Deliverable G:

Prototype II and Customer Feedback

Team 1

Engineering Design - GNG 1103 - Section B03

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Abstract

The purpose of this report is to create a test plan and to develop the second prototype to attain the objectives the team detailed in past deliverables. In addition, customer feedback will be obtained on the prototype to ensure the quality of the application.

Table of Contents

List of Figures

1.0 Introduction

The second prototype is the most important of all the prototypes we will be making since in order to ensure that your design will work. This prototype provided an opportunity for us to see how every small part of our design is working together in order to make a functioning application for our client. With this prototype, we modified areas of improvement, and looked for errors which took us one step closer to creation of our Augmented Reality software for EllisDon. The purpose of this prototype is to provide a report on the testing that is being done and the feedback we received from our client in the previous meeting regarding the first prototype. During the first prototype meeting we learned that we will not be receiving new files from our client and that we need to purchase some of the materials for the application ourselves. In this Project Deliverable report, we have included explanations for the tests during the creation of the second prototype, the different aspects of the application have been tested, debugged, changed, and improved.

2.0 Prototype Test Plan

2.1 Purpose of the Test

The chief purpose of the testing conducted for prototype 2 is to analyze the results from prior testing and to determine the areas of improvement for this prototype. This analysis will be beneficial as it will ensure if the progress we have made has been successful and if there is any new feature integration required. In order to build the best version of our application, this testing is necessary to pinpoint errors and to determine if improvement is needed. As we are unable to determine whether we will receive new files from the client or we should purchase new assets along with building components, we developed other features to manipulate the building. It is important to test all our aspects via Unity and our mobile devices to verify if the transitions are working smoothly. These testing methods will improve aspects of our product to upsurge user experience. Additionally, we will be able to distinguish where more time investment is required and vice versa. The completion of our second prototype is one of the most important developmental milestones as the next step is our final solution.

2.2 Dependencies of the Test

After our first client meet, we, as a team, effectively established a set of needs the client desired. Utilizing this detailed list of needs we were able to distinguish which needs will be integrated in each prototype. An example would be the ability to operate on mobile devices with an opportunity to upload files within a cloud for a login option. Also, annotation with elements of the building is another need the client detailed. This test must be completed prior to submission to ensure any errors will be fixed. Also, the test has to be completed prior to the developmental process of the next prototype, which is the final iteration of our solution to the client.

2.3 Testing Method

This project concerns an application created on the Unity platform, which does no physical testing other than testing done within the scripts of Unity or components of the project. It is a prominent requirement that our application presents a clean and professional appearance for users, so verification testing methods will be implemented to review this. As there is no client meet after the development of this prototype until Design Day, this test will be the sole aspect responsible for the feedback of this prototype and the development of the final one. An efficient and effective testing method is the chief tool our team utilizes to verify if our progress has been successful. Additionally, having the option to meet with our TA has been beneficial to obtain advice concerning our prototype and to receive aid in areas of trouble. Hitting roadblocks in the developmental process has been avoided due to all these resources available to us. The main purpose of this prototype is to verify all the basic functionalities and requirements the client asked has been met effectively, the next prototypes aim to integrate other features to make our application unique and professional.

2.4 Test Objectives Description - the ‘why’

*What are the **specific** test objectives?*

We aim to complete all requirements the client has detailed for us by the final prototype, however, this particular test will attain the goals in section 3.0 of this document.

*What **exactly** is being learned or communicated with the prototype?*

As we don’t have access to a moderate BIM file size that will function on our personal computers, we begin with the steps in constructing our own building with mechanical, electrical, and structural components. Additionally, we built upon the basic functions from the first prototype along with incorporating new functions that work with the building file.

What are the possible types of results?

There are no known possible outcomes of this testing other than errors in script or functionality.

How will these results be used to make decisions or select concepts?

The results obtained from the testing done for prototype 2 will aid in fixing errors that arise along with making a plan for the development of our final prototype 3. As there is no client meet associated particularly with this prototype, we will attain feedback from our TA and pair it with the testing results to determine which features need improvement or complete removal from the application. We will also plan to determine any new features we deem fit that will make our application better.

What are the criteria for test success or failure?

A successful test consists of receiving good feedback in pair constructive criticism from our TA as there is an absence of a client meeting for this week. Additionally, minimal errors arising from Unity testing is another sign of success. This paves way for areas of improvement to improve our app to make it more user friendly, accessible, aesthetic, etc. The test would result in failure if our application is not functional or receives many errors during testing. In this scenario, solely negative feedback will be received.

2.5 The ‘what’ and ‘how’ Aspects

Describe the prototype (e.g. focused or comprehensive) and the reason for the selection of this type of prototype.

The prototype is focused in this developmental stage. We solely want to build upon the functions we implemented in the last prototype and work on developing the building and the functions associated along with that. Since proper BIM files have not been received, the team works to find a substitute on the Unity store and build it to fit our application’s purpose.

Describe the testing process in enough detail to allow someone else to build and test the prototype instead of you.

The individual must have access to a Unity license and have some prior knowledge to C# scripts in order to build and test this prototype. There are a multitude of tutorials available on YouTube and the internet that they can reference in order to attain some more knowledge of this concept. After, they simply have to create additional scenes, improve upon the in-game menu, and integrate components with a building asset from theUnity store and build new functions to go along with the building.

*What information is being **measured**?*

The information has a qualitative measurement as we are solely measuring the quality of the design and function of this prototype. No quantitative data is being collected in order to assess the application as there is relatively no numerical values to be attained.

*What is being observed and how is it being **recorded**?*

The observation is of the design of the format and functional elements of our application. As we are currently integrating the environment via the construction of a building due to the absence of BIM files this is the chief observation. There is no client meet associated with this so there is no requirement for a designated member to write down information.

What materials are required and what is the approximate estimated cost?

As of the moment, an asset for UI elements have been purchased, which brings our total to $19.99. The only tool we are currently utilizing is a powerful personal computer that can run Unity efficiently along with a coding software. The estimated budget is $100.

What work (e.g. test software or construction or modeling work or research) needs to be done?

If the BIM files are unable to be imported or are not modified, therefore, we aim to purchase another building from the Unity asset store and build the annotated features within it. Additionally, UI features have been purchased to make the application more user friendly and aesthetically pleasing.

2.6 The ‘when’ Factor

*How long will the test take and what are the **dependencies** (i.e. what needs to happen before the testing can occur)?*

The test will consist of the time allocated to our group during the lecture period in terms of client testing and in terms of bug fixes during Unity testing, we allocated 1 hour. The dependencies of the test are detailed in section 2.2 of this document.

A separate test planning Gantt chart can be created to help make sure that the testing fits with the overall project schedule or it can be defined as part of that schedule (i.e. as a sub-task).

A new Gantt chart was developed particularly for prototype development in the prior deliverable, therefore, refer to the document 'Deliverable E' to attain this plan.

When are the results required (i.e. what depends on the results of this test in the project plan)?

The results are required prior to the due date of this deliverable which has been pushed to November 20th. As the plan currently relies heavily on the results of this test, we must receive feedback prior. We will build upon or revisit aspects of this prototype based on the results of this testing.

3.0 Design Concept

This prototype is constructed from the developmental schedule the team organized in past deliverables, in particular, deliverables D and E. In line with the current schedule, this prototype aims to attain the following minimum tasks within its structure. For the second prototype, the team aims to fix any issues that the application ran into during the building of prototype 1. Additionally, implementations regarding additional features will be completed here along with building on the fundamental functionalities.

TASKS:

- Reflect on feedback regarding the first prototype and determine methods the team can execute to ameliorate and fix issues within it.
- Fix scripts (if necessary)
- Fix tutorial format (if necessary). If feedback indicates that the format prior was good, work on building additional tutorials or build upon the one we created.
- Create more scenes based on prototype 1 feedback. (again, doesn't have to be all of them)
- Modify menus (if necessary)
- Similarly to prototype 1, build the application and test it a few days prior to the due date to ensure time to fix any issues.
- *Milestones*:
    - Have a fully functional menu with all tutorials available - should be completed by November 11th
    - Submit prototype 2 - should be completed by November 20th

4.0 Prototype 2

This section demonstrates the current progress the team has made regarding the creation of the augmented reality application, as well as the improvements that have been made from the original prototype I. Although closer to completion, the current prototype model is still not entirely completed, and as such still lacks certain design features and functionality that will be implemented in the days to come. One modification that has been made from the original prototype model of the application is the main menu. While the old main menu was rather lacking stylistically, the new main menu is much more stylistic and professional-looking. Utilizing the previous feedback given by the client, the new main menu retains all of the functionality of the previous, giving the user the ability to access internal views, external views, tutorials, as well as language settings directly from the opening of the application. The main menu also enables the user to exit the application from the main menu as well. In addition to the main menu being changed, the rest of the menus have also been reworked. The same functionality remains, however. Below are a number of examples of the new menu design. All menus are now offered in both English and French.

Figure 1. New main menu design (English)

Figure 2. Tutorial menu (English)

Figure 3. Language selection menu (English / French)

One of the features that has been added to the application since the original prototype I design is the ability for the user to toggle their view of specific components of the building. While accessing either an external or internal view of a specific building, the user can use the in-view menu to toggle on or off the view of mechanical building components, electrical building components, structural, building components, and the outside architecture. This feature allows for detailed analyses of specific parts of the building, which is beneficial for specific workers who are focusing on one of these components. This feature is still being implemented, and as such, it is not yet entirely completed.

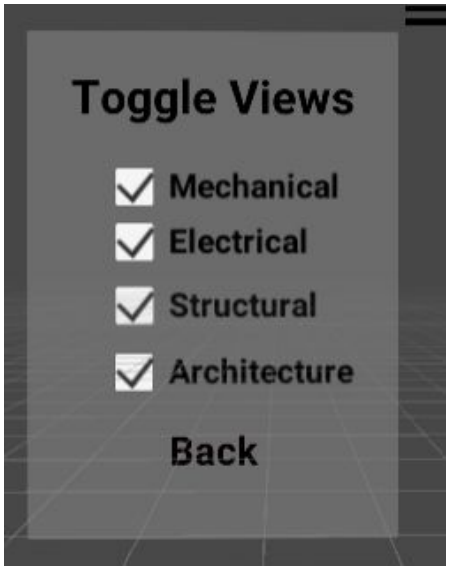

Figure 4. In-game menu for view toggling

The figure below demonstrates the view toggling feature, whereas each different colour is a different component that can be toggled on or off using the above menu. As previously stated, the BIM files are inaccessible at this time, so a dummy house model has been used in place of the STEM building.

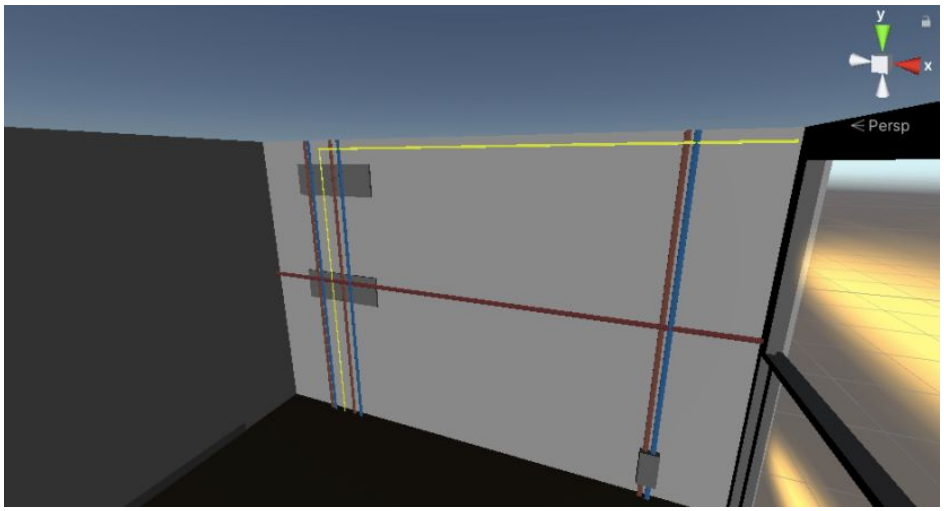

Figure 5. Example of in-game view toggling

In addition to the features and changes currently listed, other improvements continue to be added to the prototype design, which will be highlighted in the next deliverable.

5.0 Conclusion

Although the technical issues regarding the client-provided BIM files continue to cause issues in the continuation of the application, the team has continued to improve the application in many ways. Improvements to the menu designs and user interface create a better user experience, while the addition of new features results in improved functionality for all types of workers using the application. Previously given customer feedback has been utilized in the current prototype model, and improvements will continue to be made in the future. In the subsequent prototype, the issues regarding the BIM files will be fixed, and the implemented features will be tailored to fit the STEM building correctly. Certain features may also be changed, implemented, or adapted during the development of the next prototype.

6.0 Customer Feedback

Due to the scheduling of the Deliverables and the frequency of the Client meetings, we have been unable to receive feedback between the previous Prototype I design and the current Prototype II design. Despite this, we have still continued to improve many of the features in the prototype, as well as include new ones. We are confident that our client will be satisfied with the newly introduced features, as well as the aspects of the prototype that have been improved.