

3D RENDERING OF CIVIL PLAN

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ABSTRACT

Civil Engineering is the field which uses a lot of man power. In order to use the man power efficiently, the planning of jobs should be done well in advance. Usually the planning is done with the help of 3D drawing software. These plans are drawn using the computers in the virtual environment. Even though the planning is done before, the practical constraints sometimes will waste the energy and resources. This shows that some practical constraints cannot be brought into the computer, leading the plans to be an approximate but not an accurate one. In order to overcome this problem, augmented reality can be used to such situations which help in merging the real and virtual environments. When the augmented reality is used, it helps to map the problem immediately with the virtual environment and solve it very easily. This also helps the constructors to plan the alternate ways well before by considering the most of undesirable events that usually happens during a construction project. Putting these all together, construction contractors and owners can build facilities very fast and at minimal cost taken care of well ahead of time. AR can be used for optimizing the designs for better utilization of the available space, thereby preventing any wastage of space. Spatial models can be created using AR, which help the designers in identifying and rectifying the flaws while designing. Besides, this technology also helps in coming up with innovative designs, as the civil engineer will be able to visualize the structure better and make numerous beneficial changes.

Keywords: 3D drawing software, augmented reality, Spatial models.

ARTICLE INFO

Article History

Received: 24th May 2019

Received in revised form :

24th May 2019

Accepted: 26th May 2019

Published online :

27th May 2019

I. INTRODUCTION

The ability to view constructions virtually before using the real resources to construct them has been of main interest in civil engineering over a long period of time. The plans that are done in computer sometimes do not match with the real practical applications. This shows that it is difficult to bring the experiences of practical world into the computer. In order to overcome the gap between the real and virtual environments we are developing augmented reality application. The augmented reality application system developed in this work superimposes 3D models on civil plan. The system consists modules like capturing module, tracking module, virtual components, rendering module. The application is placed between camera display device. Capturing module captures the image

then tracking module track the object, keeping background as it is. In tracking module it calculates the location orientation for virtual overlay. Then rendering module combines the original background virtual object using calculated pose renders the augmented image on the display. The tracking module plays very important role in augmented reality system. It is used for position calculation in real time. The easiest way to calculate position is to use marker. The rendering module is used to superimpose the real image virtual image.

II. PROBLEM STATEMENT

Explaining construction projects to people without a technical background is a problem faced by majority of the civil engineers and architects. To solve this

problem we developed an app for 3D rendering of civil plan which enhance the user experience.

III. OBJECTIVES

- Provides 3D visualization of future homes to the people who lack technical background about architectures and civil plans.
- Helps civil engineer to see any errors in civil plan before actual construction of that model starts so that he/she can avoid those errors in future.
- By making use of the AR concept, clients can be presented with a virtual tour using different colors and providing different views of the architecture, this serves as superior marketing strategy for realtors and other businesses in the construction industry.

IV. CONSTRUCTION

Steps:

- Preparation of Augmented Reality model.
- Extraction of industrial domain knowledge.
- Technological limitations.
- Social concerns.

1. Preparation of Augmented Reality model: In order to accurately blend virtual information into real environment, AR systems need to obtain a precise description of the real environment. A carefully controlled environment could define a relatively accurate reality model. One of the important issues in developing AR systems for design and construction is to apply a systematic method to create accurate virtual model which will seamlessly blend into real world model.

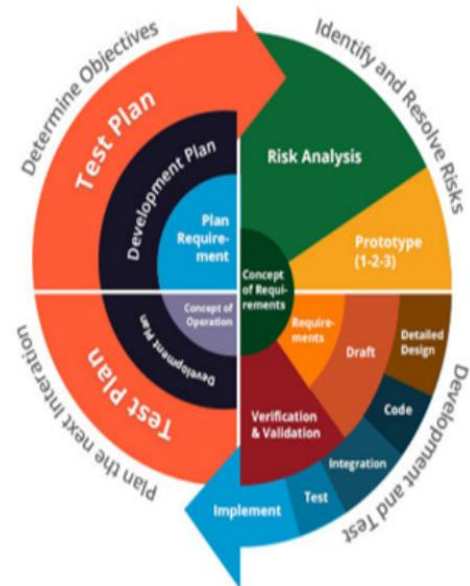
2. Extraction of industrial domain knowledge: All the information is currently represented as 2D plots rather than 3D models in design and construction industries. There apparently exists a lack of well-organized integrated 3D database supporting information source extraction that could be readily used by AR technology due to the fact that design and construction parties are not committed in this regard. Hence modeling, integration, and extracting efforts may be required and should be taken into consideration when building an AR application.

3. Technological limitations: AR requires highly accurate trackers because even tiny tracker errors can cause noticeable mis-registrations between real and virtual objects. The biggest obstacle to building effective AR systems is the requirement of accurate, long-range sensors and trackers that report the

locations of the user and the surrounding objects in the environment.

4. Social concerns: Social concerns should not be ignored during attempts to move AR system application into the hands of real users. There is a lack of motivation for AR technology transfer. It is well-known that construction people are conservative and reluctant to change much especially in the aspect of moving toward new technology. Whether AR is truly a cost-effective solution in its proposed applications has yet to be determined. Much research can be done to prove to the design and construction practitioners about the feasibility and profitability of applying AR system.

Analysis Model:



V. SPECIFICATIONS

System Specifications:

a. Software specifications:

- Firebase Database: As for the purpose of user sign-in and registration.
- Unity: Used for build a 3D model according to the plane.
- OpenCV: Used for homography, feature extraction and Link 3-D model with real world image.
- Blender: Used for import a .obj file of 3D model.
- PyCharm: for apk signing and adding user friendly interface.

b. Hardware specifications:

- Android Smart Phone.

VI. CONCLUSION

AR can be used for optimizing the designs for better utilization of the available space, thereby preventing any wastage of space. Spatial models can be created using AR, which help the designers in identifying and rectifying the flaws while designing. Besides, this technology also helps in coming up with innovative designs, as the civil engineer will be able to visualize the structure better and make numerous beneficial changes. With the help of augmented reality a new scope for user experience is developed, also it have provided a great help right from plan development to the sale of the architecture, with respective to clients.

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