# ARC

## Augmented Reality Construction

## Design Day 2020

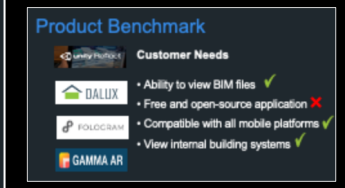
Course section: GNG 1103 | Team: A R C | Members:  B. Vandenberg, L. Healy, V. Jancowski, E.Jazvac, M.White

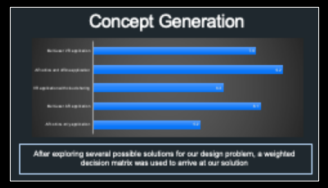
# PROBLEM ANALYSIS

## ABSTRACT

A user friendly and cost-effective application that is accessible on all mobile devices has been developed that will allow construction workers to view all aspects of 3-D Building Information Models (BIM), including mechanical, electrical, structural and architectural systems in Augmented Reality. Important aspects of the product development process are disclosed as well as a brief demonstration of the final product.





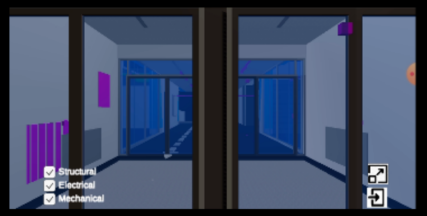




## DESIGN PROBLEM

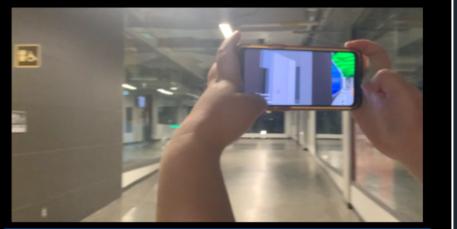
***"Design an application that allows construction workers to view all aspects of 3-D Building Information Models (BIM), including mechanical, electrical, structural and architectural systems in Virtual or Augmented Reality. The product should be cost effective, user friendly and accessible on all mobile devices."***

# FINAL PRODUCT

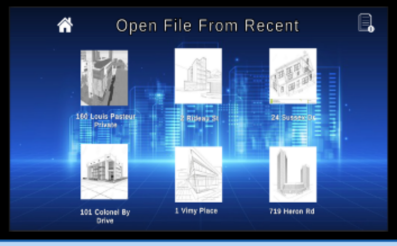
ARC is a user friendly application that allows users to view BIM files and a building internal systems in AR at the construction site.




**AR View** and **Toggle Function**



ARC in Use – STEM Building




Open Screen – access to various construction site BIM files

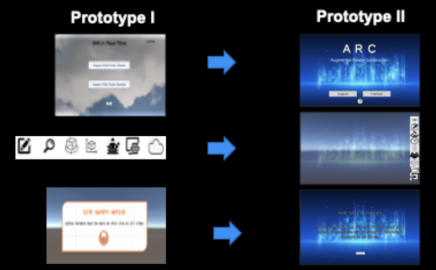

**Home screen** and **User Interface** in English and French

ARC

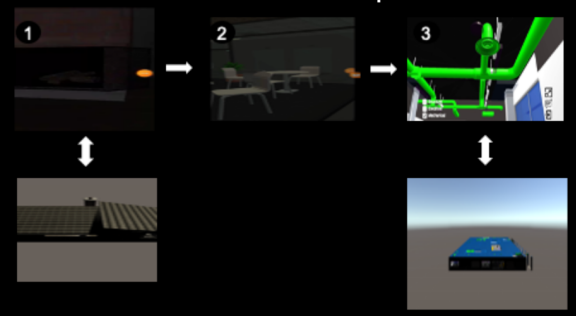
Augmented Reality Construction

# PRODUCT DEVELOPMENT

## Interface Development




## AR Camera Development




## Client Feedback and User Testimonials

*"The app was easy to use, intuitive, and user friendly. The button layout is logical and easy to navigate. Virtual aspects are simplistic and convey important information to the user."*

- Kyle Jordan, Masters Student at uOttawa

*"The user interface is visually appealing and easy to navigate, the use of bright colours makes it really easy to quickly distinguish between the different disciplines in the building."*

- Sarah, 2nd Year engineering student at uOttawa

On prototype II: *"Great progress so far, I like how the user interface looks. I'm looking forward to seeing the final prototype."*

– Patrick Lalonde, EllisDon Construction

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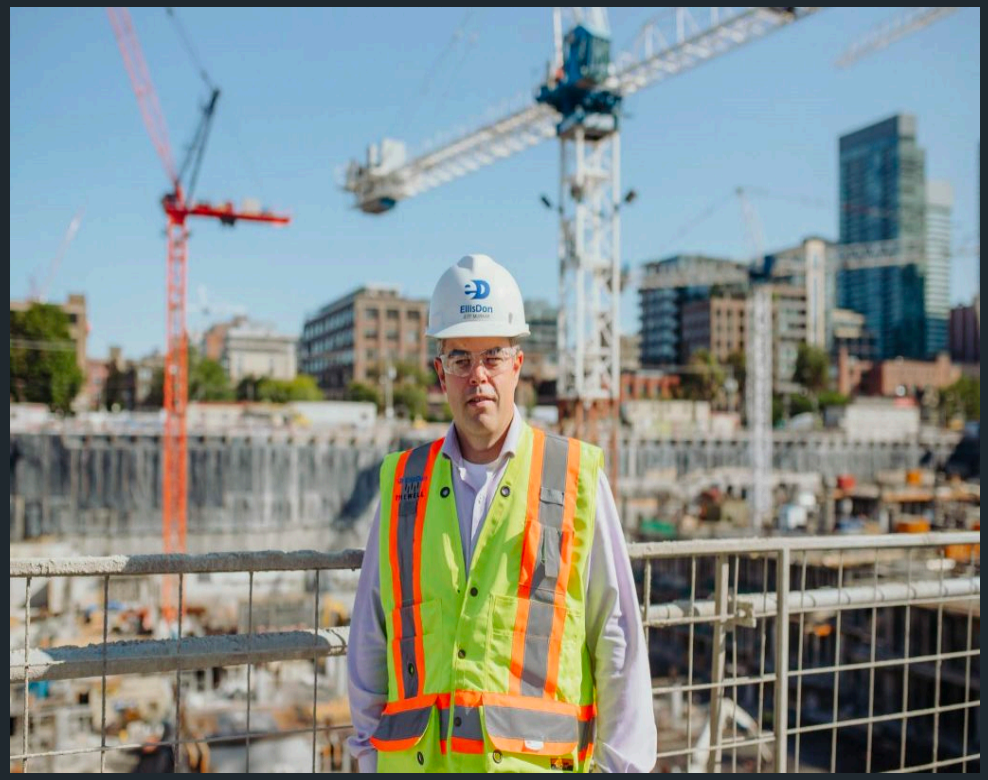
# Our Client



## What do they do?

- **EllisDon** is a world-leading construction and building services company that completes in excess of $5 billion worth of contracts annually.

## What problem do they have?

- With labour shortage, increasing construction complexities and disruptive technologies, EllisDon is experiencing a decrease productivity due to falling behind in the technological world.

## What are their needs?

- View 3D BIM files and their internal systems in VR or AR
- The product will be compatible with IOS and android platforms.
- Software application must be open source or free to use.

EllisDon

# Product Benchmark


DALUX

FOLOGRAM

GAMMA AR

## Customer Needs

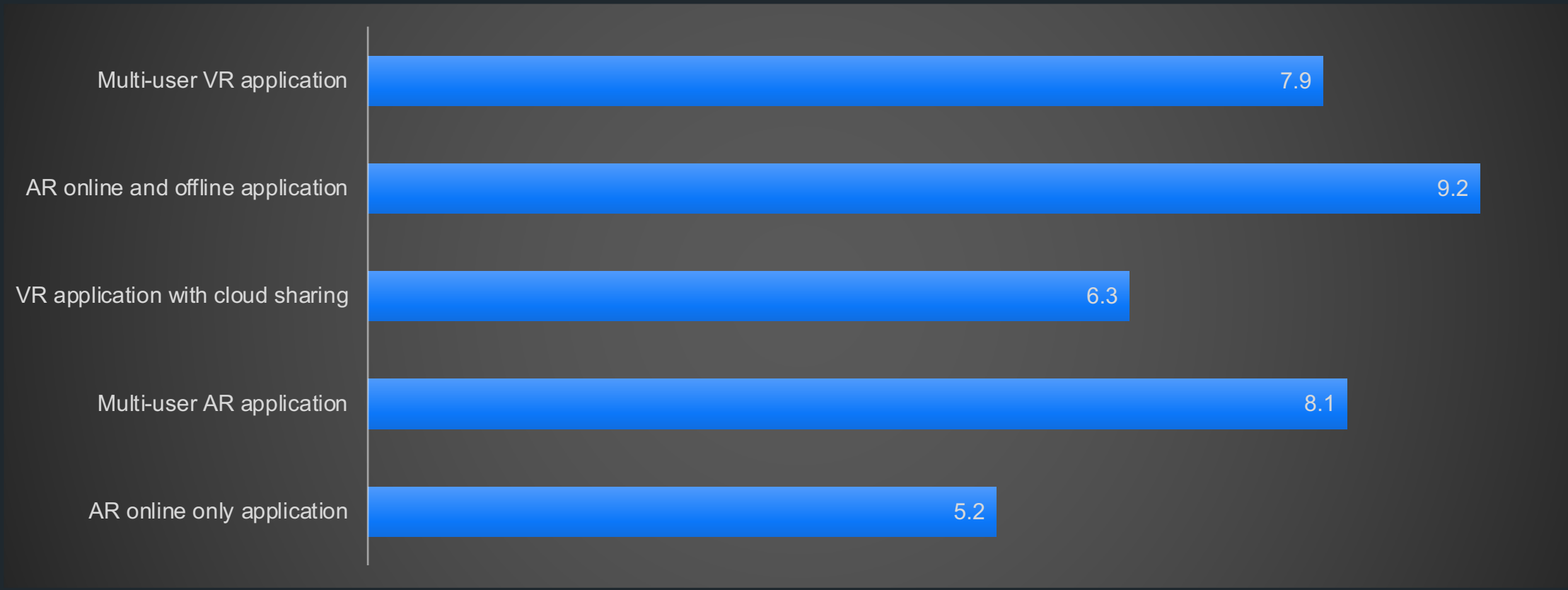
- Ability to view BIM files ✓
- Free and open-source application ✗
- Compatible with all mobile platforms ✓
- View internal building systems ✓

# Target & Design Specifications

| Metric | Rank | Unit | Target Specs. | | Final **Specs.** |
|---|---|---|---|---|---|
| | | | Marginal | Ideal | |
| View 3D BIM files in AR | 5 | Y/N | Y | Y | Y |
| Compatible with common Mobile Devices | 5 | Y/N | Y | Y | Y |
| Viewing of BIM is available offline and cloud syncing available online. | 3 | Y/N | Y | Y | N * |
| Ability to view 3D internal systems in BIM's in AR | 4 | Y/N | Y | Y | Y |
| Navigation and interface must be user friendly. | 4 | Subj. | 5 - 7 | 8 - 10 | 8 |
| In app safety reminders and warnings for any hazards on works site. | 4 | Y/N | Y | Y | Y |
| Software application must be open source or free to use. | 3 | Y/N | Y | Y | Y |
| Training and implementation documentation must be provided. | 3 | Y/N | Y | Y | Y |
| Software application must be free to users. | 5 | $ | <50 | 0 | 0 |
| Accessible in the form of a mobile application. | 2 | Y/N | Y | Y | Y |

* Viewing is available offline, cloud syncing is not available.

# Concept Generation




After exploring several possible solutions for our design problem, a weighted decision matrix was used to arrive at our solution

# DESIGN PROBLEM

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# Final Product – A R C

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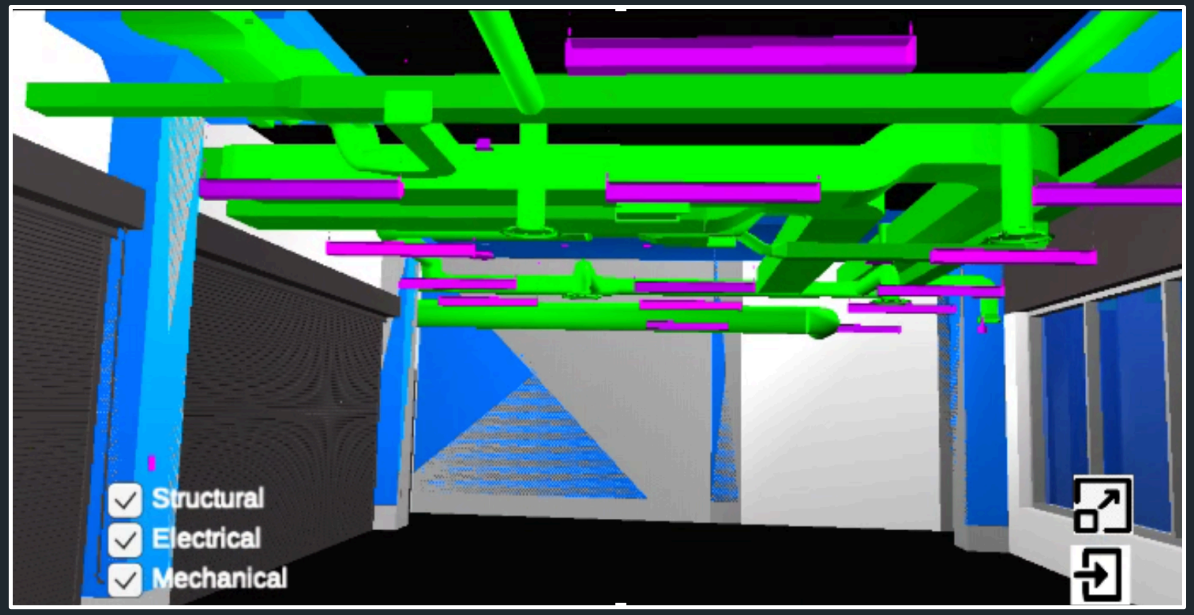


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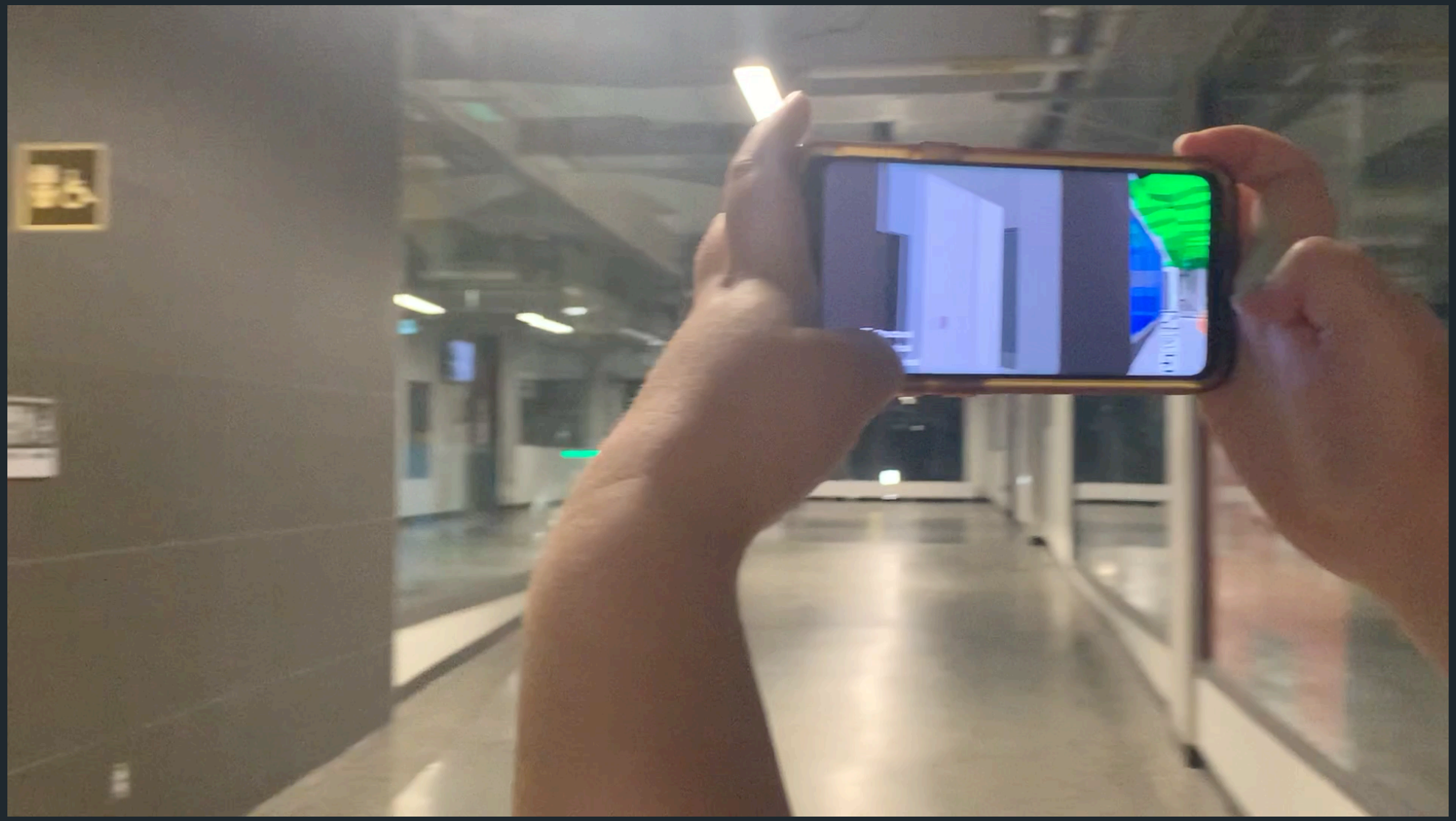

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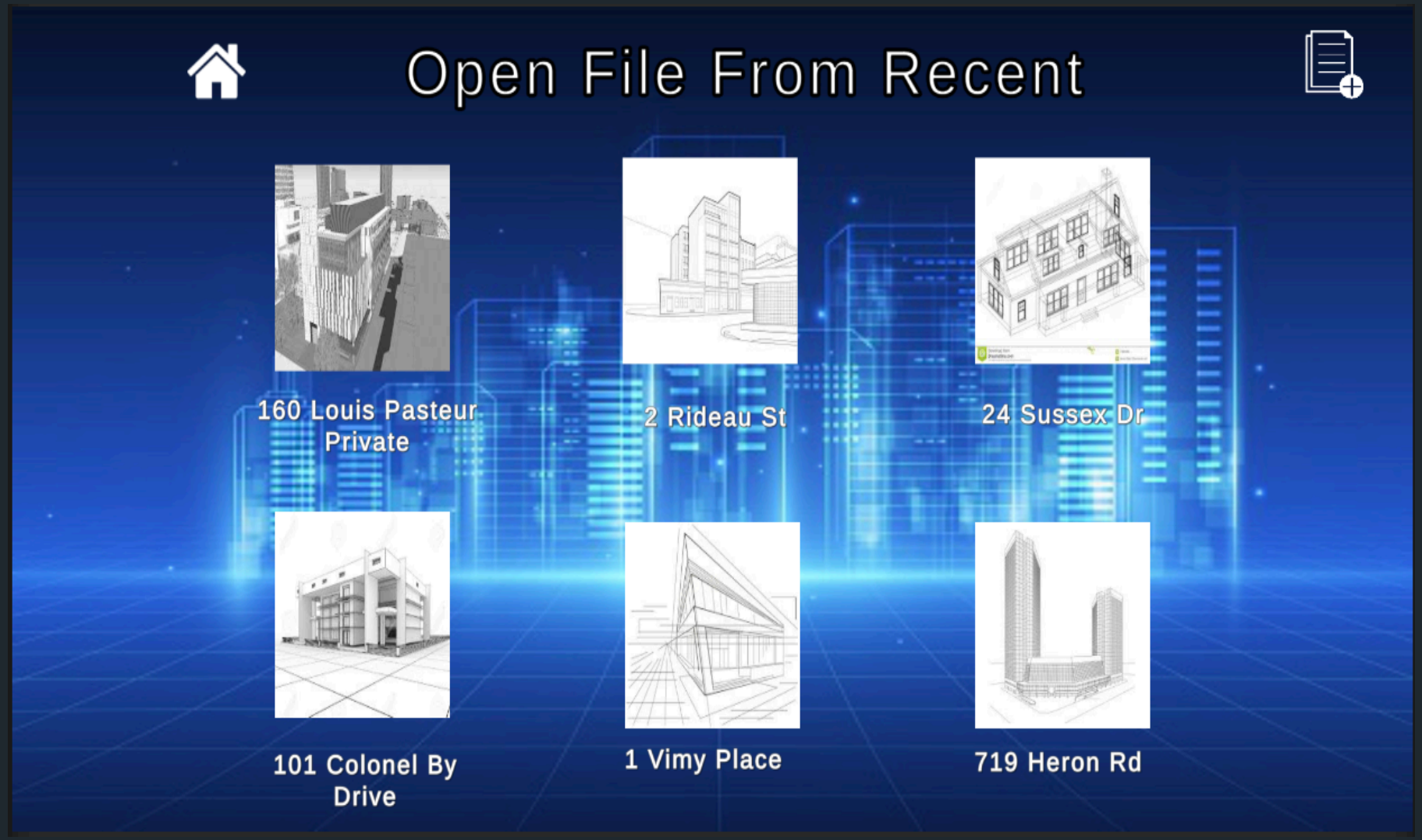


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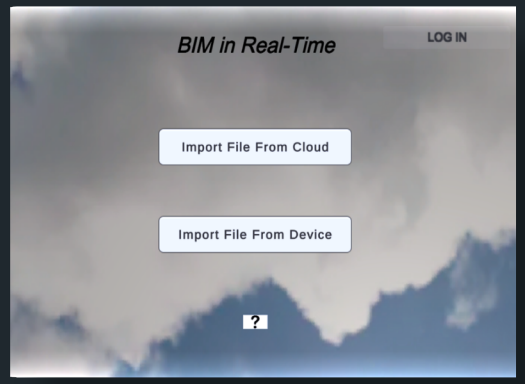
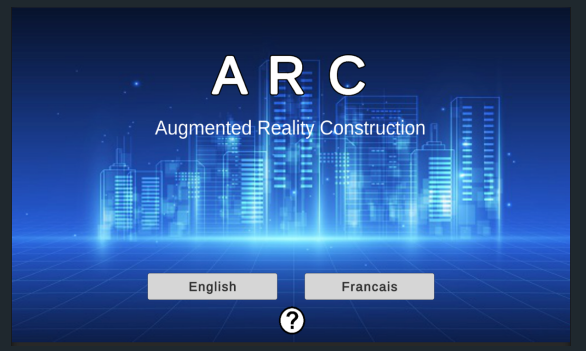
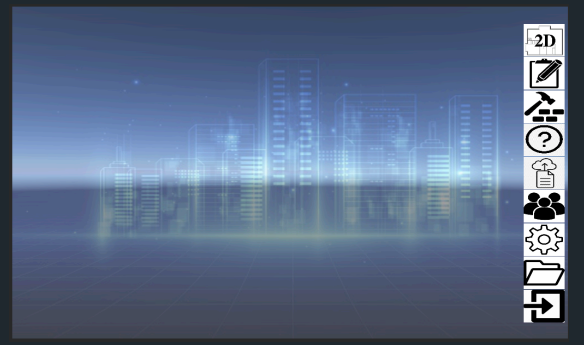
# Prototype I

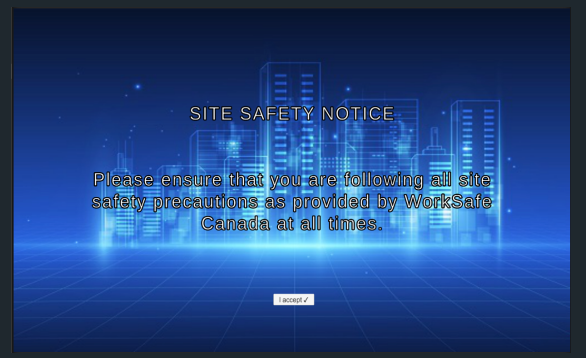


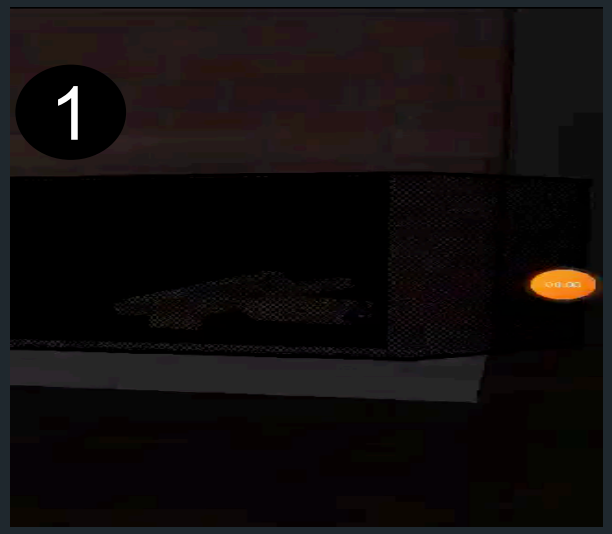


# Prototype II



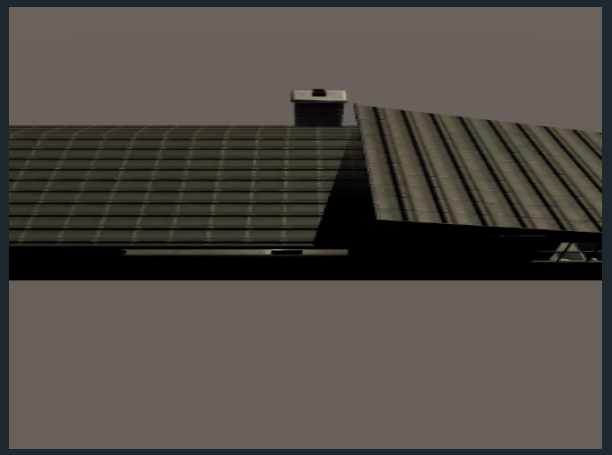



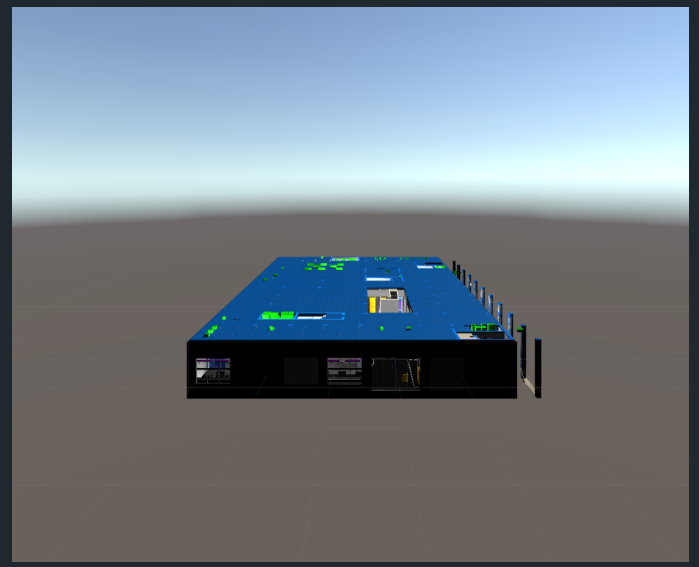




1


2


3
Structural
Electrical
Mechanical





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