scene is beautiful, the city has a nice color theme that brings a modern look to the app. Storing the location to collections is a good idea, but people might just use Google map. The map is too big and the UI is small, making it always lose track when getting closer.