

Project Deliverable D

GNG 1103

October 8th, 2020

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Abstract

The following document is a conceptual design for GNG 1103 at the University of Ottawa. The document contains each group member's conceptual design for two subsystems of the project, interface view and app layout. Each design was analyzed by the entire group and the final design for each subsystem was created and finalized. The decision was made using previously acquired target specifications and benchmarking.

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1. Introduction

Today in the world of construction, a 3D design has to be converted to a 2D draft paper and then the plans are executed in 3D. Our project is to design a system that can assist construction workers and engineers in the development of buildings through the use of Virtual Reality to cut out the middle man. Upon successful implementation, it will allow for increased productivity and efficiency in the construction workplace thereby shortening the conception and construction of any building. The combination of a user-friendly interface and multi-disciplinary views will allow users to adapt without effort. This document compiles each group member's conceptual ideas for each subsystem of the project. It also contains the final design that is easy to use with handy functions for either construction workers or engineers.

2. User Needs

The client has emphasized that the final design wanted, is user friendly, and uses VR/AR. His main priorities focus on ease of access and simplicity. To accomplish this the team has decided that minimal buttons and simple jargon will work well. The easier the software is to use, the less training and previous experience that will be needed by the users before it can be put into action on the workforce. The application must be able to operate in restricted spaces and without a VR headset for seamless use. The software must be able to operate on lower-spec phones without instability. The client also requires the budget to be maintained at no more than \$100 CAD. Within the interface, the client wants to be able to easily switch between disciplinary views and perspective. Overall the main priorities of the client are simplicity, accessibility, and functionality at a low cost.

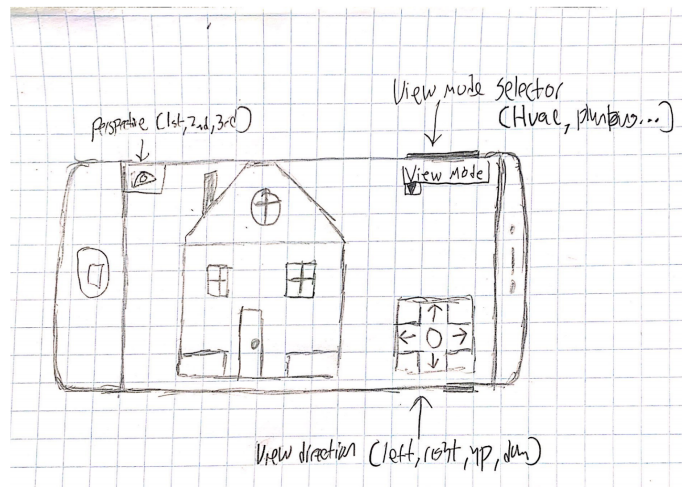
3. Individual Concept Ideas

a. Interface View

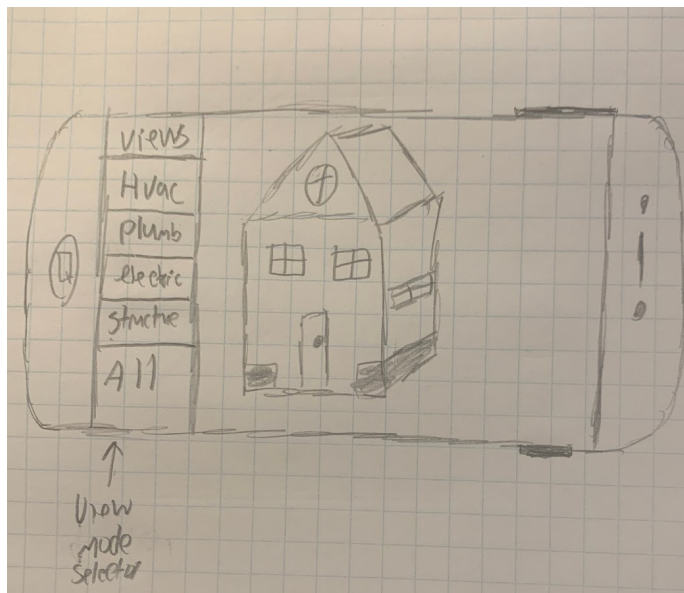
Featured below is a comprehensive list of each member's ideas, about the interface view. Each member provided two designs and an explanation.

i. Adam Walters

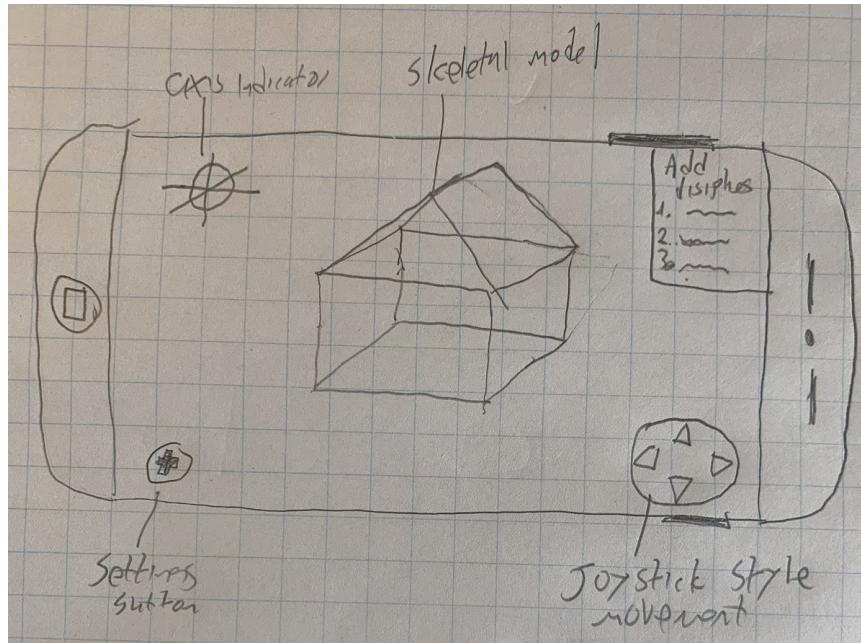
1. Design 1



2. Design 2



3. Design 3



4. Explanation

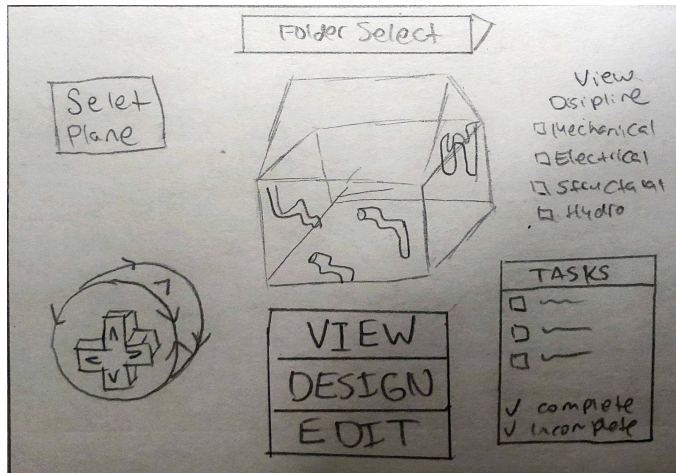
Design 1 features 4 main components. In the top left corner is the perspective button. This switches the perspective between first, second, and third. The second component is the view selector in the top right corner. This switches the view between the different disciplines. In the bottom right is the movement buttons, to move around. Lastly is the actual object, featured in the center.

Design 2 has similar characteristics to Design 1, but the View selector is on the right and is a menu rather than a drop-down menu. There is no option to select a perspective, and the movement buttons are floating and are anywhere on the screen.

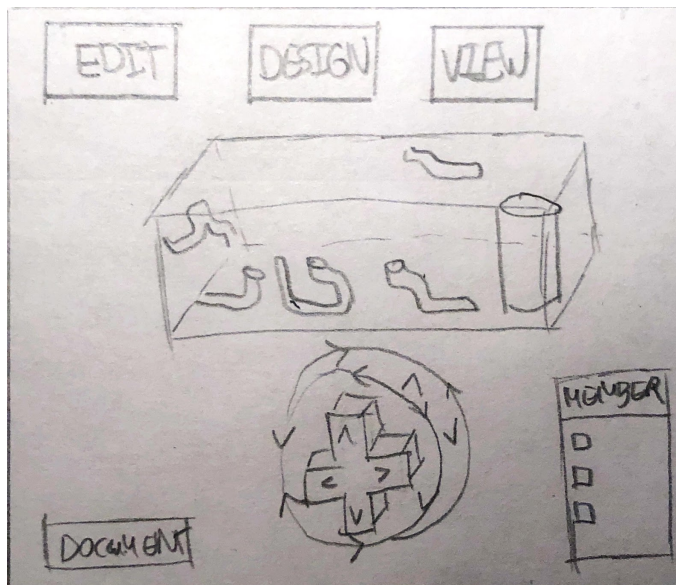
Design 3 features a skeletal model that you can add your chosen disciplines too. It also features joystick-like controls to navigate the model.

ii. Adam Jahan

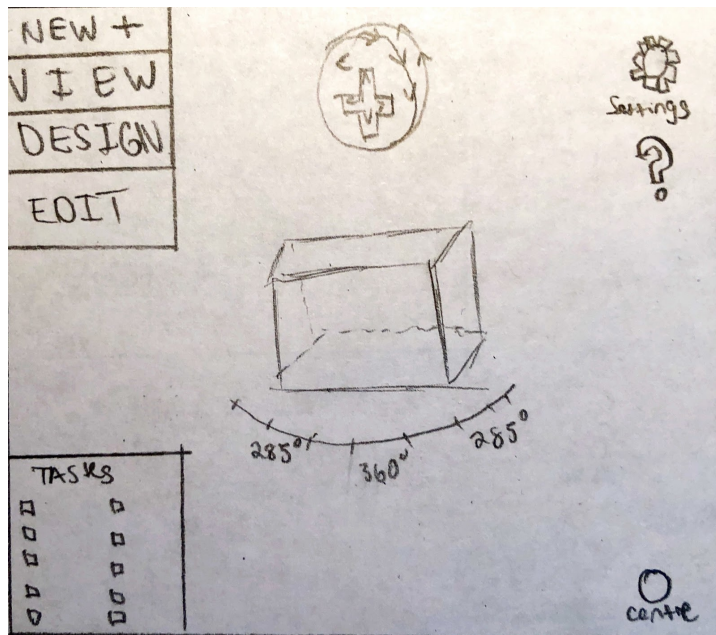
1. Design 1



2. Design 2

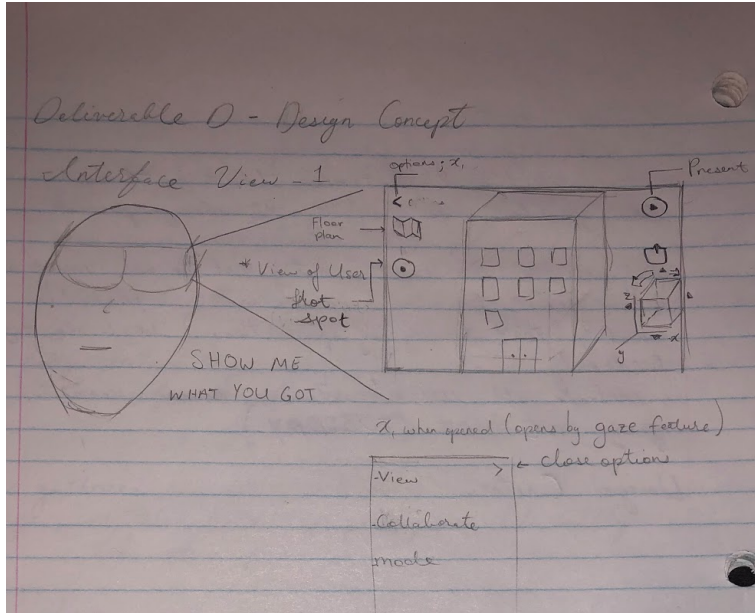


3. Design 3

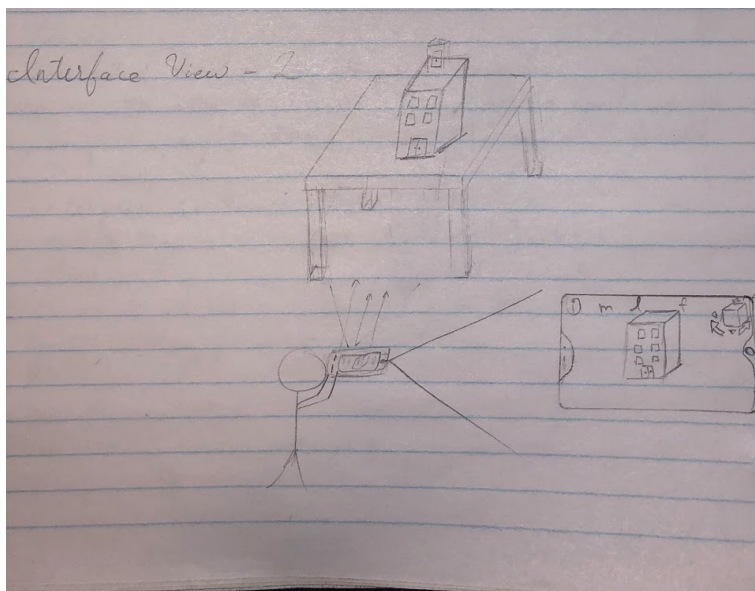


4. Design 1 follows a more busy layout with many more options and settings in the interface. There may be even too many options and unnecessary clutter that will make the experience harder and overcomplicated. However, I also believe that these extra options are very useful and important to design and communicate with others. Design 2, on the other hand, follows a much more simplistic design making a less complicated experience, however, I also feel like some important functions are needed. Design 3 is even more simplistic with all the main functions being accessible through drop-down menus with only the most important features being displayed.

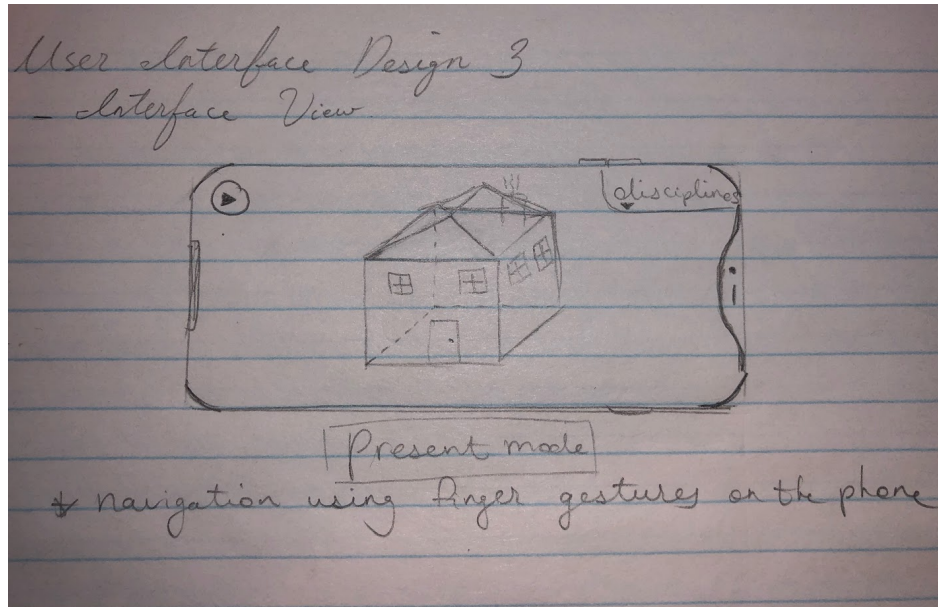
iii. Nassar Shakir
1. Design 1



2. Design 2



3. Design 3



4. Explanation

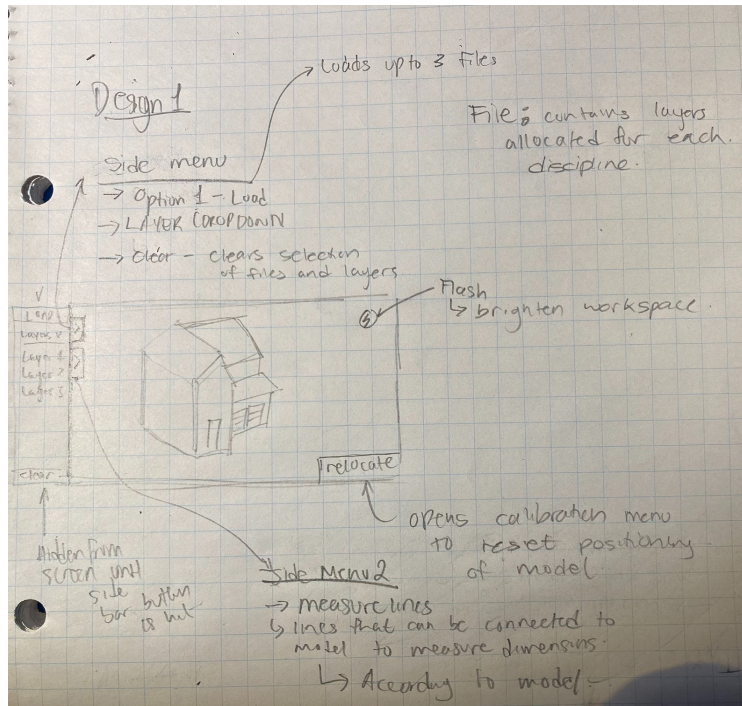
Design 1 allows the user to view the model within a VR "cardboard" there will be a floor plan feature to allow the viewing of each floor or room. A hot spot feature, programmable for an occasion where you go to a room frequently, so users can jump to it faster. Cube for orientation of the model. A present mode for hiding all UI and connecting it to other users' cardboard devices. A share button is included for easy sharing. An options button is added as a drop-down menu for changing all specifications within the app such as discipline, team members, perspective, and edit.

Design 2 features AR spectating. The app will mainly function using the gaze feature (looking at something with an added crosshair for 1.5 seconds to select), for convenience I have added a layer button denoted by "L", a perspective button denoted by "m" and a collaborative feature denoted by "f". Design 3 features the app in presentation mode, this collapses all side-bar and drop-down menus while retaining the ability to switch between disciplines. Functionality with finger gestures will be added to navigate the model.

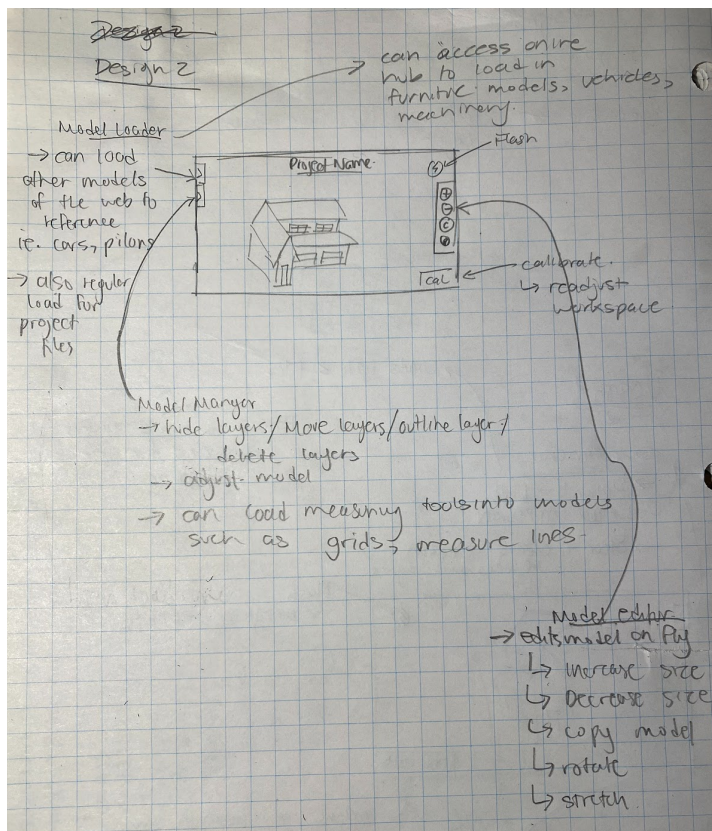
Two-finger swiping for rotating, pinching for zooming in and out, 1 finger swiping for panning.

iv. Abdullah Nauman

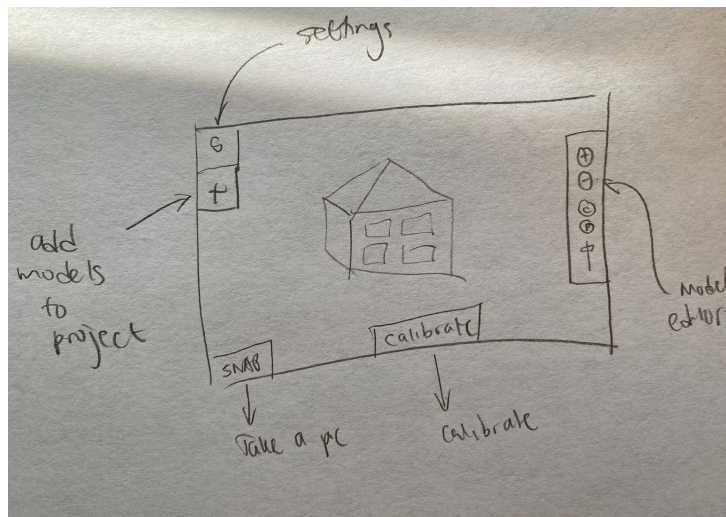
1. Design 1



2. Design 2



3. Design 3



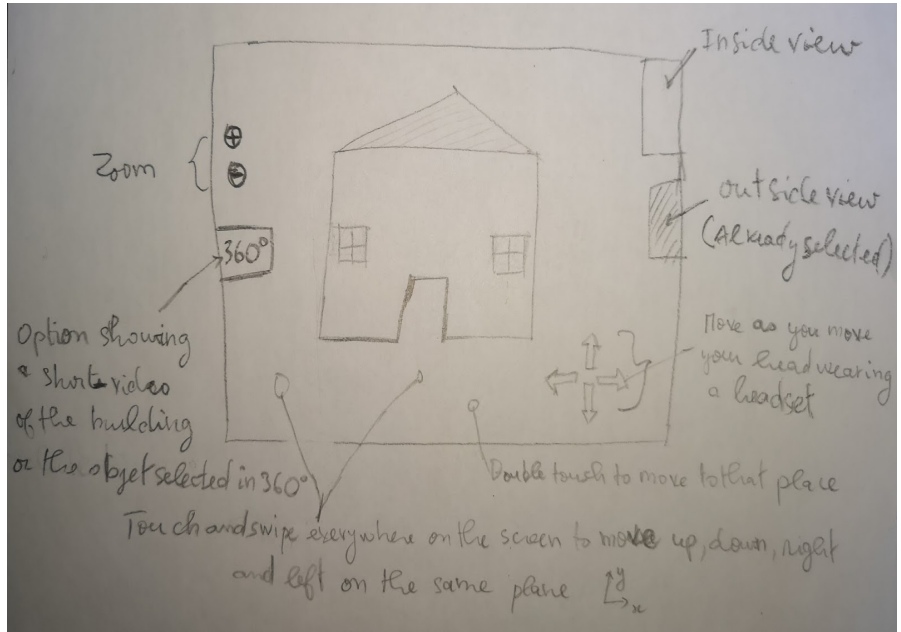
4. Explanation

Design 1 offers a simpler design made for those looking for a streamline experience with little to no editing. More of a viewing software than an editing one. Gives the ability to hide, move, outline, delete layers

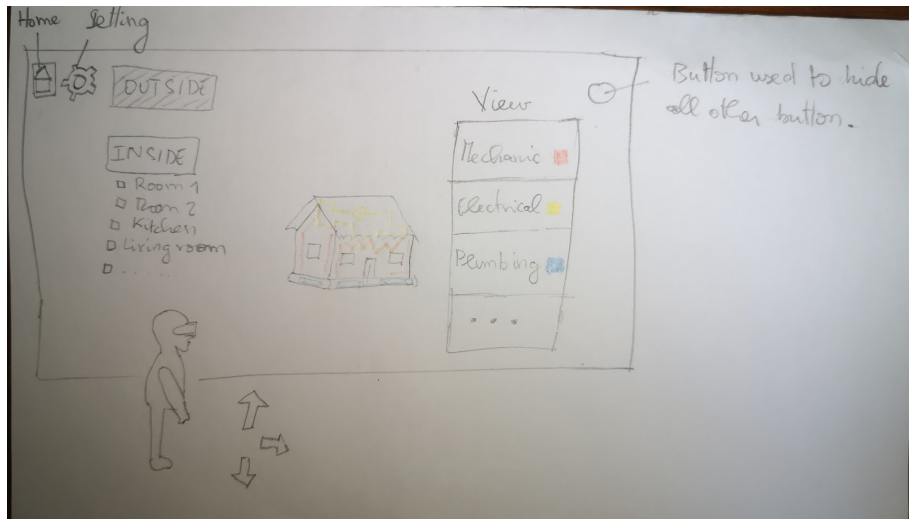
Design 2 offers the ability to manipulate any models loaded into the project on the fly. Gives the ability to load grids, measuring lines, etc into the project to make it easier to manipulate. Gives the ability to hide, move, outline, delete layers.

v. Emeric Chanhoun

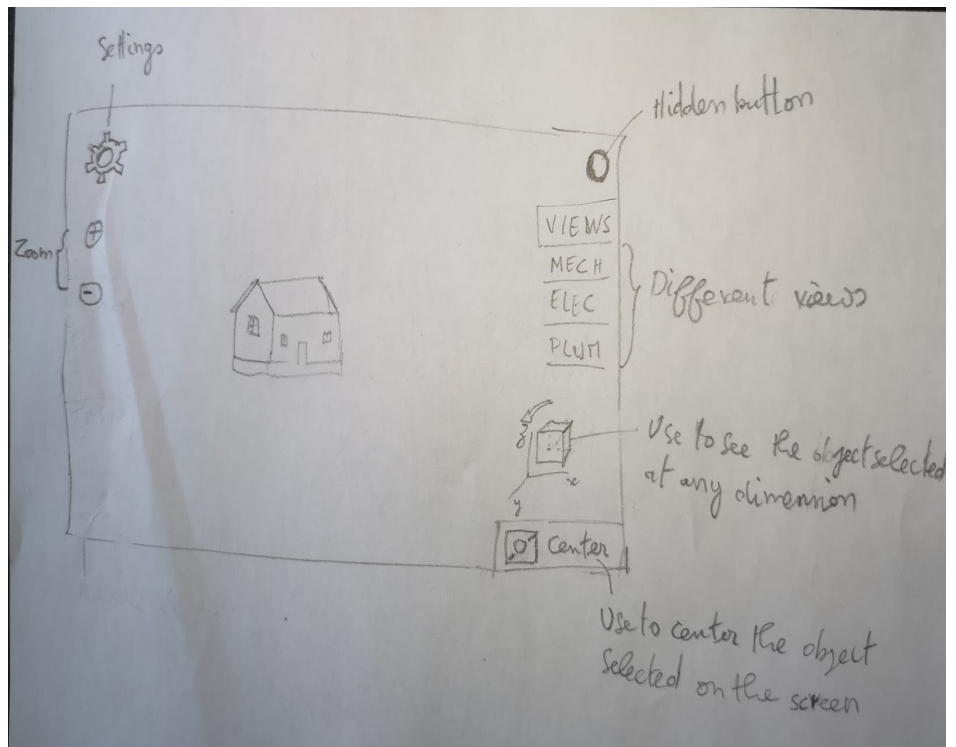
1. Design 1



2. Design 2



3. Design 3



4. Explanation

The design 1 is used without a VR headset, it is used on the mobile or the tablet directly. The explanation of its functions is shown in the picture.

Design 2 is used with a VR headset. It allows the user to have several views, inside and outside and also viewing materials in specific colours. The user can have access to any room directly. A circular button on the top right allows the user to hide the functions shown on the screen. The arrows shown on the floor allow the move in any direction. The user can select any function by watching it for 3 seconds.

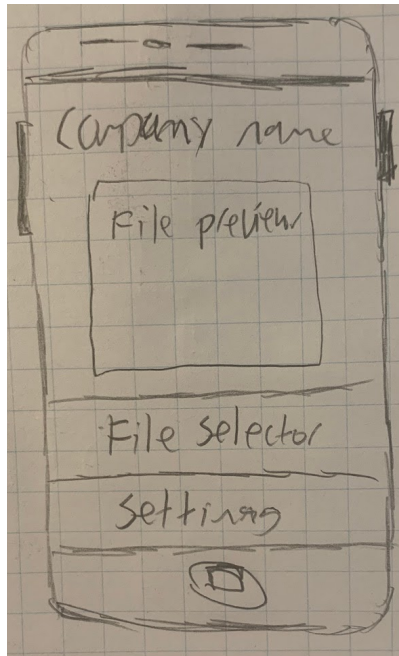
Design 3 is the combination of designs 1 and 2 with some adding. The Center used to center the object selected for on the screen. The cube at the right side is used to see the object in 3 dimensions.

b. App Layout

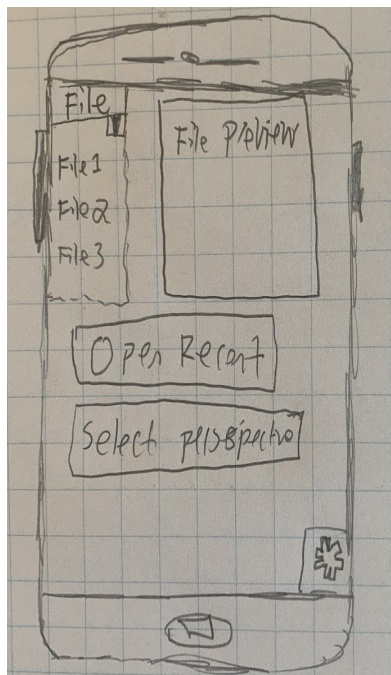
Featured below is a compilation of everyone's ideas about what the app should look like. Each member of the group provided two ideas and an explanation.

i. **Adam Walters**

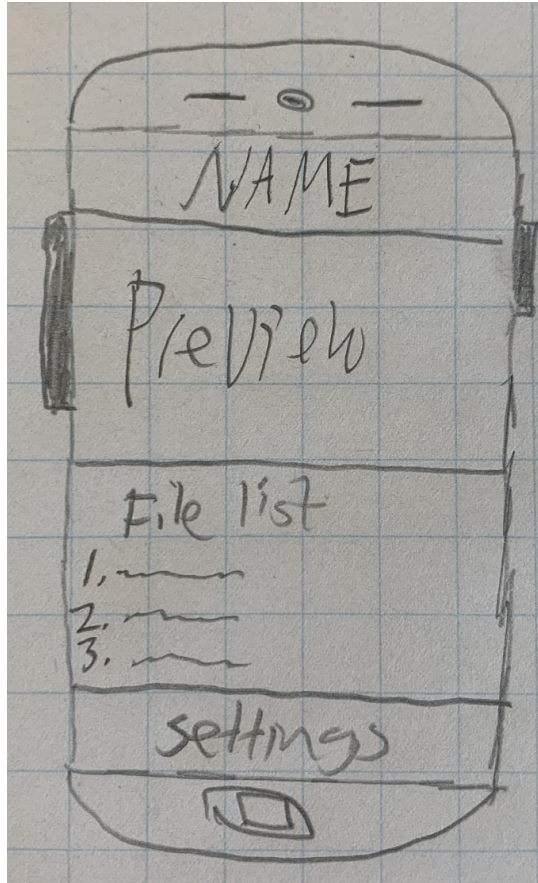
1. Design 1



2. Design 2



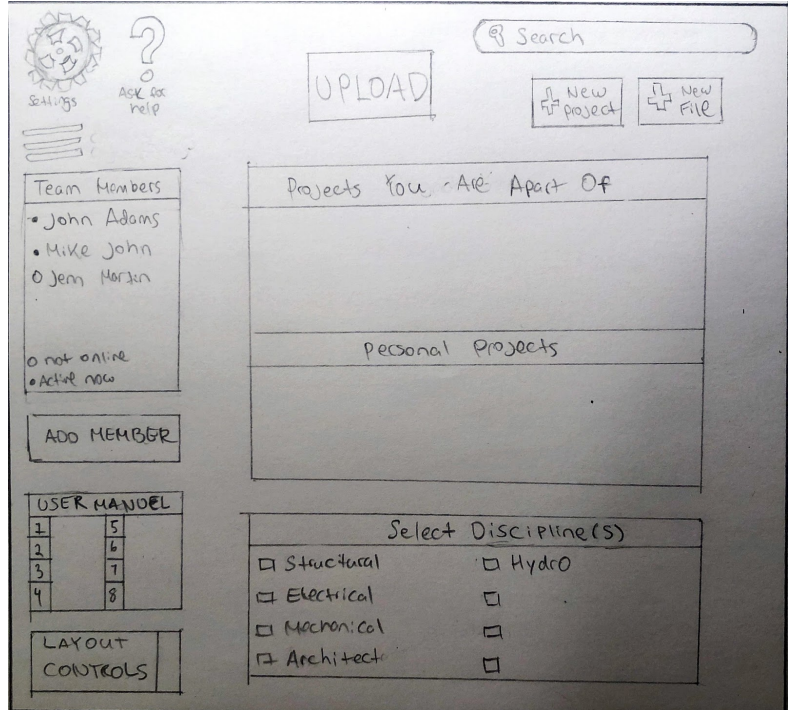
3. Design 3



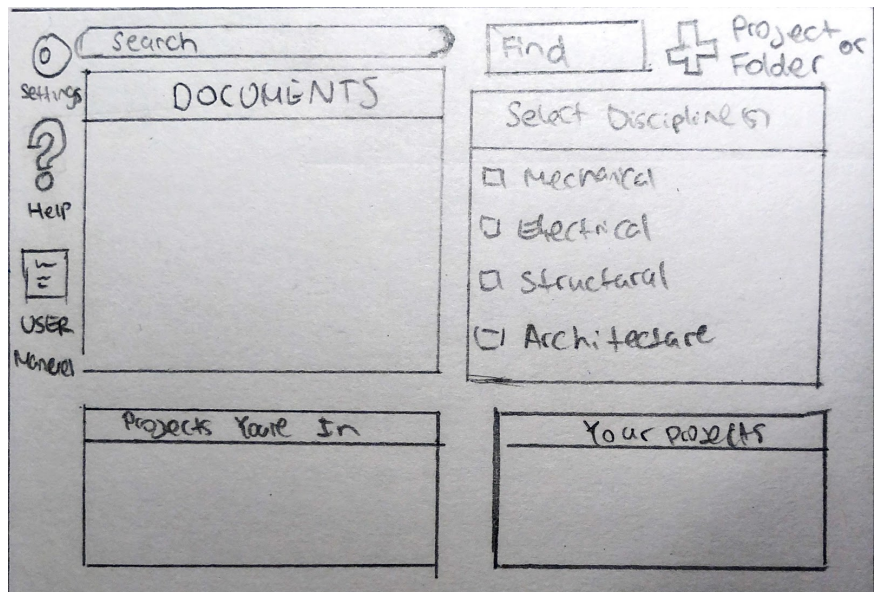
4. Explanation

Design 1 is very simplistic and features 3 main components. At the bottom is the settings button, within here options such as perspective, sensitivity, and others, are available. Above that is the file selector button, which works in sync with the file preview screen. Together these two allow easy file selection, with great precision. Design 2 also features the file selector and file preview, but also utilizes a open recent button, for quick access to recent projects. Furthermore, in design 2 the perspective choice button is independent of the settings. Design 3 is the simplest of them all and features a list of files to choose from. The setting is where the more complex stuff is tucked away.

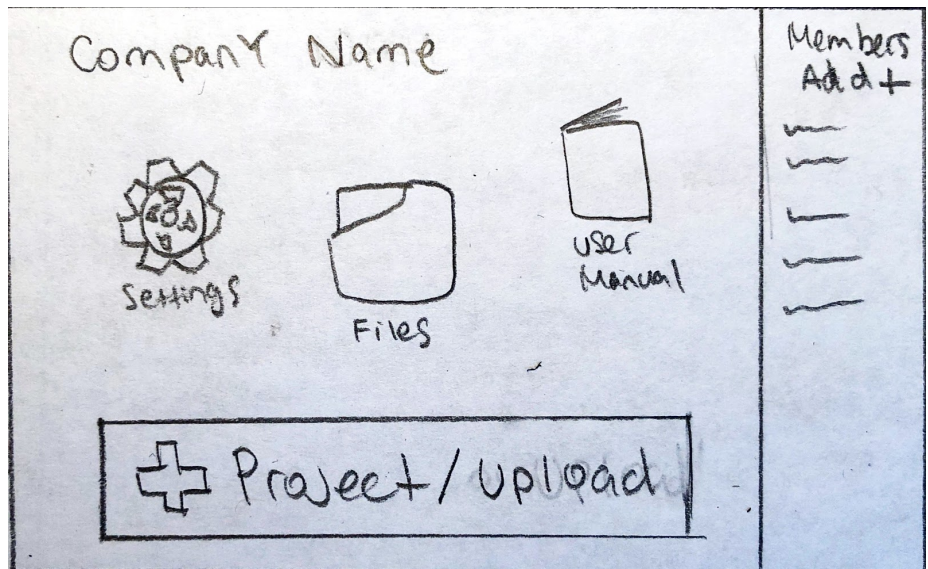
ii. Adam Jahan
1. Design 1



2. Design 2



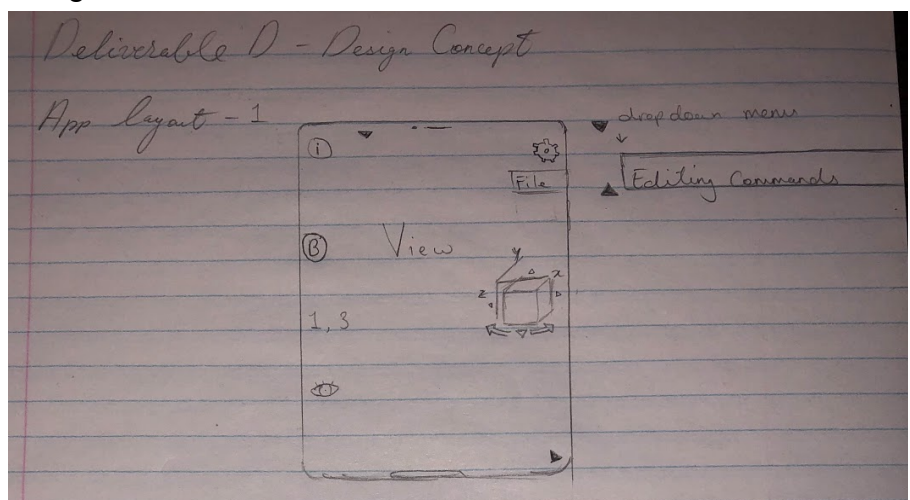
3. Design 3



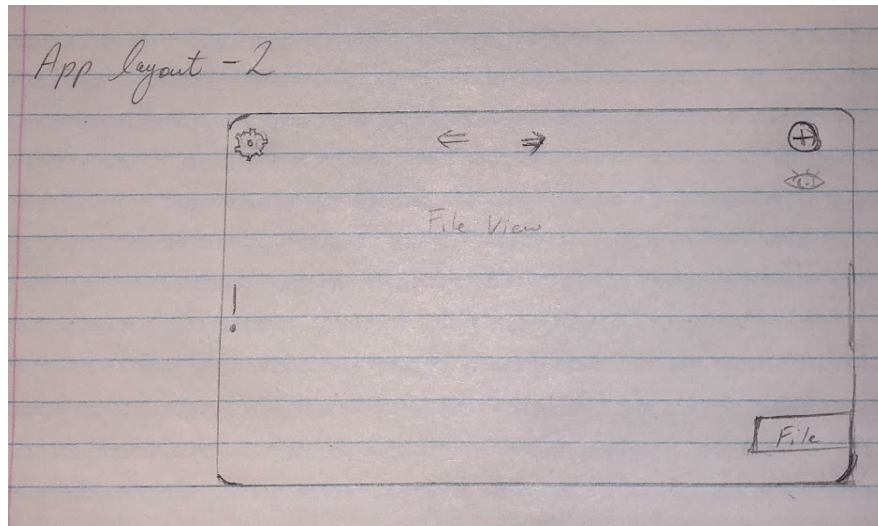
4. Design 1 and 2 depict a very simplistic design that uses very simple terms along with visual icons. Many different sections are given titles and areas for information. If help is needed, there is a help directory along with a user manual and search bar. In design 1 there is an additional section for team members and showing those who are online or not. Design 3 is more aesthetically pleasing with more visual icons. Design 3 also has an added feature to add members or create a team for your project.

iii. Nassar Shakir

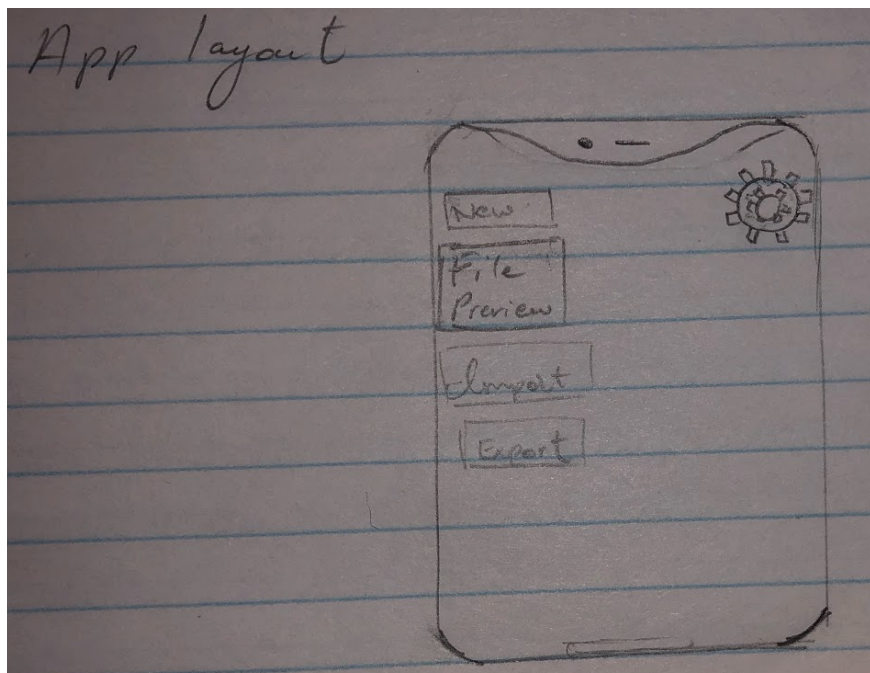
1. Design 1



2. Design 2



3. Design 3



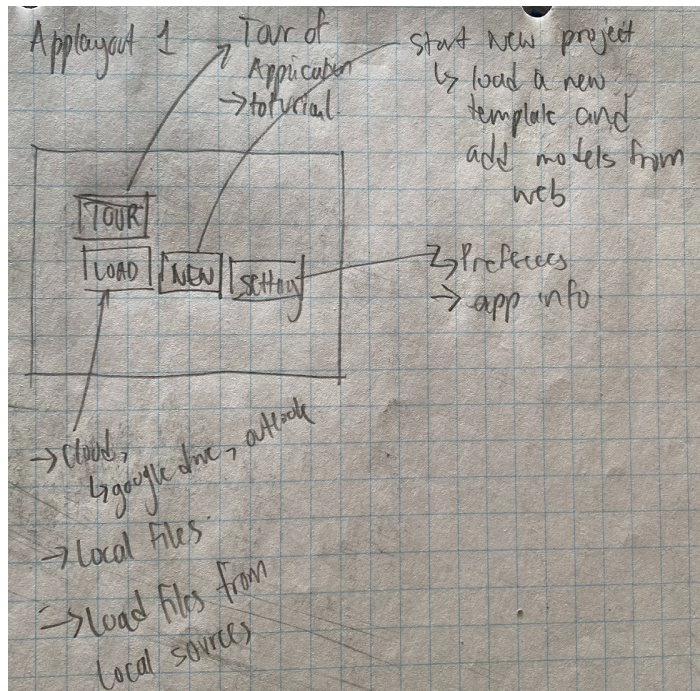
4. Explanation

Design 1 features a standard mobile phone, the encircled "i" represents the "help" button; redirecting the client to a user manual. The cube represents orientation, which can be controlled via swiping and/or moving the cube itself. The gear represents settings, this will allow the user to change specification within the app. "1,3" allows the user to switch between perspective "first-person" and "third person". The encircled B enables blueprint mode, letting the use apply

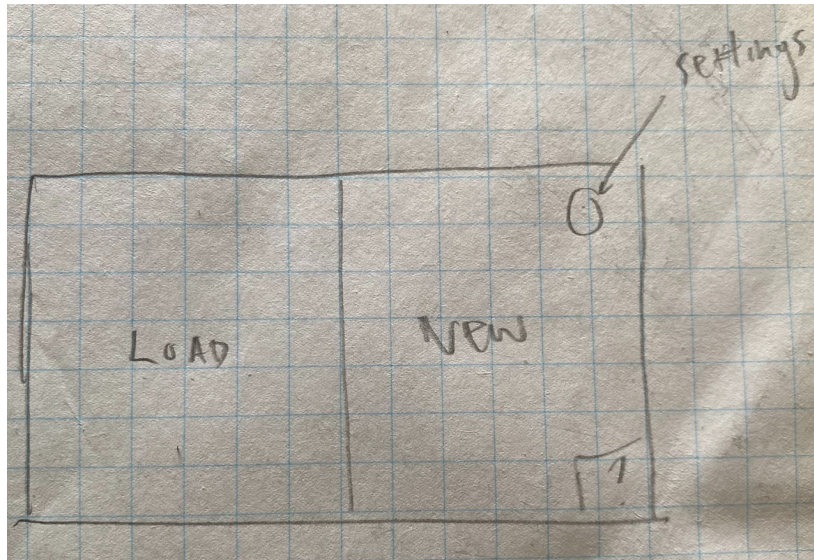
changes without changing the original model. The file will provide a save function, add a new doc function, etc., the drop-down arrow will serve to hold all editing options, such as cutting, placing a shape, or anything of that sort. Design 2 will be mostly similar to D1, this time it will be on a tablet, featuring different tab functionality by clicking on the left or right arrow. The different tabs will allow for all the disciplines to be present in a single doc with easy access. The encircled “+” will add additional tabs and the eye will function to enable or disable layers within the document. Design 3 implements necessary features such as “New File” and “File Preview”. Additionally, an import and export feature has been added to allow switching between desired programs easily.

iv. Abdullah Naumann

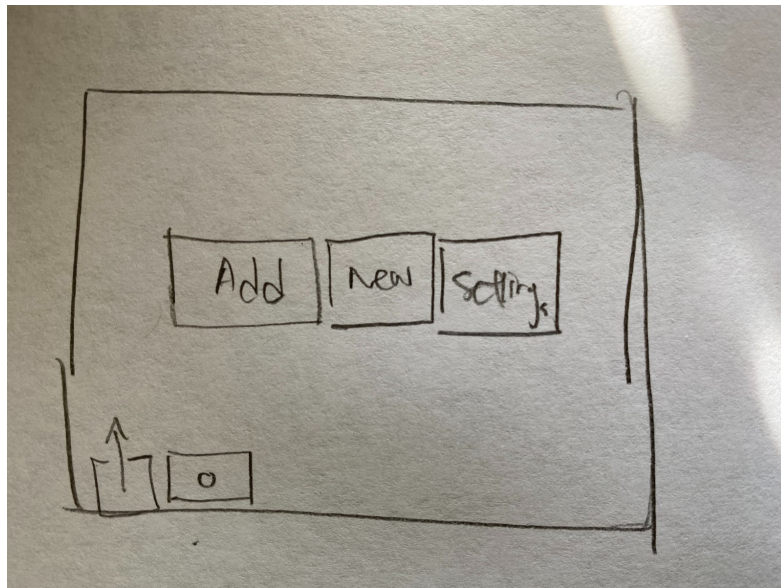
1. Design 1



2. Design 2



3. Design 3



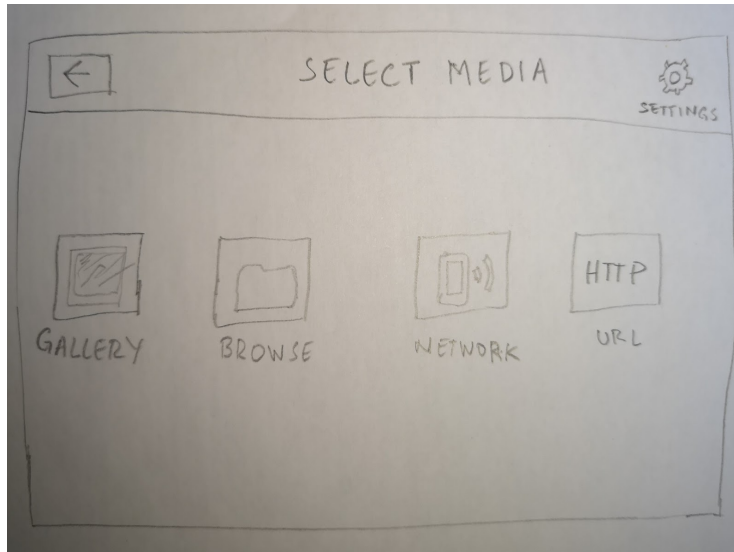
4. Explanation

Design 1- a seamless, user-friendly experience. You can add files, create a new document, take a tour, or adjust settings.

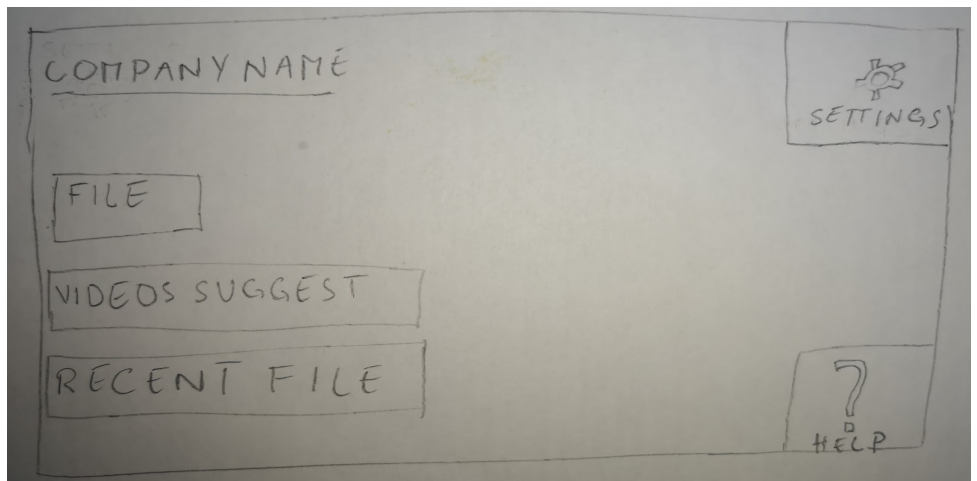
Design 2 - a seamless, user-friendly experience. You can load projects, create a new document, take a tour, or adjust settings. This is more visual design.

v. **Emeric Chanhoun**

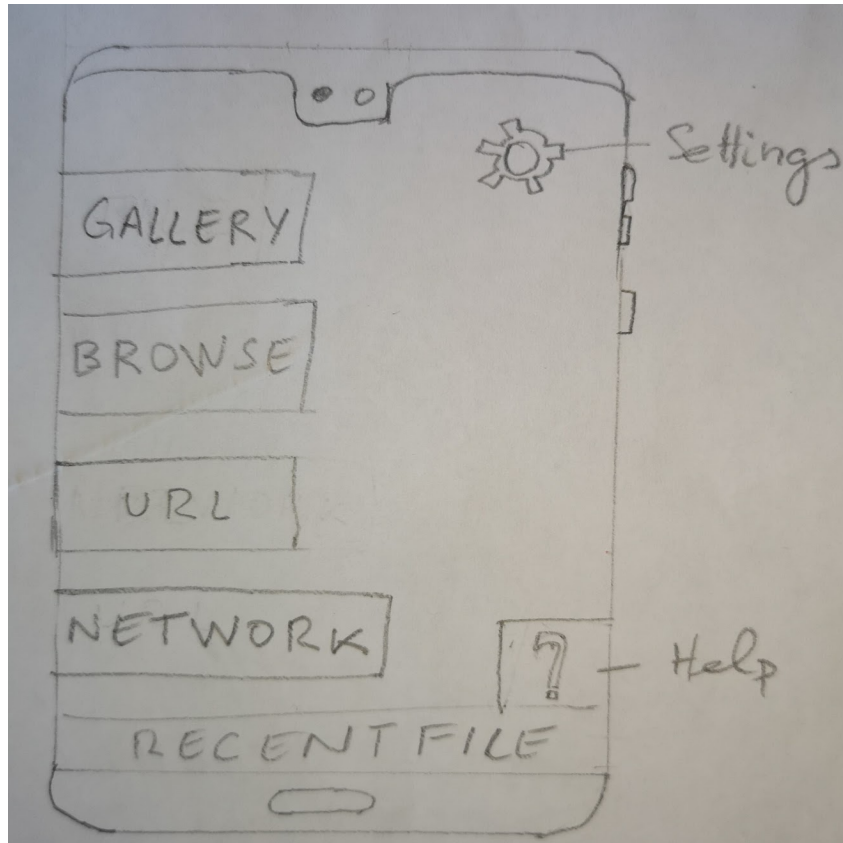
1. Design 1



2. Design 2



3. Design 3



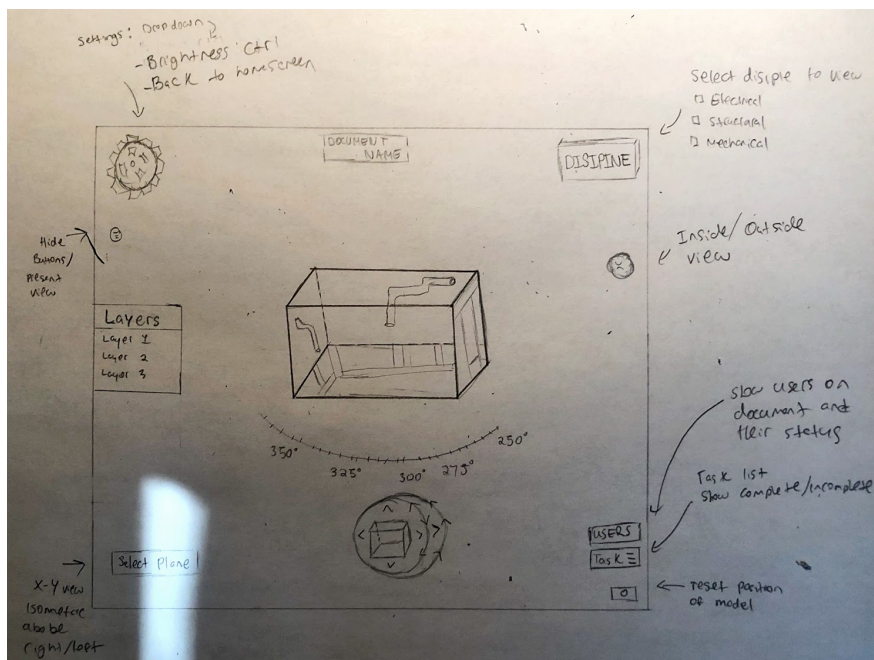
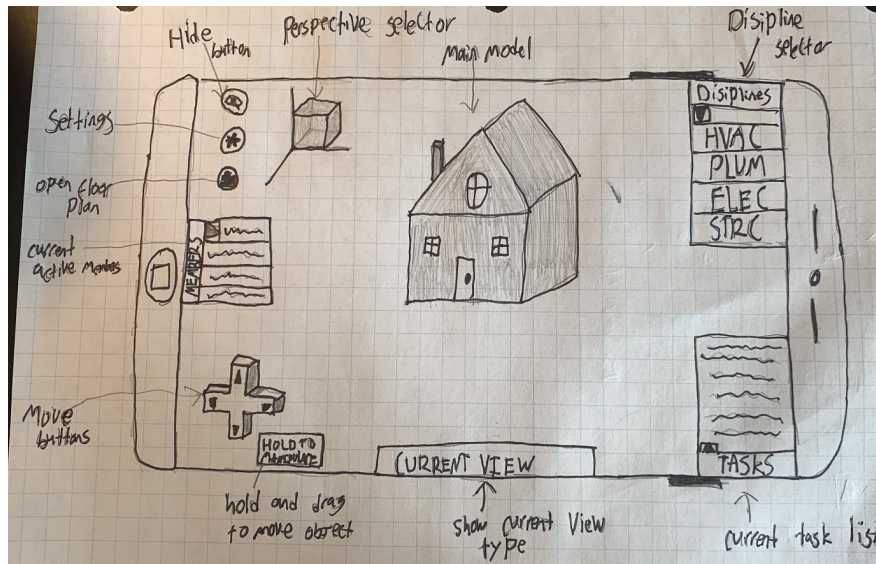
4. Explanation

Design 1 allows the user to add files through the gallery directly. We can also take that file directly from the internet. Design 2 has some videos suggested helping the user to gain experiences in VR. Design 3 is the combination of design 1 and 2

4. Concept Selection

Featured below are the final selections of the group. As a group, we went through every design above and compiled a list of things we liked and did not like. We then turned this list into the below sketches to represent our final concept selection.

a. Interface Views

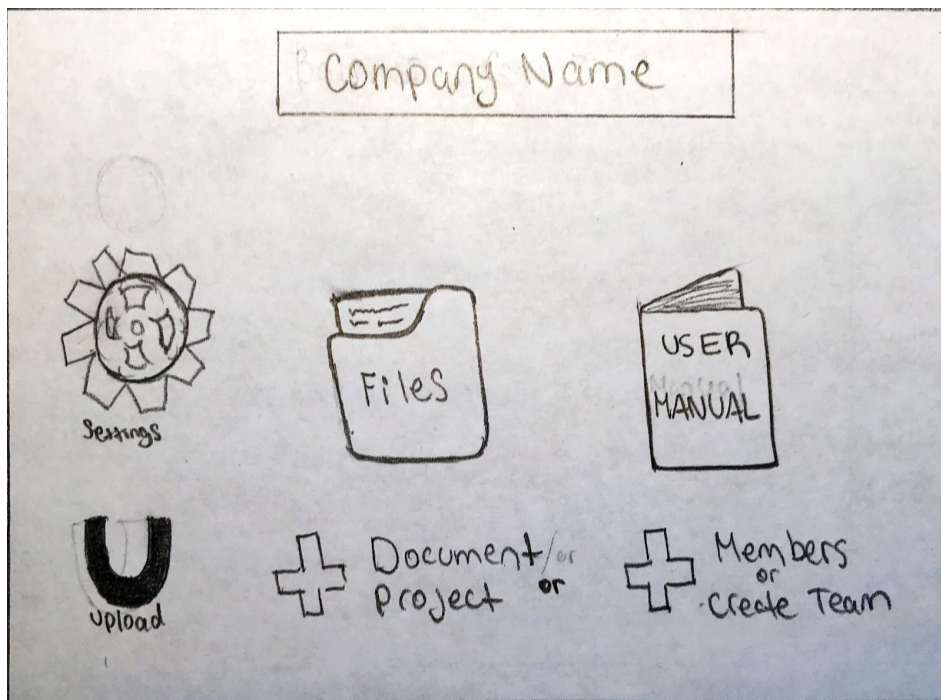
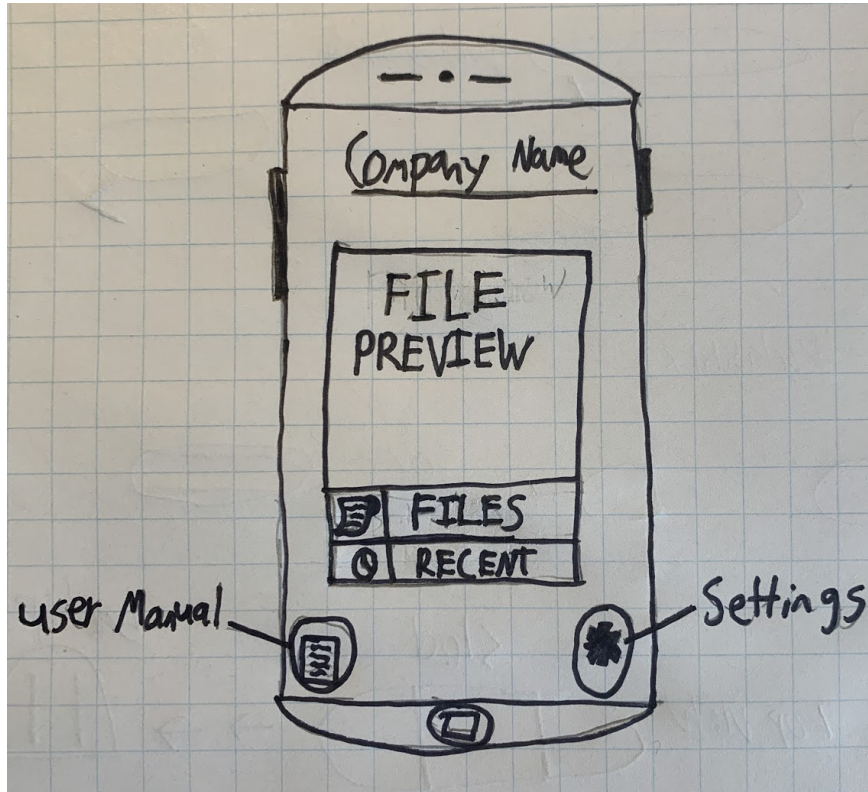


The final chosen design implements a mix of the best features from every design above. The key features being, small buttons, task lists, discipline selectors, perspective selector, and a movement function. The usage of small buttons helps keep the screen clutter-free, which increases its simplicity, and ease of use. The perspective and discipline selectors make it easy to switch between views and disciplines, keeping the time to switch and load to a minimum. Additionally, these functions satisfy the client's need for multi-disciplinary viewing. The movement buttons will utilize simple directions, to make their functionality and usage better.

Features

An addition of a "Tasklists" menu would make it easy to keep track of project progress and adds project management functionality to the software. Having a floor view button will allow the user to jump to any desired floor, this works in tandem with the hotspot function which allows the user to assign rooms that are viewed frequently to make navigation more convenient. If issues arise with calibration, a calibration button has been incorporated into the design to make it quick and easy. Another added feature is an edit bar so one can manipulate the models within the project as needed. This would give the user the ability to increase/decrease size, copy smaller models, rotate, etc. A small indicator showing the user the degrees at which they are rotating could give a good insight into some situations. With the addition of a "hide" button, a presentation mode could be interpreted into the design. On the interface, quick access to the flash could prove to be useful on some work sites. An option to take a comprehensive tour could be useful as it helps increase the accessibility of the software.

b. App Layout



The agreed-upon designs will include the most important features such as file preview, file search and file load capabilities. A user manual is sleekly integrated into the layout of the app without being intrusive. There is also the option of adding members to your project individually or putting together a whole team. The different hardware disciplines throughout the model will be available in tab mode on the bottom of the screen for easy access and navigation. To familiarize the user with the experience, a tour function will be included within the user manual. A list of icons will be created to make the different sections in the app more aesthetically pleasing.

5. Conclusion

As mentioned previously, the desired outcome of this project is to reduce conception and build time for construction projects that choose to adopt this system. Many features designed specifically for optimizing analysis and reducing miscellaneous steps have been included. Such as a simple and intuitive user interface, innovative collaborative features, extensive multidisciplinary view, and a thorough user manual, all at a relatively low cost. Successfully integrating this method of construction has the potential to significantly boost productivity, reduce the need for paper, and increase the magnitude/scale of any building project.

6. References

[1]: <https://www.yulio.com/>

[2]: <https://www.onshape.com/>