**SMU\_AR**

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**Abstract**

Our objective for this project is to build an augmented reality application for smartphone users so that it increases the interest level of Saint Martin’s University visitors and increase the level of student/staff engagement around campus. The goals for our project is to build a bug free Android application that users can enjoy. Our application scans QR-codes and changes them into an image instantly. The users will use the camera on their smartphones and scan the QR-codes we provided to see through their screens that the QR-code changes to an image or video.

**Introduction**

The problem that we identified for this project is that students may not show interest in a guided tour due to the following reasons, a guided tour may decrease the interest level of campus visitors and a tour guide may skip some important facts about the buildings on campus due to time constraints. Our solution for such problem is to create an augmented reality application that reads Qr-codes and display facts and historical information about the buildings around Saint Martin's University campus. The application will allow most students, staff and faculty members to enjoy and a fun and exciting experience here on campus. The environment in which our software will run, is on Android devices, specifically smartphones with a camera. The application will not need to connect to the internet everything will happen on the handheld device without the use of an online source to obtain data needed. We chose this project because we

believe that this idea is an addition to the current marketing strategy and it will improve the whole marketing strategy of Saint Martin’s University. Also, it will help students navigate their surroundings better. For this project, Alwaleed (Welly) Alqufaydi is the developer of this application and the manager of the software aspects of the project. Hassan Alhukash is the GUI designer and the editor for this project.

**Literature Review**

Some examples of An augmented reality application would be A 3D furniture viewer. For instance, a user may use the application to organize their homes before buying furniture. This application helps users choose the best furniture that suits their offices and homes.Another example would be an AR browser. The users will use the camera on their smartphones and point it to a historical architecture and the app will display the information related to the architecture on display. Also, a great example is using an augmented map so users can pinpoint their smartphones on an object they see on the street and they can save it on the map. For this project we designed the layout of the application and we have invested many hours to complete the project in the time frame that we were given.

**Design Methodology and Design**

We chose to use the agile design method because in the agile design method we can make sure that our application is not complete until everything functional works as expected. The agile method includes that we first design our application then test our idea and implement the application. Finally we test the application for bugs and known issues, if none are found we review our objective once more to check if we have accomplished everything on our list, if that is the case then we deploy the application. For the requirements of this project, we used a QR-code as an input into our application and the outcome will be a fact displayed on top of the QR-code. Also, the user will provide input by clicking the buttons we created for the various functions that we have implemented and the output will be the functions that each button is associated with. We have uploaded our QR-code samples into a free database service that is included in the Vuforia developer license. The database can be downloaded and used locally on the smartphone without having to connect to the internet. Our user interface is designed with simplicity so that users will not have to wonder where to go first or what to try first. We used a simple GUI to keep the user experience as easy and as smooth as possible. There are some non-functional aspects of our project which are the following:

* Reliability
  + The application is reliable and is sure to run on android devices with a minimum of v4.01 of android
* Availability
  + As long as the QR-codes are mapped to a video or a picture the user can scan the code and it will immediately display the results.
* Security
  + Our application runs locally on the smartphone device and asks the users for permission to access the back camera of the device the first time the user runs the application

Our application is created with the help of a 3D design tool (Unity) and it is built using Android Studio. Physically, our application runs on the android devices and will not require any online source. All the augmented pictures are uploaded on a database and embedded into the application itself so the users do not need to have an internet connection to use it the application.

**Implementation**

In our project we used the agile development method to allow us to build one feature at a time and be able to test each feature before moving to the next. If we encounter a problem in a previously implemented feature we would go back to resolve the issue then move to the next part. We performed the following tests on our application:

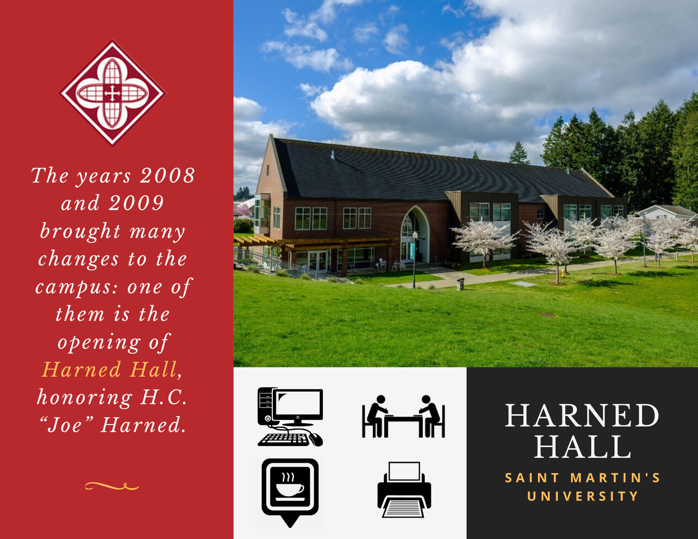
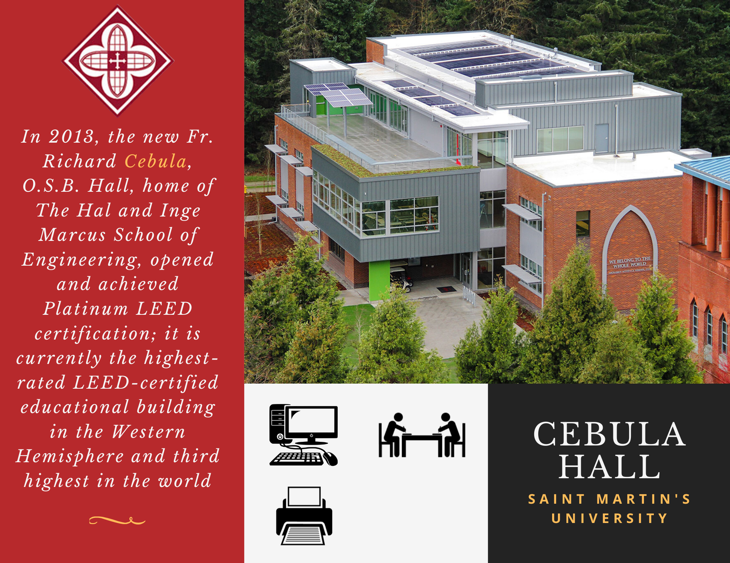
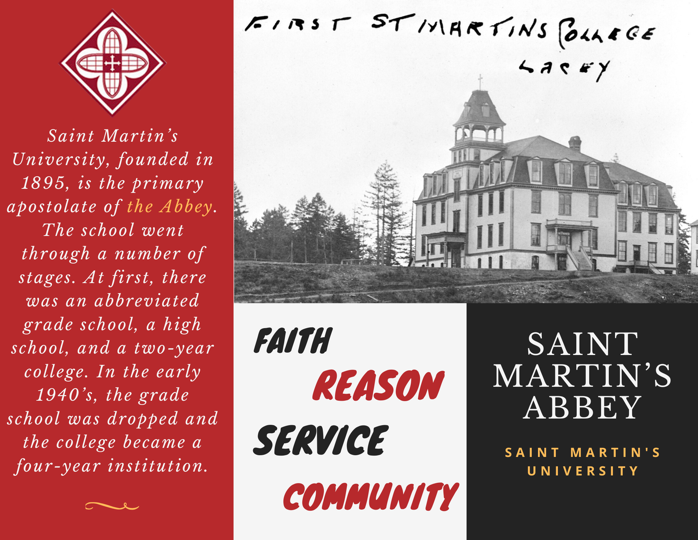
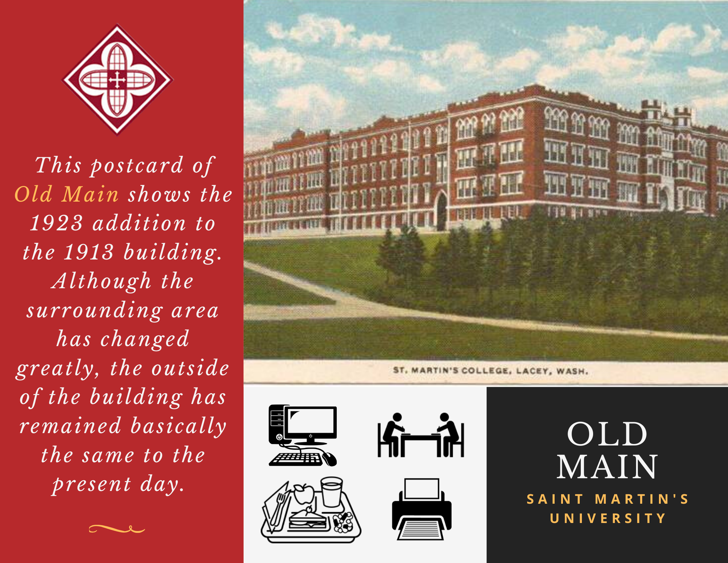
* Back buttons
  + Unity does not support back buttons to navigate the application so we had to create a script that allows the users to press “Back”
* Scanning a QR-code
  + We tested our application on many shapes/sizes of QR-codes to see if it would recognize the code present.
  + The distance in which the application can recognize the QR-code was also tested
* Gradle File
  + We had to integrate our unity application into android studio so that we are able to build the application as an Android app
* Issues:
  + Integrating the Unity app into android studio resulted in some minor errors. However, to resolve the issues we had to start all over and edit our gradle fire. Instead of building an app ere had to build the unity app as a library then import the library into android studio and sync our grade file.
* Programming Languages used:
  + We mainly used C# and Java
* Issues
  + We had to learn how to program in Java because we had no prior experience in developing an android application.

**Conclusion and Future Work**

For this project, our goal was to build an Augmented reality application to help make the experience of saint martin’s university students better and to improve the overall marketing strategy. We have successfully completed all parts of the application and we can say that it is ready to be used. However, there are still a couple of features that need to be adjusted so that users can have the best experience using our application. We planned to embed a google map api into our application but due to the complexity and the time constraints we were not able to achieve that goal. In future work , we will continue developing ways to make the maps more original and allow users to interact with map by zooming in and out or saving the location in which they found a QR-Code at.

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| **Design:**  **Photoshop:**   * Designed QR samples for several buildings around Saint Martin’s University campus. Created the posters with taking in mind the colors of the university logo which Red and White. Since the app will be on phone we decided to make a poster with big pictures and as little words as possible. We were aiming for a quick scan that can show you all the information you need to know about a specific building such as if the building has a printer inside or if it has a computer lab or a coffee shop.. etc. We also added a historical fact or fun fact about the building which add more information layer you get when you scan a QR code. * We also design a map that indicates the places of QR code around the campus. The map we originally used is a map in Saint Martin’s University website, we changed the scale of the map so that it fit the scale of a mobile phone screen. The map can also show you most the buildings, fields, and parking around campus. * New students and new visitors was taking in mind when designing both the QR codes and the maps.     **Appendices**  **GUI:** |

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