Review presentation on

Augmented Reality in Construction Using BIM Technology

Presented by

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OUTLINE OF PRESENTATION

- Abstract
- Introduction
- Literature Review
- Objectives
- Methodology
- References

Abstract

Augmented reality (AR) is an interactive experience of a real-world environment and it refers to technologies and experiences that bring computer-generated objects into the user's physical environment. It can be defined as a system that incorporates three basic features, A combination of real and virtual worlds, Real-time interaction, and accurate 3D registration of virtual and real objects. AR can be used in everything from project planning to communications. AR is typically powered by mobile applications, headsets and other smart that superimpose digital objects into the real world. It can also help to teach people how to use complex equipment, AR can assist educators through life-like demos. AR enhances the project presentation, better collaboration, safety and construction training.

Abstract

BIM is one of the most promising recent developments in the architecture, engineering and construction (AEC) Industry. BIM simulates the construction project in a virtual environment. A BIM model characteristics the geometry, spatial, relationships, geographic information, quantities and properties of building elements, cost estimates, material inventories and project schedule. BIM is used to improve the efficiency of the construction process, reduce waste during construction and improve the quality and efficiency of the buildings. In this current project, In this project, we have completed the development of an application which visualizes the 2D into a 3D environment. Now we are going to add detailed structure and other working parts of the building like plumbing, which can be accessed through a Mobile phone.

Introduction

Augmented Reality:

Augmented reality (AR) is an interactive experience of a real-world environment and it refers to technologies and experiences that bring computer-generated objects into the user's physical environment. It can be defined as a system that incorporates three basic features, A combination of real and virtual worlds, Real-time interaction, and accurate 3D registration of virtual and real objects. AR can be used in everything from project planning to communications. AR is typically powered by mobile applications, headsets and other smart that superimpose digital objects into the real world. It can also help to teach people how to use complex equipment, AR can assist educators through life-like demos. AR enhances the project presentation, better collaboration, safety and construction training.

Introduction of BIM:

BIM is one of the most promising recent developments in the architecture, engineering and construction (AEC) Industry. BIM simulates the construction project in a virtual environment. A BIM model characteristic the geometry, spatial, relationships, geographic information, quantities and properties of building elements, cost estimates, material inventories and project schedule. BIM is used to improve the efficiency of the construction process, reduce waste during construction and improve the quality and efficiency of the buildings.

BIM is used for?

BIM is used for creating and managing data during the design, construction, and operations process. BIM integrates multi-disciplinary data to create detailed digital representations that are managed in an open cloud platform for real-time collaboration.

How BIM is connected to AR?

BIM models can now be enhanced by Augmented Reality (AR) empowering its users to view and access the BIM model data hands-free in 3D. AR adds a layer of information and views/overlaying relevant information to the digital representation.

Literature Review:

Pampattiwar.et.al(2022): **:**

Utilized marker based AR for executing another plan approach for inside structure. This AR condition will allow the customer to look over an extent of furniture and subsequently show the virtual furniture picked on the real condition.

Shakil Ahmed. et. al (2021): The principal purpose of this study is to explore the using opportunities of AR and VR technologies in construction management and also explore the contribution to overcome various construction management issues from last three decades. It is revealed in the study that these incredible improvements in AR and VR technologies are having a great impact on the construction industry in a couple of ways.

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Claudia Calderon. et. al(2018):
It could be suggested that AR is an extension or a supplement of BIM. Also, these applications have a lot of potential during the design and construction stages of a project and its integrated use must be researched on a deeper level. The flow processes must be designed, controlled and/or improved in an orderly manner, generating activities with added value and reduction of waste.

Md. Mihrab Hossain. et. al (2017): AR and VR technologies are hugely used in construction safety management and worker training for many past years. Project parametric model visualization and walking through into project before the starting of the actual project with the feeling of the real world is another great characteristic of AR and VR technologies. Assuming that AR and VR technologies will improve with safety, quality, visualization, workforce management and time management.

Ali Karji. et. al(2016):

First, each of these advancements has its own level of complexity, such as programming in AR and image processing which makes it difficult to integrate. Second, there are limited areas of common applications where these three advancements can suit. Third, the input/output of these three advancements may not be aligned in some cases.

Samant et al (2016) :

Examination accomplished virtual home programming by utilizing the strategy for 3D remaking to obscure scene to execute camera 3D enlistment, did a necessary investigation to this sort of Augmented Reality System dependent on no markers.

Abdalrahman Elshafey. et. al(2015):

Software developers can consider important factors identified through this study, such as ease of use and the perceived enjoyment of the software, to create BIM-AR platforms that have a higher possibility to be used and accepted by the users. For organizations, providing training for the stakeholders before using the system appears to be significantly effective as user perception of external control and ease of use are among vital factors for accepting the BIM- AR.

Vito Palmieri. et. al(2012):

Extensive tests performed by engineers and architects have revealed that such a system may enhance the investigation of historical buildings. The system was found to be helpful to contextualize information for indoor analysis of the building and to simplify access to BIM information

Phan. et. al(2010):

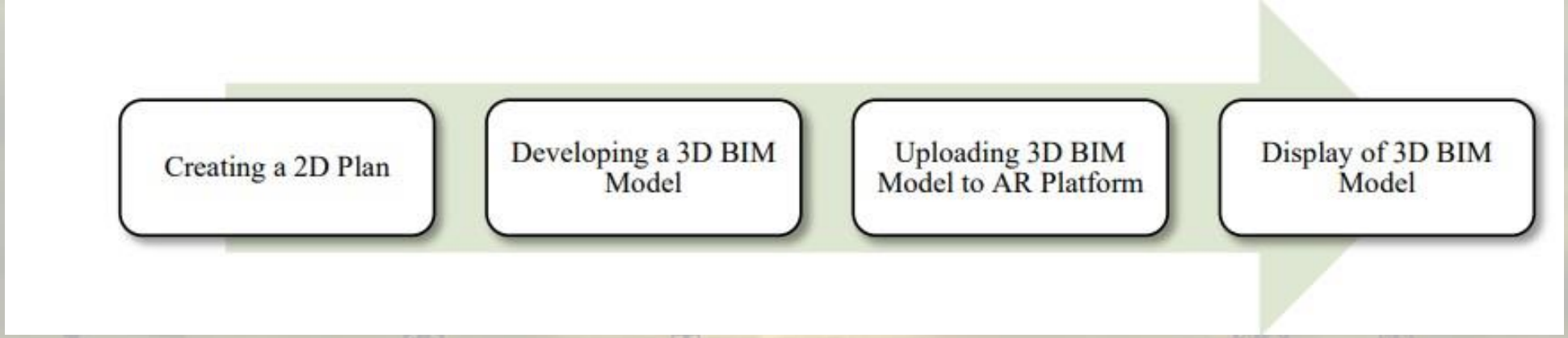
Exploration inspected virtual furniture and change work to make another structure technique utilizing Augmented Reality innovation for Interior Design training. In an AR situation, structure work can turn out to be all the more energetic, advantageous, and smart. Besides, planning work and assembling can be directed simultaneously and we cosy relationship with one another

Objectives

- To develop an app using BIM Tool.
- To develop 3D models of the construction site.
- To develop customized views(MEP) for a better understanding of the customer.
- Develop the app to support new android versions.

Methodology

- Developing a 3d model In Revit Software.
- Creating an app using Unity.
- Providing Database (Exporting) to the app using Vuforia.
- Installing app in the mobile.



- Developing a 3d model using Revit software :

The Revit software platform has become a popular option for design and modelling buildings and their components in 3D. The models are annotated with 2D drafting elements and building information can be accessed from the model's database. Entire buildings or parts of buildings can be worked on in the Revit environment.

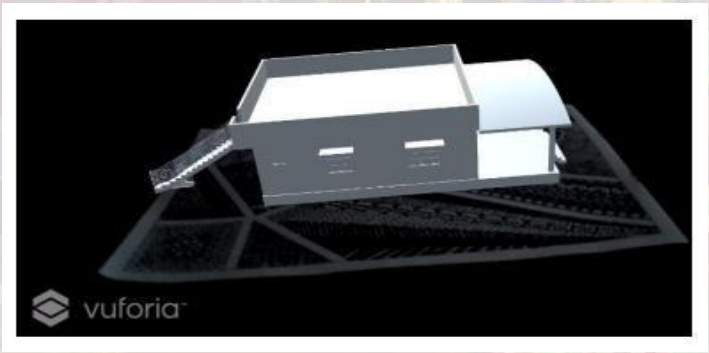
Creating an app using Unity Software.

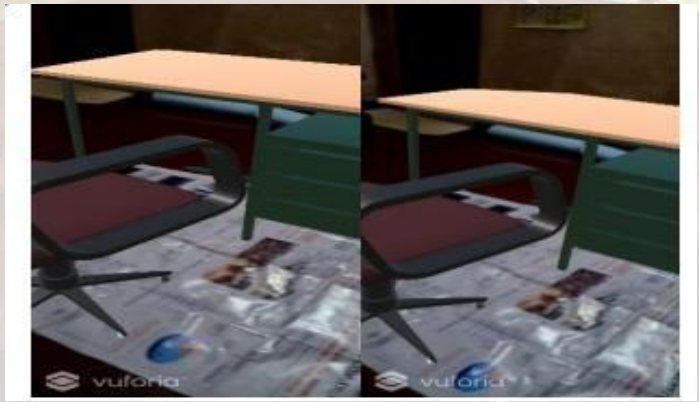
1.Setting Up Project & Creating Particle Prefabs.
2.Creating & Adding Effects Script.
3.Creating & Adding Touch Controls.
4.Creating customised buttons
5.Testing.
6.Creating Main Menu.
7.Organizing Hierarchy.
8.Installing SDK on the mobile.

Providing Database (Exporting) to the App using Vuforia.

- Add Vuforia Engine to your Unity project.
- Set up Vuforia Engine's Image Targets in Unity.
- Add content and test your AR app.

Samples designed through the Vuforia, which changed 3d model to AR view,





Installing app in the Mobile (AR Handset):

- Exporting the either in the format of .apk or .ipa
- .apk stand for android & .ipa stand for ios.

Work Done (phase – 2) :

- **Installation of Software, Which includes,**

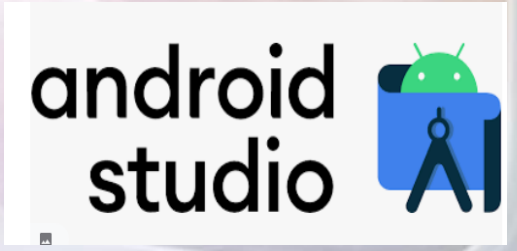
- **REVIT 2023**

- **UNITY 3D**

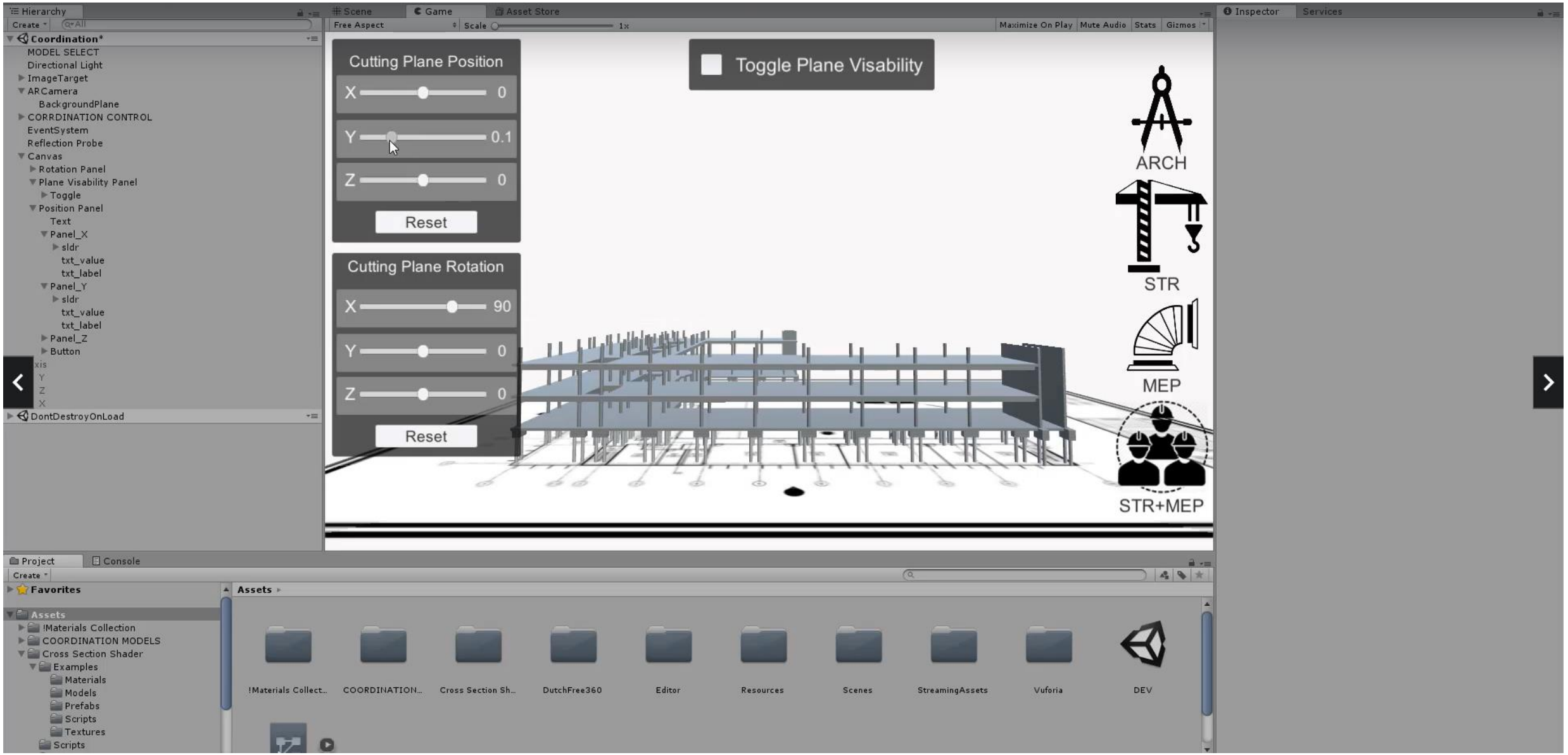
- **VISUAL STUDIO**

- **VUFORIA ENGINE**

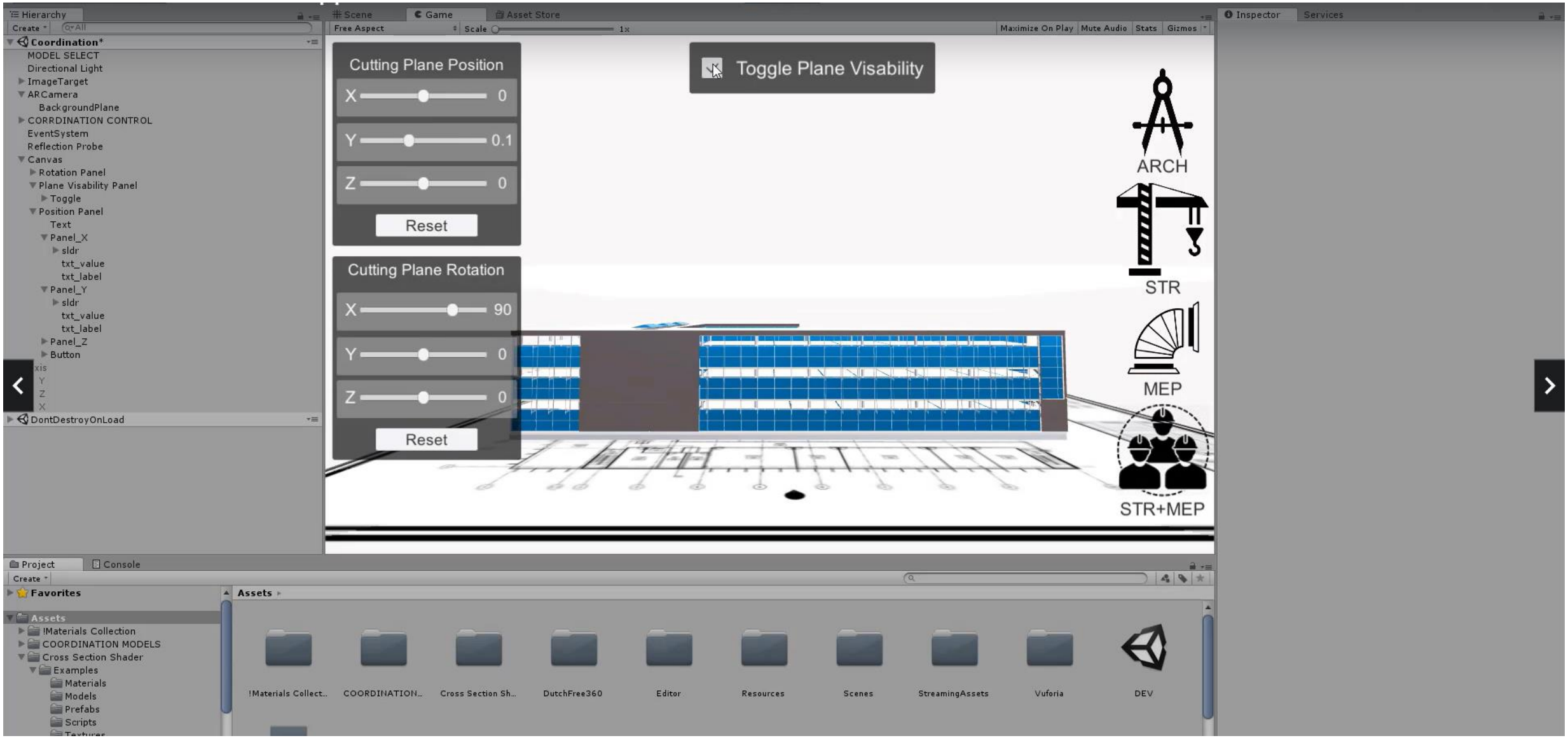
- ANDROID STUDIO



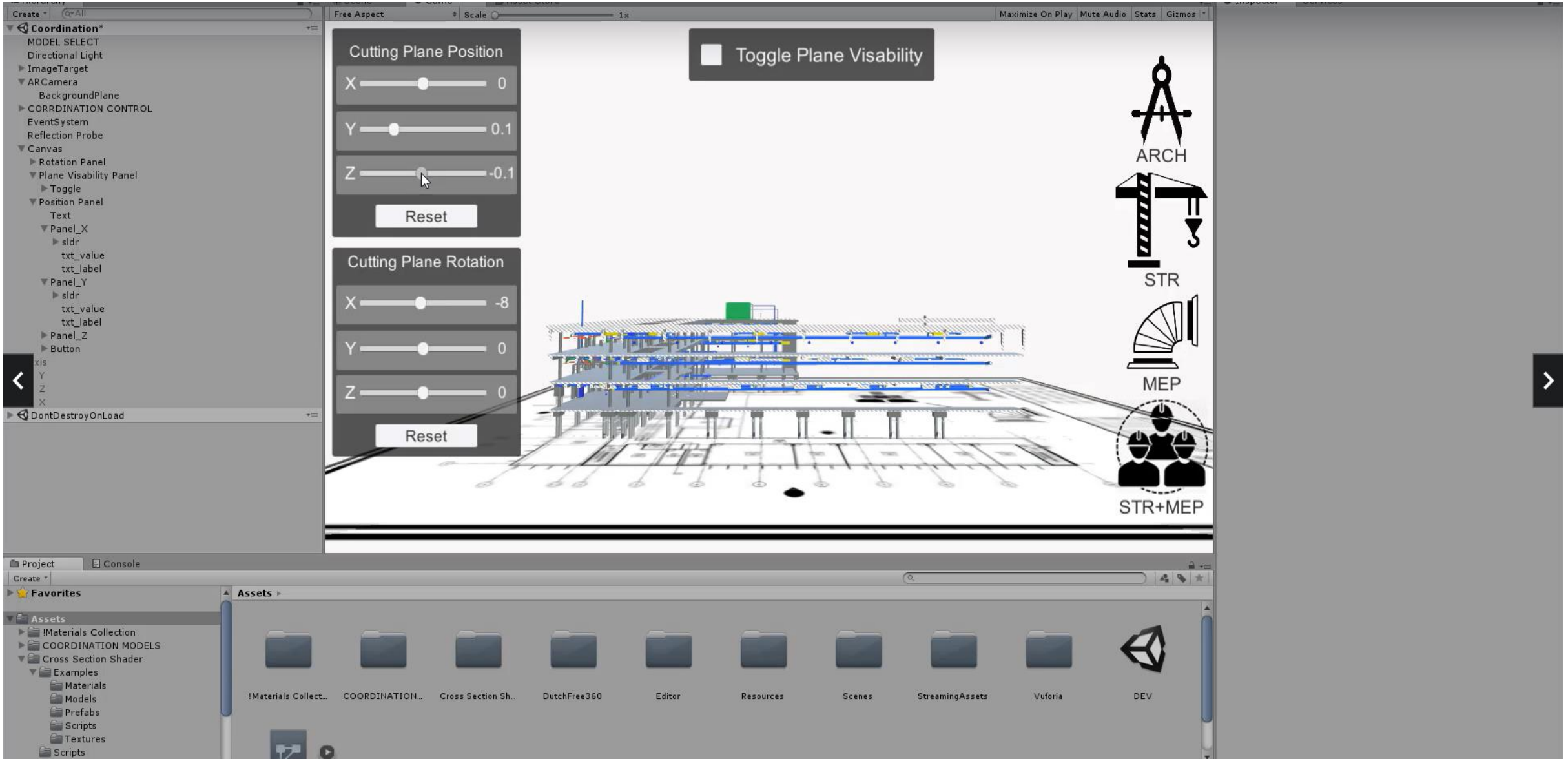
- STRUCTURAL VIEW



STRUCTURAL + MEP VIEW



PLUMBING VIEW



- **CONCLUSION**

  - As of now, We conclude that
  - We have done completing the 3D models of the construction in REVIT 2023 Software.
  - Successfully built the App and Installed it on our Mobile.
  - we have completed the development of an application which visualizes the 2D into a 3D environment.
  - Now we are going to add detailed structure and other working parts of the building like plumbing, which can be accessed through a Mobile phone

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Thank
You