GNG 1103 B

Project Deliverable B

VR/AR for Construction

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Group B03-4

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Introduction

It has been an ongoing trend, in recent decades, for different sectors of industry to increase their efficiency through the integration of new technologies. For example, the manufacturing sector has made tremendous strides in productivity and cost-effectiveness through the use of automation. Now, investors are looking for similar progress in the field of construction. As such, capital investment in construction startups has increased tenfold in the last 10 years, with the goal of incentivizing the use of new tools and applications. At the same time, well established and long-standing construction companies, such as Ellis Don, are looking into fixing those problems which have kept their performance stagnant over the years. In particular, they're maneuvering away from the use of static plans to relay information from their design engineers (who usually model in 3D) to their construction teams, a practice which often leads to inefficient communications, difficulties in implementation, and ultimately lower productivity.

Thus, for this project, Ellis Don has requested for students at the University of Ottawa's faculty of Engineering to develop a program which makes use of AR, or Augmented Reality, to improve their construction efficiency. This software would, in principle, allow on-site workers to view rendered building models in real time, through a mobile phone camera, which would help to eliminate the inefficiencies that typically come from the translation of static building plans into the real world.

Client Statements/Needs

The software:

- Must communicate the end product of construction, in an AR environment, to the on-site construction crew.
- Must display multidisciplinary BIM; not just the walls and doors, but also what is behind walls and ceilings, as well as mechanical, electrical, and structural components.
- Should require minimal training to use.
- Should be compatible with cross-platform mobile devices.
- Should be developed using free/open-source technologies.
- Should be fully accessible off-line.
- Should not require a headset, to allow for more widespread usage and accessibility.
- Would preferably utilize a first-person perspective.
- Should display dimensions and annotations.
- Must be provided along with the appropriate training and implementation documentation.
- Must utilize pre-designed models, so as to not require any manipulations during its use.
- Must allow for a single user as a baseline. Multiple user access would be an asset.
- Should have a translucent interface so as to keep safety indications visible on-site.
- Should work on any appropriate build file, not just one in specific.

List	*Priority	Customer Needs	Needs Specifications	**Benchmark Akular
1	5	User Friendly	Easy to use and doesn't need a lot of training regardless of technical skill level; user friendly navigation.	5
2	3	Platform Accessibility	App to be used on both iOS and Android as well as tablets (such as iPad OS).	3
3	5	Multidisciplinary	Program combines structural, architectural, electrical, and mechanical components.	2
4	3	Dimension and Annotation	Program shows information on object dimensions within the program and allows annotation.	3
5	4	Hazard Display	Program displays site hazards and instructs users to use relevant safety precautions.	2
6	3	Offline Access	Program is accessible and usable offline and is accessible without the cloud.	3
7	3	AR (1st Person)	Program is in AR rather than VR and shows a 1st person perspective which can be used as the user moves.	4
8	5	Tutorial	Program has an easy to use tutorial video or interactive screen which explains all components.	3
9	2	Multiple User Access	Program has single user accessibility. Having multiple user access at once is an asset.	3
10	4	Reusability	Program functions with not just one specific file, but with any build.	4

**Priority: importance rating 1-5; 5 being most important, 1 being least important.*
***Benchmark (Akular): we measure the quality of the feature by rating from 0-5 (5 being most well implemented, 1 being least well implemented, 0 being not present) in comparison to how it appears in Akular.*

Problem Statement

The construction service giant *EllisDon*™ is under high pressure to conform to the digital era to avoid stunted growth. Our aim is to create a mobile device software in AR/VR which provides construction teams with an easy to use, dynamic user interface that facilitates the communication of complex multidisciplinary building information models directly from design engineers, circumventing the need for 2D blueprinting. This software will improve the overall efficiency and communication of future construction projects.

Reference(s)

- https://akular.com