**Deliverable Title:**

Deliverable D: Conceptual Design

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# **Introduction:**

In this deliverable we have come up with three great game designs that fit the criteria of the building blocks of the perfect AR system. When creating these designs, we thought about the certain aspects we needed to include for the system to be functional and optimal for the user. We came up with these designs by carefully going through all our clients needs, and the issues that would occur while working on our final product.

The designs that we will be creating will allow our team to effectively decide on which of the following concepts is the best for us to pursue. We will be able to decide by benchmarking the concept that is needed which will allow us to organize our ideas and help us decide for the most effective design. We will then further carry out our concepts with global designs which we will then decide on the best one through the process of benchmarking. This process allows us to have a fall back of different designs if in the situation of the design not satisfying the customers' needs.

When we have finalized our global design, we will show it off to the client for their input which we can then use to improve the design. This design must be an augmented reality software which will allow the user to access specific parts of the building, allow model selection, and to view dimensions and the structural, electrical, or the mechanical components of the building. In addition, the software must be user friendly, and multilingual.

# **Design Solutions 1:**

## Step 1: Starting Screen



## Step 2: Language Option: the customer will choose the language he prefers.

A picture containing indoor, person, table, holding

Description automatically generated

## Step 3:

### Option 1: User will choose whether he wants to see the dimensions of the building or not

Chart, bubble chart

Description automatically generated

### Option 2: Choose the building on the premises which is to be worked on

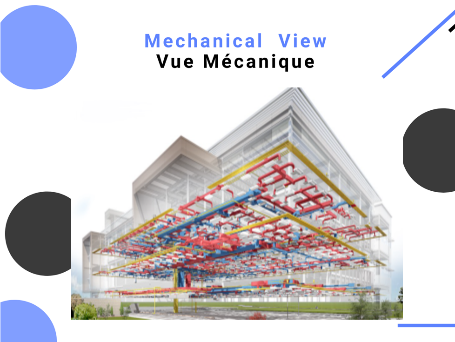
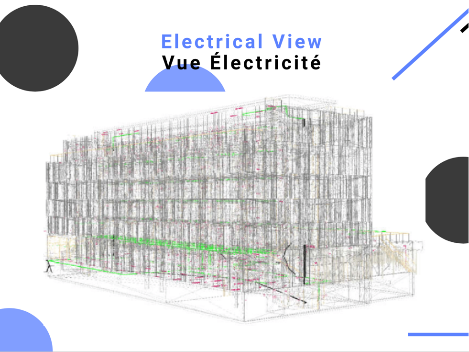
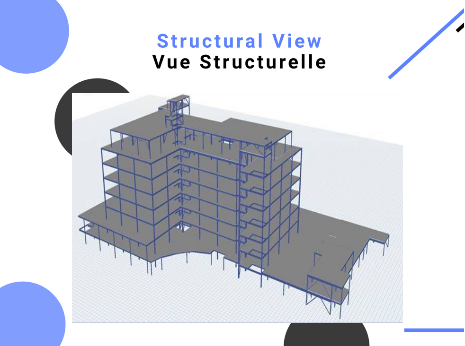
A picture containing diagram

Description automatically generated

#### Option 2a: User can choose which exact view he wants to see; it is either structural or electrical or mechanical

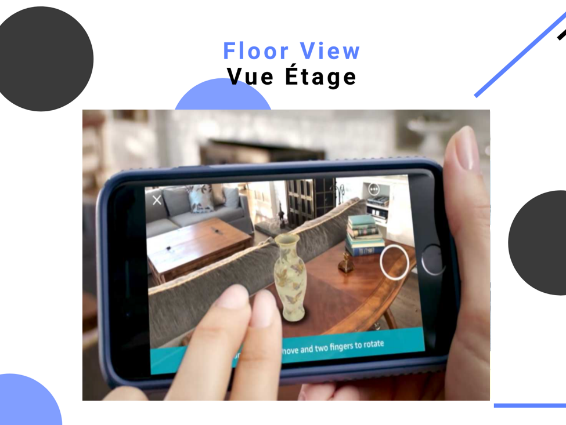
Diagram

Description automatically generated



#### Option 2b: User can select the floor to view through VR glasses or through a portable device

A picture containing text

Description automatically generated

## Step 4: the application will give the “Thank You” statement before exiting the application

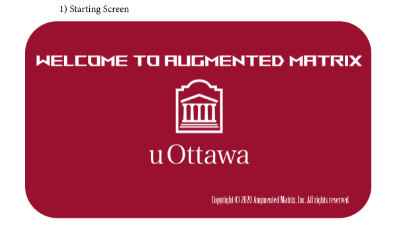
A sign on the side of a building

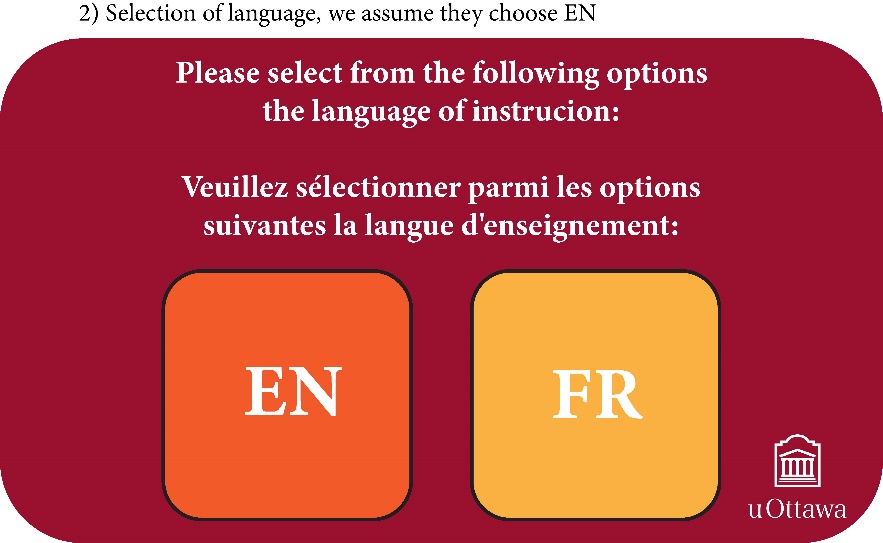
Description automatically generated

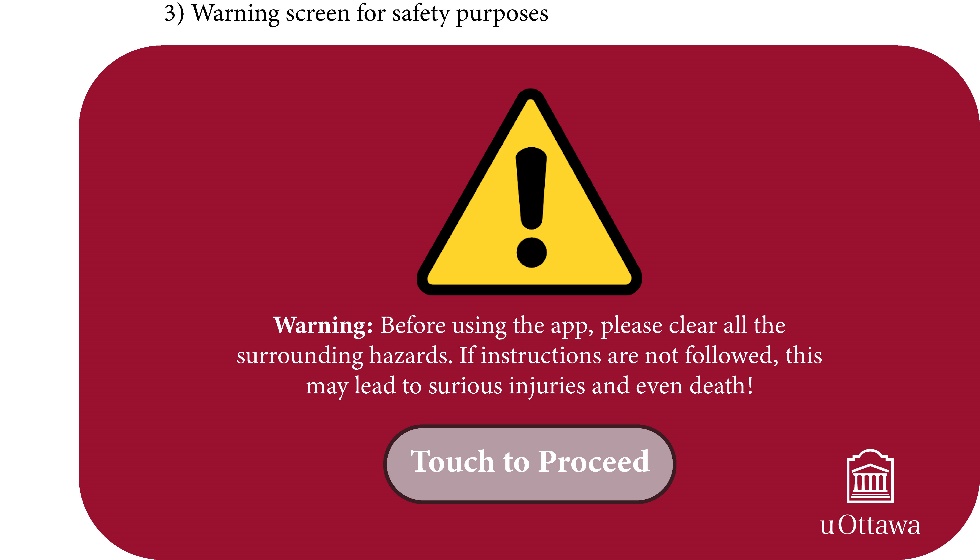
The design I made will make it easy on the customer to navigate through the application. First, the customer must choose the language he prefers, either English or French. Afterwards, the user will have the option to choose whether he wats to see the dimensions of the building/rooms or not. Then, the user will get to choose which exact view he wants to see; it is either structural or electrical or mechanical. Finally, the customer will select a building that he wants to view, either the STEM building or another building.

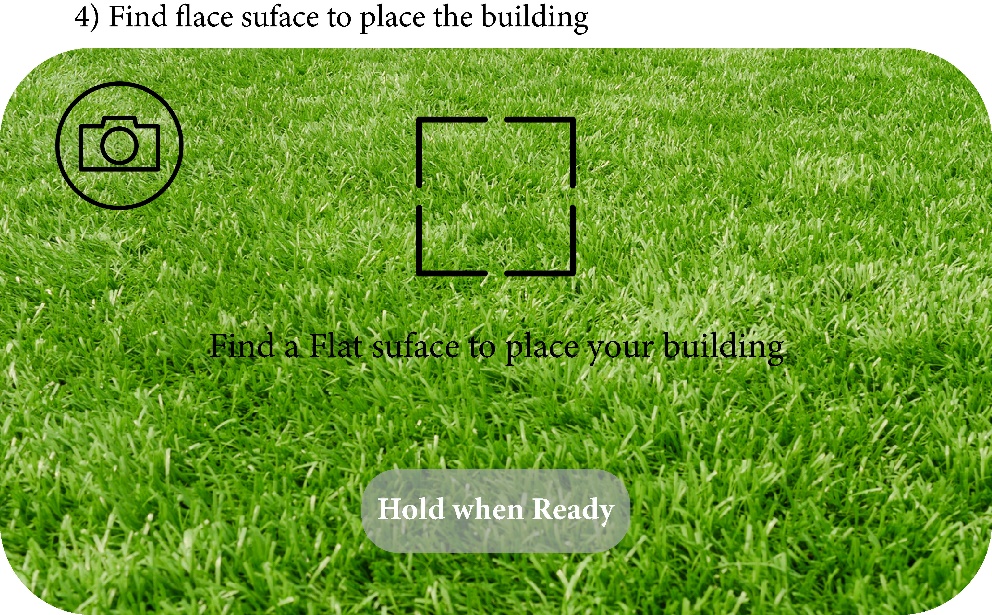
Eventually, the building will be shown in the view that the user wants; either mechanical, electrical, or structural. The user can swap between one view and the other. But he can only view one of them at a time. The user will then start moving and viewing the rooms using the application. After he is done, the application will give the “Thank You” statement before exiting the application.

# **Design Solution 2:**

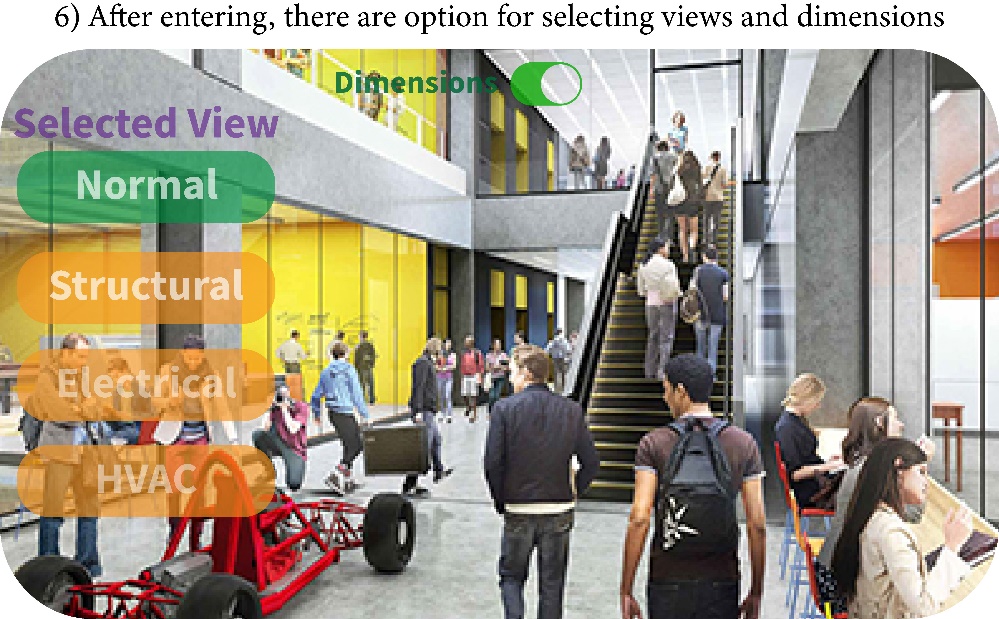


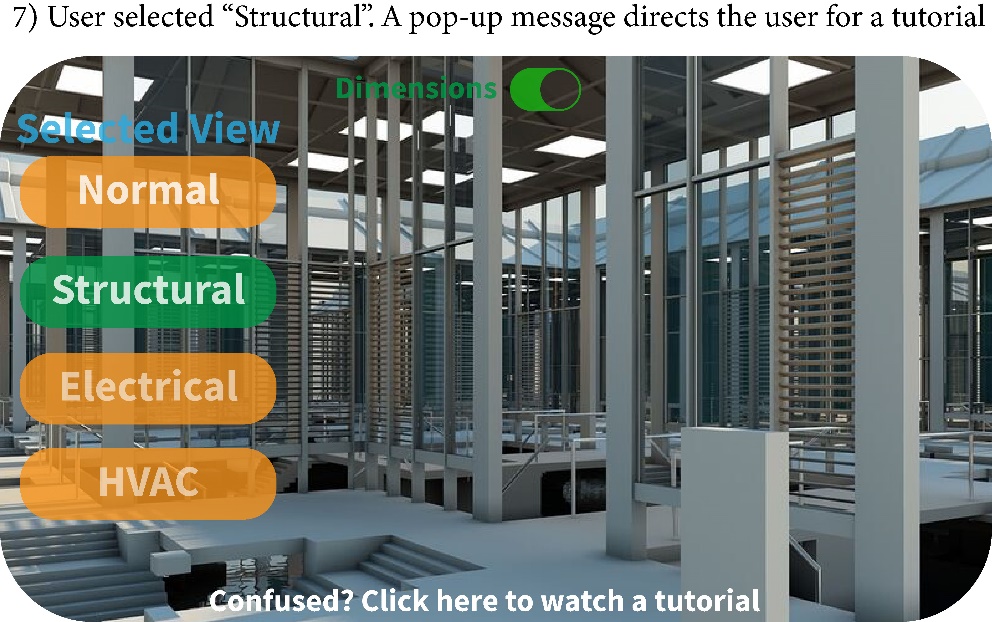


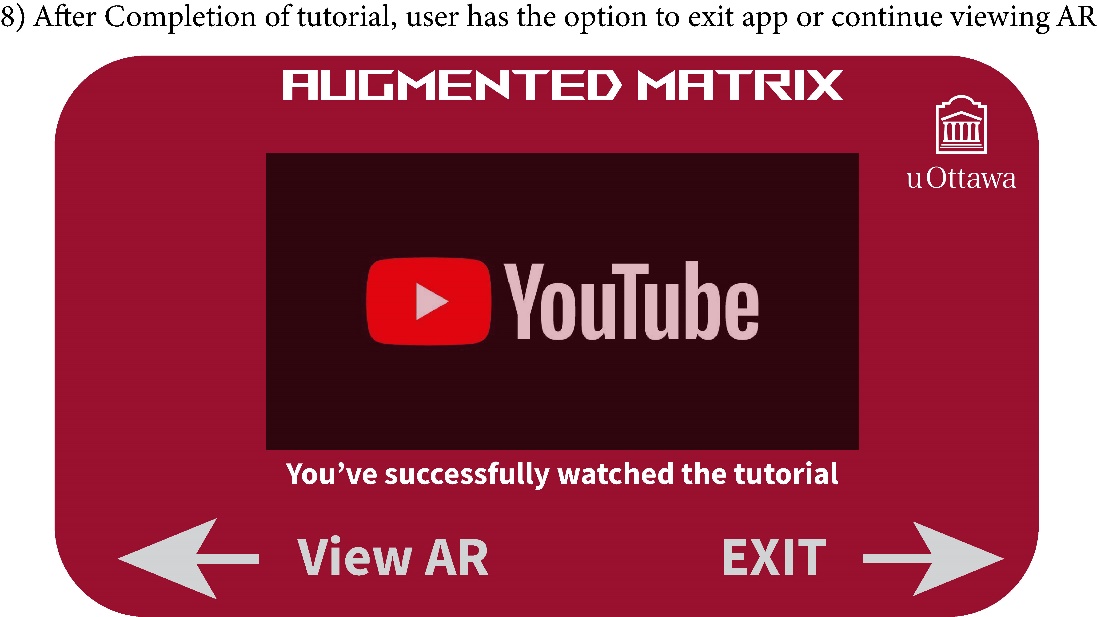












Design #2 (Augmented Matrix) starts off with a loading screen that contains app logo and uOttawa logo. The next screen that appears it instructs the user in French/English to choose their language of preference which is either English or French. Then a hazard message appears which instruct the user to clear all their surroundings to ensure safe usage of the software. This hazard message is only available in this design and is quite crucial.

Now, the rear camera of the device used is turned on and the user is instructed to find a flat surface where they can lay down the AR. They are expected to hold down the button until the finishes analyzing the surface. Once the building is put down, three buttons appear: a compass, rotation, and moving/panning. The user is then asked to enter the building. Once inside the building, there are four important options for views: Normal, Structural, Mechanical, Electrical. Also, the user can choose to see the dimensions of the building by sliding the green button. A message then appears to the user which asks him if they are confused and require assistance. Once clicked, a screen opens and loads a pre-recorded YouTube video. After watching the video, the user has the option to either go back to viewing the building or exit the application.

# **Design Solution 3:**

Select Language

English / French

Here User first selects the language in which the app responds and proceed

Select the building:

1. STEM Building
2. Other Building (if client has other projects)

User then selects the building that it wants to see

After selecting the building user is asked to enter a 4-digit code or to scan a QR code to confirm the building

Select the building

STEM Building selected, Enter code/Scan QR: 1234

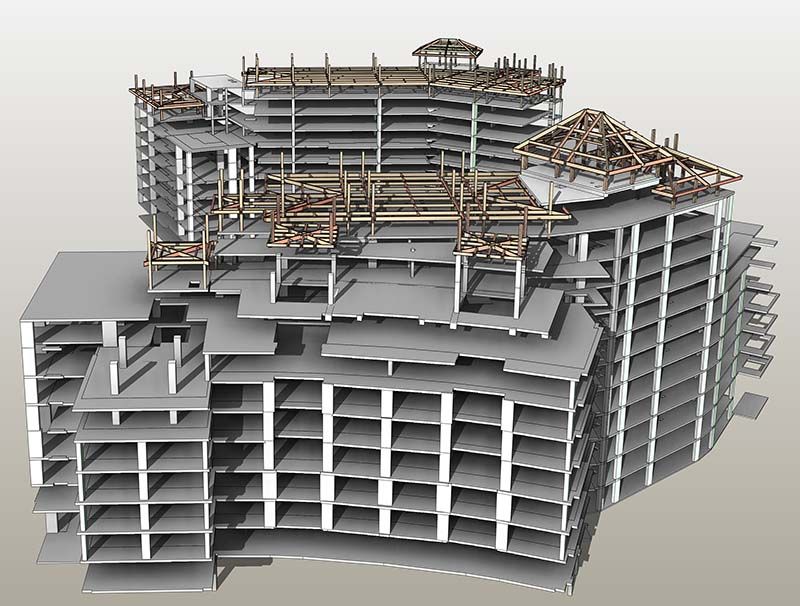
STEM Building will appear



Select type of view: “Structural” “Electrical” “Mechanical”

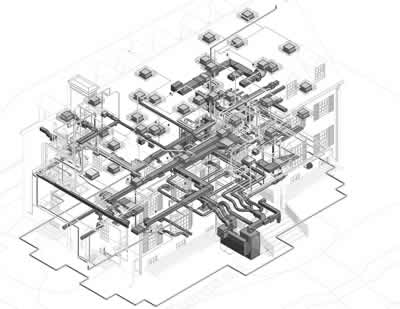
User then will see the project building displayed and app will ask the user to select the view by clicking on the view type. (Structural, Electrical, Mechanical)

Structural View-Enter the floor number: “05”



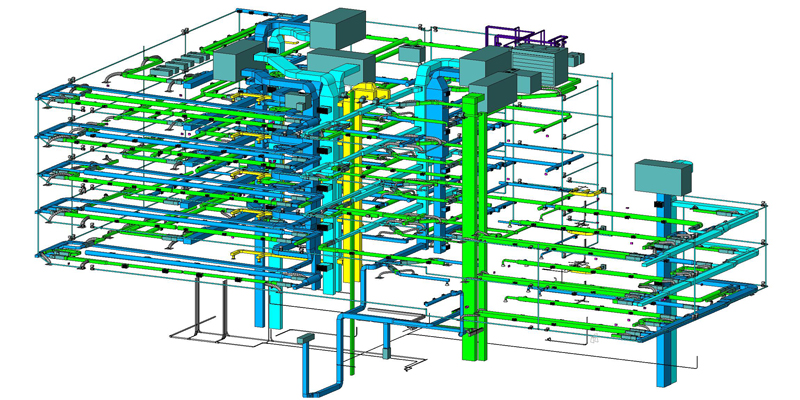
For example, from the previous step if the user selects to view the structural design, it will display the whole building and asks the user to enter specific floor number to display that floor in structural view

Electrical View-Enter the floor number: “05”



Here is another example if the user selects to view the electrical design which the app will display the whole electrical lines throughout the building and if user wishes they can enter the specific floor number also

Mechanical View-Enter the floor number: “05”



If user selects to view the Mechanical design, it will display the building as well as it will also ask user to enter specific floor number of users wishes to just like the rest of the views

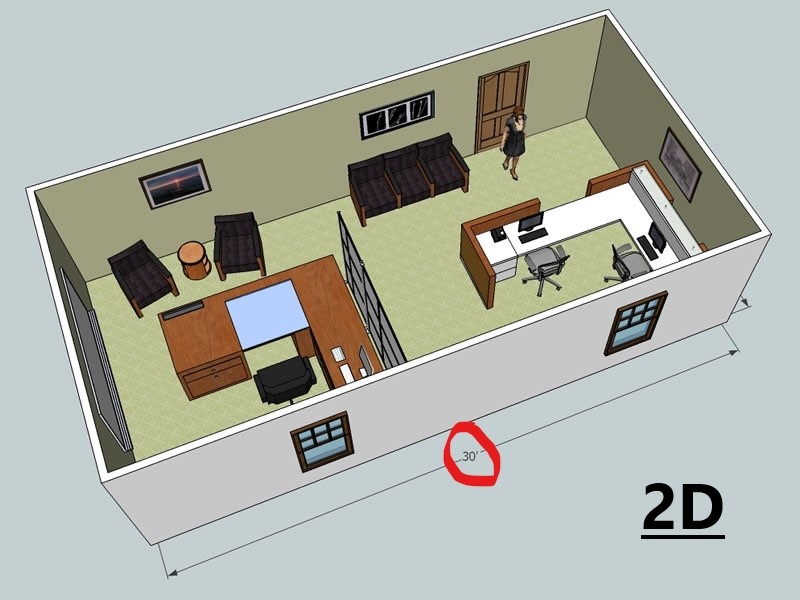
Individual Floor view under specified BIM view (Structural, Electrical, or mechanical)



After user selects the floor under specific view it will display like this and just like google maps, user can move around the floor by pressing the arrows on the floor which will help in navigating the user. User can also select individual object to get more details

After selecting an object while navigating through the room, here for example user selects two walls to get the distance between them, which is highlighted in red circle while the app will also give user the option to view that floor in 2D drawing if they wish to do so

After selecting object, it will display 2D drawing if user wishes or just shows dimensions



After examining the whole floor if the user wants to exit the app, a simple back button on the observing device will help in exiting the app

Press back to exit

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The pros of the design are that it can include multiple buildings under one app and user can only access this app at the project site with the help of 4-digit code or to scan a QR code. It also shows the 2D drawings of the floor for the easy transition to the user. On the other hand the cons of this design are that it cannot go back once you selected the view that user wants to see for example if user selected Electrical view for the 5th floor and if user wants to see the mechanical view, users has to exit the app and start again by selecting the building, view, floor and after that user can access the mechanical view.

# **Benchmarking Process:**

By completing the benchmarking process below, it would be much easier for the design team to compare different global designs. Criteria to be tested was defined in previous deliverables, including the concept criteria and the issue statement.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Intended Specification** | **Importance** | **Concept 1** | **Concept 2** | **Concept 3** |
| **Simple to use** | 2 | Yes | A little difficult | Sophisticated |
| **Displaying dimensions** | 4 | Yes | Yes | Yes |
| **Different modes available for use** | 5 | Mechanical, Electrical, Structural | Mechanical, Electrical, Structural | Mechanical, Electrical, Structural |
| **Language preference** | 3 | English or French | English or French | English or French |
| **Clear Instructions and guidelines** | 4 | Little instructions and no tutorial provided | Clear instruction and a recorded tutorial are provided | Instructions are clear but no tutorial provided |
| **Safety Warning** | 5 | No | Yes | No |
| **Physically Interactive** | 3 | Touch and Camera | Touch and Camera | Touch and Camera |
| **Total** |  | 59 | 74 | 53 |

# **Conclusion:**

After analyzing and going through all of our concepts for the different subsystems we decided that (Design Solution 2) was the best design for us to pursue since the product that we created had overall the best metrics, is easy to use, is multilingual, allows access to specific parts of the building, allows model selection, etc. This design will be for the use of construction workers and will allow them to first, select a language to be translated in, then allow the customer to choose all sorts of things, ranging from the design of the product, to the dimensions. This process is very beneficial for construction workers as it will allow them to view the final product of a building without needing to create it first. The design of this augmented reality system will be suitable for people with little knowledge of technology, will be easy to control, and will be designed through Unity3D.