ARC

Augmented Reality Construction

GNG1103 Design Project

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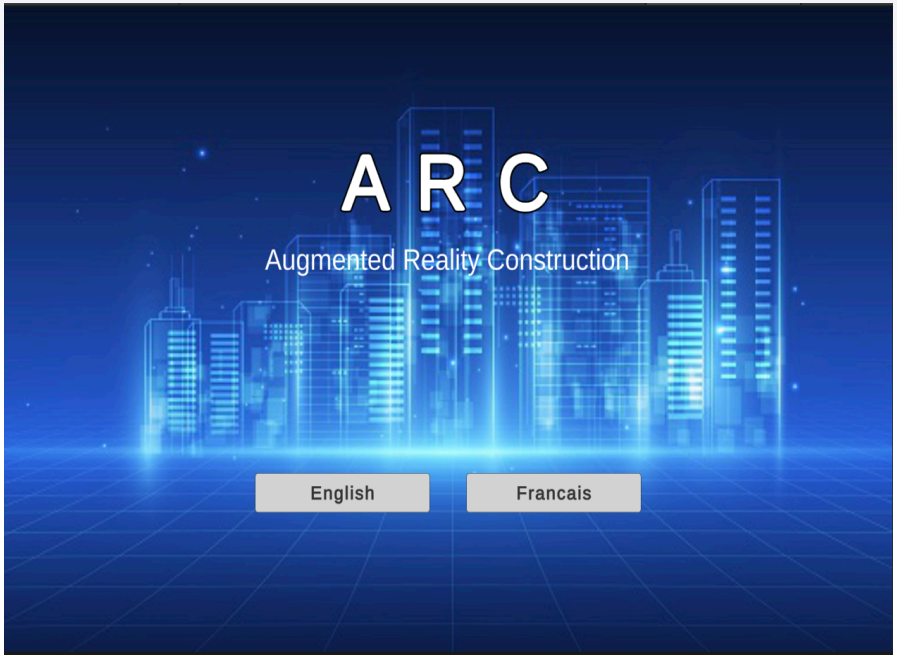
Agenda

- About ARC
- Problem Refinement
- Product Development
- Final Product
- Trials & Tribulations
- Future Work & Lessons Learned

About ARC

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

- Founders:
  - Briar Vandenberg
  - Lauren Healy
  - Victoria Jancowski
  - Edwin Jazvac
  - Maya White



1

Problem Refinement

Customer needs

Based on client meet 1:

- Ability to view and interact with a BIM file in an AR environment
- The product will be compatible with IOS and android platforms.
- Ability to isolate mechanical, electrical, structural and architectural systems
- The product will not cost the user any money.
- The product will work offline but have online capabilities in range of internet.

*Ordered from most important to least important.

Problem Statement

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.

Benchmarking

DALUX

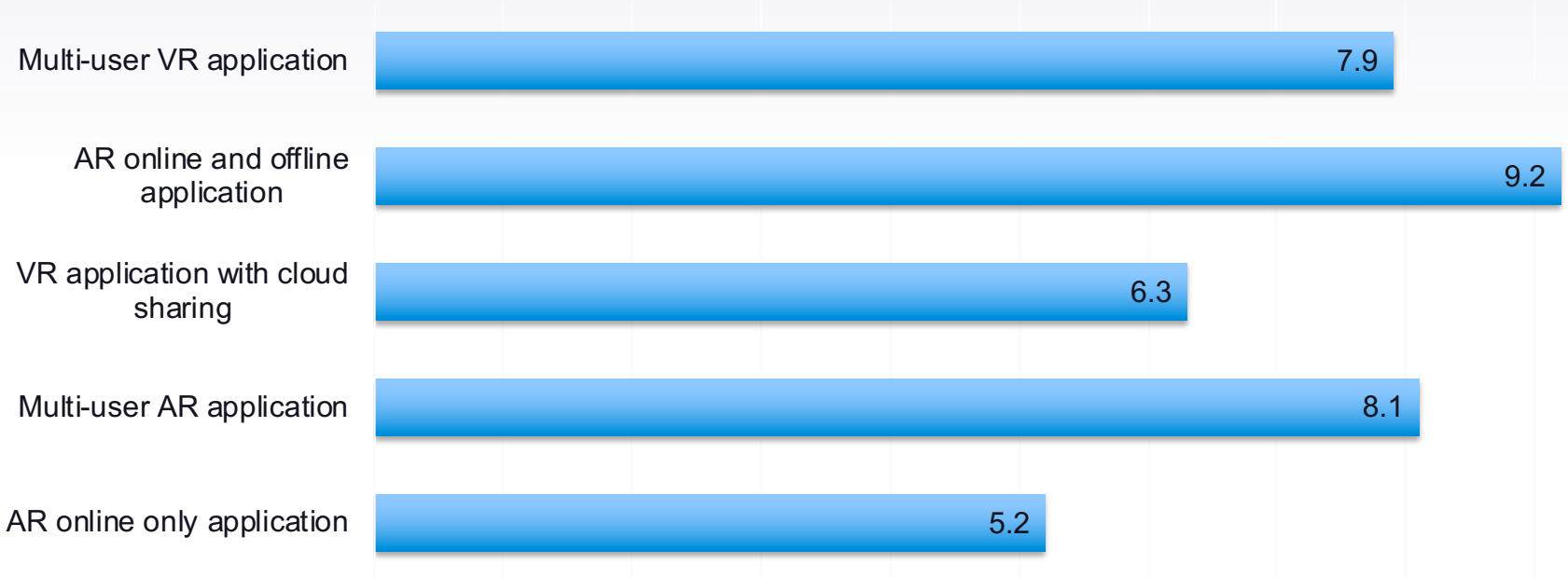
GAMMA AR

FOLOGRAM

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

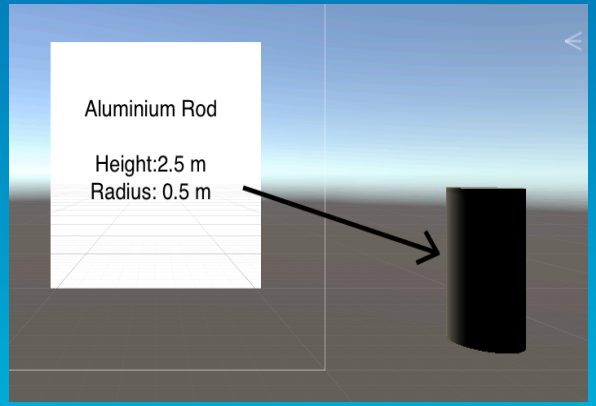
2 Prototype Development

Concept generation

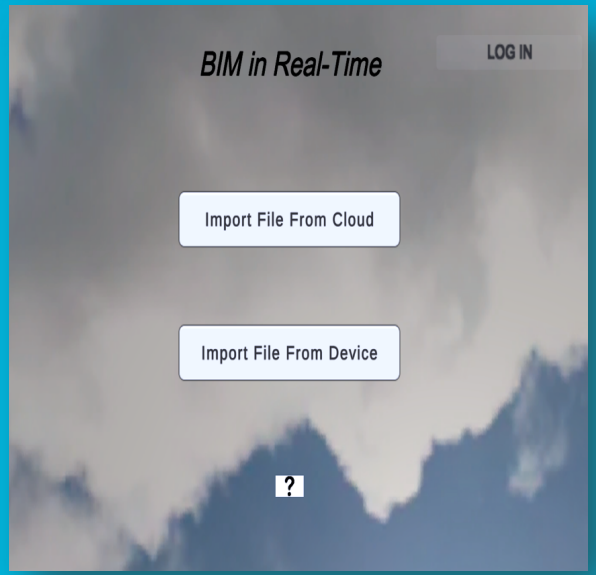


Prototype 1

- 6 low fidelity analytical prototypes
- Used existing examples of our concepts
- Verifying Unity is a good platform for the project
- Main Menu interface, tool bar, multi-user interface, AR camera scripting, dimension tool, site safety reminders
- Client feedback:
  - Good start, interface needs to be scripted and cohesive


Aluminium Rod
Height:2.5 m
Radius: 0.5 m

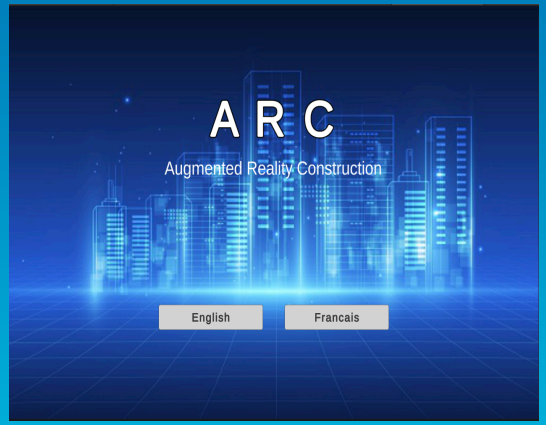

SITE SAFETY NOTICE
Safety helmets must be worn on this site at all times

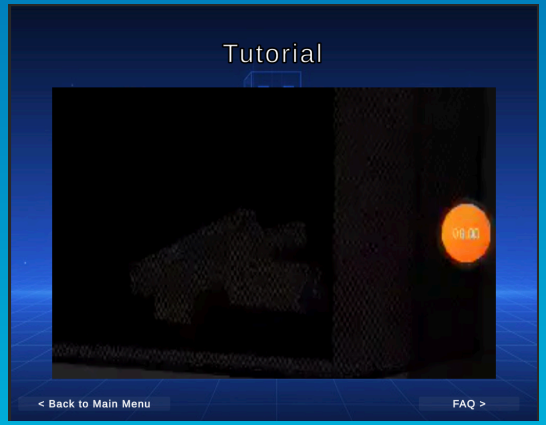

BIM in Real-Time
LOG IN
Import File From Cloud
Import File From Device
?


Save Menu
Save on device
Save changes to cloud
Return

Prototype 2

- 1 low fidelity comprehensive prototypes
- Combined the previous focused prototypes
- Very low functionality
- Client feedback:
  - Should be further along at this point
  - Need to implement BIM file


ARC
Augmented Reality Construction
English
Francais


Tutorial
< Back to Main Menu
FAQ >


SITE SAFETY NOTICE
Please ensure that you are following all site safety precautions as provided by WorkSafe Canada at all times.
I agree


2D

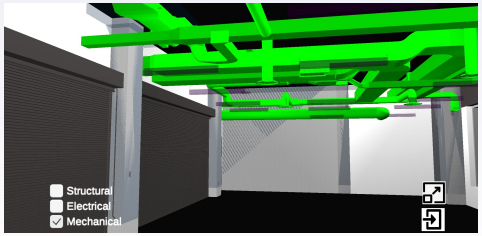
3

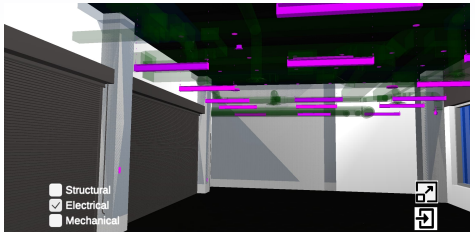
The Final Prototype

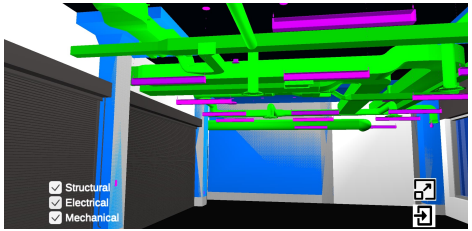
Product Demonstration

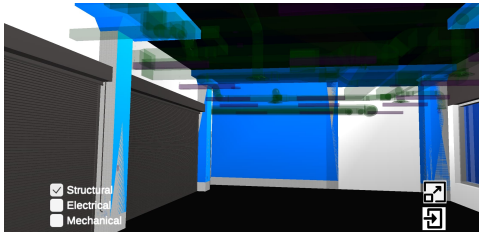
Key Features

- Ability to toggle between views of internal building systems including mechanical, electrical and structural.
- Aerial view of building in AR
- Video and tutorial and FAQ section.
- Compatible with Android and IOS devices.
- Free & Open source software
- User friendly interface
- Bilingual (En/Fr)









Final Prototype Specifications

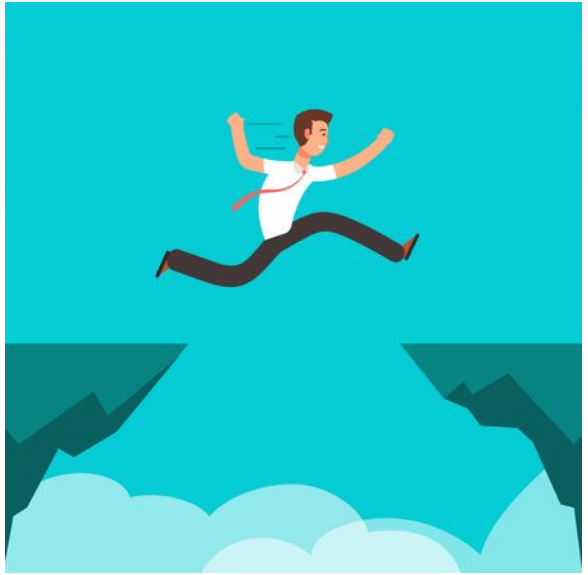
No.	Metric	Units	Target Value	Tested Value
1	Ability to view 3D Building Information Models (BIM) in Augmented Reality.	Y/N	Y	Y
2	Compatible with common Mobile Devices (iOS or Android).	Y/N	Y	Y
3	Viewing of BIM is available offline and cloud syncing available online.	Y/N	Y	N*
4	Ability to view 3D internal systems in BIM's in Augmented Reality.	Y/N	Y	Y
5	Navigation and interface must be user friendly.	Subjective Rating	6	8
6	In app safety reminders and warnings for hazards on work site.	Y/N	Y	Y
7	Software application must be open source or free to use.	Y/N	Y	Y
8	Training and implementation documentation must be provided.	Y/N	Y	Y
9	Software application must be free to users.	$	0	0
10	At minimum be accessible in the form of a mobile application.	Y/N	Y	Y

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

4 Challenges & Lessons Learned

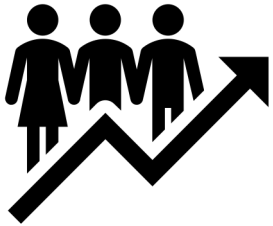
Challenges

- **Navigating individual schedules**
- Time constraints / rapid development
- Lack of technical experience (initially)
- Delays in receiving required files
- Fatigue (team and individual)
- Team communication



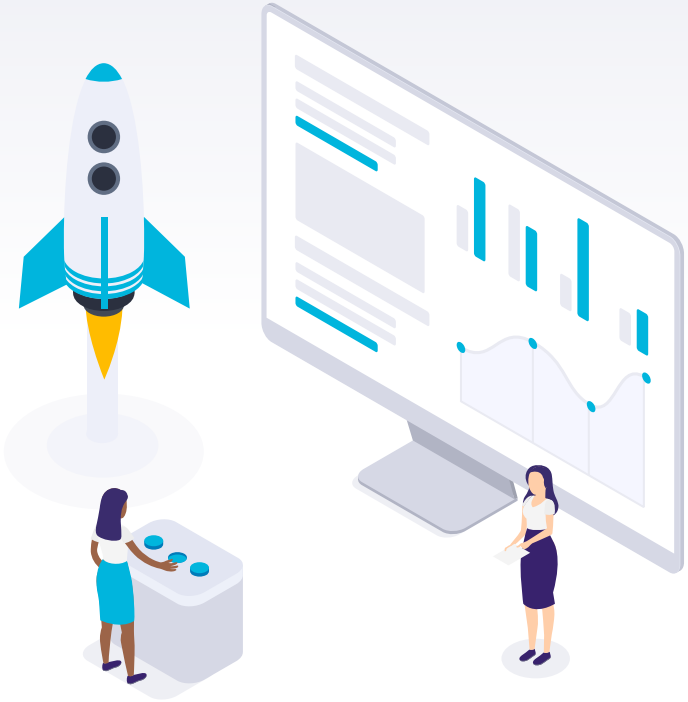
Lessons Learned

- Implement version control whenever possible
  - OneDrive for documents, spreadsheets, presentations, etc.
  - Ensure all members know how to use VC, stick to a common convention
- Communicate constantly, ensure everyone is aligned to the same objective



Future steps

- *Final touches*
  - Addressing the last remaining bugs
- *How can we extend / make our product better?*
  - Add Additional features
    - Cloud sharing
    - Annotations
    - 2D Views
- *Next project steps*
  - User manual



Thank you!

Questions?