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AUGMENTED REALITY CONSTRUCTION APPLICATION

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Abstract: This paper discusses the use of augmented reality (AR) in construction applications such as building modeling, site simulation, and the creation of an IT application that combines these benefits into a single app that is simple to use by all project participants and provides a virtual tour of the construction phases.

Index Terms **- Augmented Reality, Construction Industry, Landscape Design.**

I. INTRODUCTION

Augmented Reality (AR) is a practical and effective way for blending virtual and actual reality [1]. The Augmented Reality Landscape app is a smartphone software that runs on the powerful Android platform and offers a new way to understand some aspects of building construction from start to finish. The application will aid in the understanding of the building project prior to the start of construction work, and will be beneficial to both construction experts and non-experts in the field. To increase construction efficiency, to fully comprehend building blueprints, and to involve all stakeholders (builders, architects, project owners, etc.). The proposed technology and the implementation of Augmented Reality (AR) landscape applications are the subject of this research. The use of augmented reality to blend virtual and physical reality is a practical and efficient method. When digital data is combined with real-world things, the user's interpretation of the object improves. In augmented reality (AR), computer-generated knowledge overlays with the user's perspective of the real world. In augmented reality (AR), markers are used to locate data in a computer overlay. Context awareness solutions are trustworthy because they provide consumers with correct information based on their location and context. According to Abowd et al (1999), context is defined as "any information that can be utilized to characterize an entity's circumstance." A person, place, or thing that is considered relevant to the interaction between a user and an application, such as the user, is referred to as an entity.

II. LITERATURE SURVEY

It's unclear how long Augmented Reality (AR) has been around, however a few early versions that look to be equal to today's Augmented Reality standards first debuted in the 1960s. The term "Augmented Reality" was invented in the early 1990s by Professor Tom Caudell and David Mizell of Boeing Computer Services in Seattle [4]. Virtual Fixtures was the first completely working Augmented Reality system, built by Armstrong of the United States Air Force. In the same year, Feiner et al. released the Touring Machine, the first outdoor AR system. A backpack including a computer, an input tablet, and several sensors was required of the user. As technology has progressed, AR has become more common, and smaller devices can now participate. In recent years, mobile games such as Pokémon GO and Ingress have garnered considerable popularity [2], with the former having over 100 million downloads globally. Instead of handheld devices, AR has been deployed with head-mounted displays such as Google Glass and Microsoft HoloLens. Advanced interfaces like augmented reality (AR) may now be taken from the lab to the field thanks to recent breakthroughs in mobile technology. For professional applications, their capacity to display information on-site, where it is needed, has various advantages [1]. Augmented Reality (AR) is a cutting-edge computer-based technology that can give the construction sector new visualization tools. Researchers have known about this application opportunity for at least a decade and have been seeking for methods to capitalize on it in the construction business. Several studies in the fields of architecture, engineering, and construction (AEC) have proved the utility of augmented reality (AR) as a visualization tool for tasks such as detecting subsurface buildings (Roberts et al. 2002) [4] In augmented reality, computer-generated files such as graphics, sounds, photographs, or digital features are layered on real-world objects. From Harvard's Ivan Sutherland's first see-through head-mounted AR monitor in the 1960s (Sutherland, 1968) through Golparvar et al's HD4AR and Mobile Augmented Reality System (MARS) (Bae et al. 2012) [2, Augmented Reality in construction involves projecting a suggested design's 3D model onto the room where the construction will take place using mobile devices and 3D models. As firms like Bentley Systems have begun to include augmented reality into their projects, the application of augmented reality in the design, engineering, and construction industries has expanded in recent years [3]. The AEC business, in particular, is adopting more AR technology to better various stages of construction projects. By allowing the observer to interact with both real and

virtual items and monitoring construction progress by comparing the project's as-planned and as-built condition (Shin and Dunston 2008), this advanced computer technology provides major benefits to the construction sector.

III. USES OF AR IN CONSTRUCTION

AR can be used in construction for everything from project design to communications. Take a look at the scenarios below: Presentation: The project's presentation to provide stakeholders a better knowledge of the project, certain information and aspects might be added onto a construction plan. AR can also be used to show off 3D models and even conduct tours, providing clients with a clear sense of how a structure will look before it is built. Keeping track of what's going On. Project Progress Capture: Augmented reality can be used to track and monitor project progress. Construction experts can track project progress using a variety of tools available on the market. Construction training: When it comes to educating individuals how to operate complex equipment or heavy gear, AR can assist educators by offering life-like demos that allow personnel

IV. PROPOSED SYSTEM

The proposal is to develop a mobile application that runs on the capable Android platform to provide a new way of understanding every step of building construction, from the initial state to the final state, in order to increase construction efficiency, better understand construction plans, and ensure that all factors are considered (builders, architects, owner project, etc.). The application will aid in the understanding of the building project prior to the start of construction work, and will be beneficial to both construction experts and non-experts in the field. The software consists of five parts, each of which performs a particular function and may be used by anyone. New buildings, their size and scale, their impact on the site and the environment, and other information that is impossible to examine throughout the design process can all be presented using an Augmented Reality application. As a result, the new visual tools have the potential to improve the quality of future construction projects by involving the entire community in picking the best alternative. It's also worth emphasizing that the viewing mode will be based on either real-time change created by overlapping virtual objects or a virtual image over which virtual items will be overlaid. VI. BACKGROUND OF AUGMENTED REALITY IN CONSTRUCTION Advanced interfaces like augmented reality (AR) may now be taken from the lab to the field thanks to recent breakthroughs in mobile technology. For professional applications, their capacity to display information on-site, where it is needed, has various advantages [1]. Augmented Reality (AR) is a cutting-edge computer-based technology that can give the construction sector new visualization tools. Researchers have known about this application opportunity for at least a decade and have been seeking for methods to capitalize on it in the construction business. Several studies in the fields of architecture, engineering, and construction (AEC) have proved the utility of augmented reality (AR) as a visualization tool for tasks such as detecting subsurface buildings (Roberts et al. 2002) [4] In augmented reality, computer-generated files such as graphics, sounds, photographs, or digital features are layered on real-world objects. From Harvard's Ivan Sutherland's first see-through head-mounted AR monitor in the 1960s (Sutherland, 1968) through Golparvar et al's HD4AR and Mobile Augmented Reality System (MARS) (Bae et al. 2012) [2, Augmented Reality in construction involves projecting a suggested design's 3D model onto the room where the construction will take place using mobile devices and 3D models. As firms like Bentley Systems have begun to include augmented reality into their projects, the application of augmented reality in the design, engineering, and construction industries has expanded in recent years [3]. The AEC business, in particular, is adopting more AR technology to better various stages of construction projects. By allowing the observer to interact with both real and virtual items and monitoring construction progress by comparing the project's as-planned and as-built condition (Shin and Dunston 2008), this advanced computer technology provides major benefits to the construction sector.

V. WORKING

The operation of this program can be divided into six stages, each of which does a different task and can be used by any of the participants. It's also worth noting that the view mode will be depending on either real-time changes caused by overlapping virtual objects or a combination of both. STEPS: Login/Register: Users must either login or sign up with an email address to access the augmented reality landscape app. Checking the user network: Seeing if the user network is capable of loading 3D models. The user is directed to the home screen after signing in, where the model selection tab is chosen, and the other tab is the profile screen, where the user may logout, upload an interior or exterior custom model, and view images acquired by the user. AR Core uses a camera to look for clusters of feature points that appear to be on a single horizontal surface, and then makes the surfaces available as geometric planes to your app. The geometric place's boundary may also be determined with AR Core. An alert flashes on the camera screen when a plane is spotted, spawning an outside 3D model. When the user presses the indication after selecting a place, the selected 3D model shows. The 3D model may be resized, rotated, and photographed by the user. After the selected 3D model appears, the user may press the interiors button to bring up a screen that displays the inner 3D model, i.e. the interior view of the outside 3D model/apartment. The software spawns the model in which the user may snap a picture of the inside after tapping a selected model.

VI. RESULT

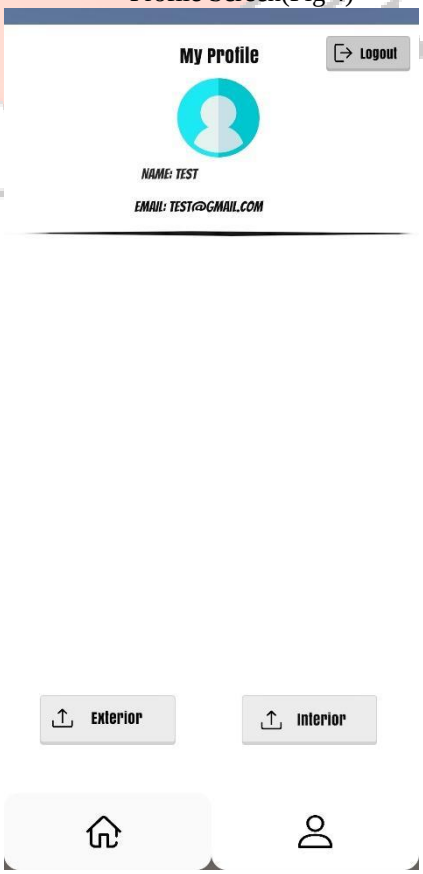
The primary purpose of this software is to demonstrate to civil engineers how a completed building project will appear. They may also be used to show 3D models and even give tours to clients, giving them a good idea of how a structure will look before it is completed.

User Register Screen (Fig 1)

User Login Screen(Fig 2)

Home Screen(Fig 3)

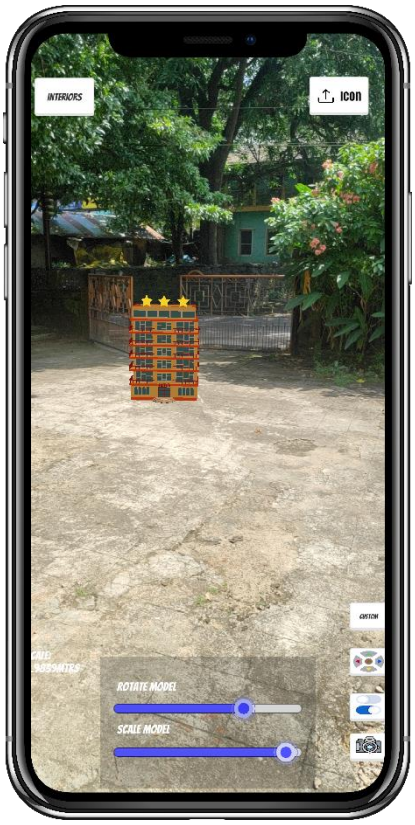
Profile Screen(Fig 4)



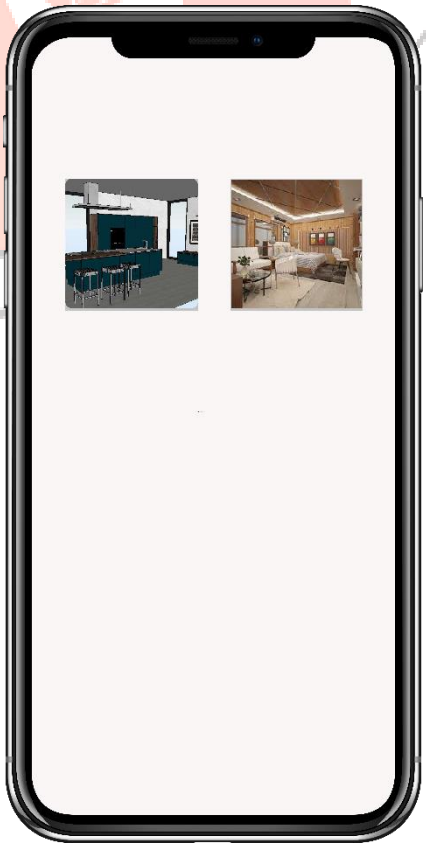
AR camer lauch Screen(Fig 5)

3d model Screen (Fig 6)

Model spanshot (Fig 7)



Interior model selection (Fig 8)



Interior model spwan (Fig 9)

VII. CONCLUSION

The main conclusion of this application is that augmented reality is a promising technology in the field of construction that should be used by creating applications that transform building design in the modern day. App users can get a lot more information via augmented reality than they can from a typical presentation of past work plans. As a result, the previously built application integrates a variety of helpful modules that could previously be replicated using different photos, augmented reality, and a mobile device. All of the findings offered lead to the secondary conclusion that augmented reality and technology have boundless possibilities in this industry

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