GNG 1103 – Engineering Design

Deliverable F – Prototype I & Customer Feedback

Team B1-05

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Abstract

A detailed report that establishes an effective test plan and presents the project's first prototype. Client feedback has also been analyzed and considered in the development and production of prototype I.

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1 Introduction

On October 20, 2020 and November 06, 2020, we had the privilege of meeting with our clients Patrick and Kenny, to discuss and elaborate upon our project thus far. In this report, we have interpreted our clients' valuable feedback and implanted these remarks to provide adequate design details for our concept. As such, we and have built an impressionable first prototype to test our project's most critical functionalities and target specifications.
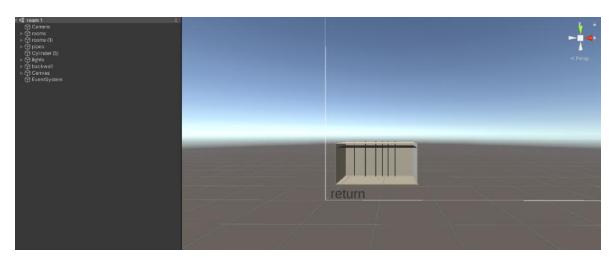
2 Prototype I

Based on beneficial feedback of our clients, the pre-determined target specifications, and criteria, we have produced our first prototype below. In this model, we believe we have validated our assumptions and have efficiently presented an encapsulation of the needed design criteria.
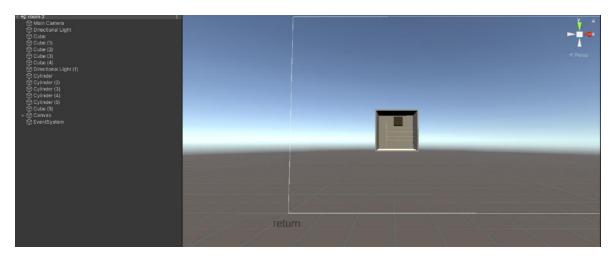

Figure 1: Main Screen

Figure 1 is a screenshot of the main menu of our AR interface in Unity. In this initial prototype, we have decided to focus on just the 'basics' of our project and ensure that we are able to actually compute and build in Unity. The first step was this man screen which has the ability to let our client pick specific locations in which they may enter to start implementing BIM.

Figure 2

Figure 3

Figures 2 and 3 are distanced views of 2 of the room we have created in Unity. These rooms

have been set to be navigated using a mouse or keys. In addition, the simulation works in such a

way that once a room is selected, the user is taken to this room and is able to easily travel around

and utilize the space in such a way that allows them to manipulate and use the room.

3 Prototype Testing

3.1 Client Feedback

Below, we have summarized all the points of suggestion, concern, and feedback given by our clients. Although our client gave little feedback, we have developed suggestions based on other groups' ideas and through our own brainstorming. We have used these points to further develop our initial design concept into a prototype (some elements used in this report, some will be implemented in the next prototype and report).

- Work on main menu.
    - Suggestion: implement a tutorial and add some type of start button.
- Execute the different disciplines
- Code camera to move with the arrow keys
- Set camera at the entrance of the STEM building
- Add a camera to each floor of the building
- Add a note function to the program

3.2 Feasibility Verification

The project that we are currently doing is one that is easy enough to realize. The only difficult part of this project would be the programming and actual construction of our project. There is little programming experience within our team, however, we have slowly been able to overcome this obstacle. Through many tutorials, trials, and troubleshooting, we believe we are on track to present a viable solution for our client. In addition, Unity is a very popular program so almost everything that we want to do has already been done by other designers, and therefore, we can reflect on and develop codes that have already been produced. As such, we firmly believe that whilst we may be a slower group to learn, we will present a strong and well-thought-out product.

3.3 System Analysis

Since the prototype is an online application, there a limited number of materials and components to be analyzed.

1) List of components and materials

- User's android/iOS device

We also considered a study in reducing any risks or uncertainties that may arise in the actual system:

Risk	Severity	Contingency plans
Lack of experience in programming	3	Research, watch tutorials & reach out to TA's
Unity, as well as other necessary coding programs may crash	5	Debug and research troubleshooting options
VR headset may be affected by shipping delays or empty stock	3	Order the headset early in advance
Elements may only be producible through Asset store	2	Use the Unity Asset Store as an alternative
Severity: scale is 1-5, where 1 is not severe and 5 is a very severe		

Functional Requirements

Design Specifications	Relation	Value	Units	Verification Method
Ability to view 3D Building Information Models (BIM) in Visual Augmented Reality	=	Yes	N/A	Analysis/ Test
Compatible with common Mobile Devices	=	Yes	N/A	Test/ Use IOS and/or Android
Software application must be open source or free to use	=	0	$	Estimate/ Final Check
Navigation and interface must be user friendly	=	Yes	N/A	Test/ Evaluate User
Training and implementation documentation must be provided	=	Yes	N/A	Instructional Reports
Presented through VR or AR on a mobile device	=	Yes	N/A	Test/Evaluate platform
Easily operated by any individual regardless of technical skill level	=	Yes	N/A	Final test/ Evaluate User

Non-functional Requirements

Design Specifications	Relation	Value	Units	Verification Method
Take obstructions into consideration	<	Yes	N/A	Test
Use Google Cardboard or similar device	>	Yes	N/A	Test
Display markups (dimensions, annotations, etc.)	=	Yes	N/A	Simulation/ Test

Constraints

Design Specifications	Relation	Value	Units	Verification Method
Available on IOS and Android	=	Yes	N/A	Report/Test on multiple devices
Cost	=	0	$	Estimate/Receipts of purchases, in app purchases

3.4 Next Client Meet Preparation

Based on our previous client meeting and refinement of the prototype, we have composed [#] concerns to clarify and our next immediate steps to continue suiting the needs of our client:

- Since it was an important need in designing this program, we want to clarify that we want to implement the ability choose which disciplines they would like to see.
- Another important part of the program we will discuss with the client is the tutorial. We want to implement a tutorial of some sorts to show the user how our app works.
- One big thing that we plan on implementing is the ability to "walk" around the STEM building using the arrow keys on a keyboard. To do so, we will program the camera to move with the keys.
- The last major thing we are going to add is a camera at the entrance of the STEM building.

4 Conclusion

Therefore, with the valuable feedback of our clients and their remarks, we believe we have successfully completed all the necessary aspects of this report. We ensured that all our clients' comments were implemented into our advanced design detail criteria, and thus, an adequate first prototype. In addition, we ensured that there was an emphasis on our project's most critical functionalities and target specifications through detailed testing and analysis.