

NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION, AFFILIATED TO VISVESVARAYA TECHNOLOGICAL UNIVERSITY,

BELGAUM, APPROVED BY AICTE & GOVT.OF KARNATAKA



PHASE-I REPORT

on

AR APPLICATION FOR ARCHITECTS AND INTERIOR DESIGNERS

Submitted in partial fulfilment of the requirement for the award of Degree of

Bachelor of Engineering

in

Computer Science and Engineering

Submitted by:

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CERTIFICATE

This is to certify that the Phase 1 Report on **AR application for Architects and Interior designers** is an authentic work carried out by SAI SIDDHANTH. A (INT17CS158), RITHESH SHANMUGHAN (INT17CS151), RAHUL KHATRI (INT17CS142) and UTSAV MONDAL (INT17CS217) bonafide students of Nitte Meenakshi Institute of Technology, Bangalore in partial fulfilment for the award of the degree of **Bachelor of Engineering** in COMPUTER SCIENCE AND ENGINEERING of Visvesvaraya Technological University, Belagavi during the academic year **2018-2019**. It is certified that all corrections and suggestions indicated during the internal assessment has been incorporated in the report.

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DECLARATION

We are hereby declare that

- (i) The project work is our original work
- (ii) This Project work has not been submitted for the award of any degree or examination at any other university/College/Institute.
- (iii) This Project Work does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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ABSTRACT

The project is a user friendly application that aids the architectures and interior designers to provide their clients a preview of their fully completed product even before construction. And giving them a better understanding of the finished product.

The application provides both default and custom feature that can be used to create rooms, furniture and other objects and these objects can be easily resized, repositioned and reoriented using gestures. The custom objects can be created by analysing few images of the object from different views using a device camera and this same object can be rendered into the virtual built environment or in real world.

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Chapter 1 : INTRODUCTION

1.1 Background

In General-context, this reality was also termed as mixed reality which discusses multiple fields that covers Virtual Reality (VR), Augmented Reality (AR), tele-presence, and other related technology. This technology has been used in various fields like in repairing, medicine, tele-robotic, manufacturing, robotics, maintenance, engineering design, education and military application. This study distinctively bridges all users of relevant businesses to the user-intensive design of an augmented reality.

1.2 Brief History

Although the idea to use AR for architecture, engineering and construction dates back to the early 1996's and AR has actually matured from a pure research field into certain practical industrial applications, until now it has not been implemented as a real product in architecture and design. In contrast, architecture and design communities apparently have the knowledge of the operations/tasks that AR could potentially enhance as well as the motivation to bring in this new technology for improving the current practices.

The work presented in this paper holds a different perspective of discussing how Mixed and Augmented Reality has been and could be applied in architecture and design

the design and implementation of Augmented Reality systems for industrial problems in architecture and design arenas, researchers and system developers face three major relevant challenges: extraction of industrial domain knowledge, preparation of reality model, and technological limitations. The following subsections discuss the details of each challenge and the suggested solutions.

1.3 Applications

The paper provides you with the inner depth on how the augmented reality can be implemented to facilitate the architects and interior designers as well it discusses the algorithm used to achieve the functionalities. The novelty of the project is that it does not require any sort of expensive gadgets. It can easily be used via smartphones and tablets. It is also operable on any operating system.

1.4 Research Motivation & Problem Statement

Envisioning how a specific object will look in a room before it is decorated is a difficult challenge for anyone. Augmented reality is a new technology that includes the placing of some of the virtual objects on the real environment. As an outcome, the end-user can see the real environment augmented with physical object where you can interact with them.

1.4.1 Research Motivation

Use of Augmented Reality in interior designing is not only helpful for the architects but also for the clients, there are many particular turning points for this mutual benefit:

- Better Visualization – AR in interior design help the client visualize the project before it is developed. Using AR in interior design gives an ability to the user to design the space the way they want.
- Design editing abilities -User will also get an ability to edit the designs and make changes even if the design is at the final stage.
- Better guidance– AR in interior design will let a user guide the designer in the best possible manner. Every detail can be communicated interactively using AR.
- Find and try products remotely – The clients can try various products for their new project such as the furniture without paying a penny.
- Interactive idea presentation – Using AR it would be much easier for designers to present their innovative ideas to clients. A design idea board may not be enough for the clients with dynamic needs.
- Profitability – An effective AR visualization for the clients will help in accelerating the purchase and designing process along with increasing the probability of closing successfully.

1.4.2 PROBLEM STATEMENT

Nowadays with excessive work load and busy life, many professionals face problems that result in the loss of their clients or the certain overheads that spoil the process of satisfying the client.

AR/VR helps to remove some of the fear and anxiety that a client might have about committing to a design plan that they are unsure of and achieve 98% closure rate

The proposed software will be used by interior designers or architects. This proposed research most likely acts as an effective tool which can decrease the gap between industrial company and customer in addition to other applicable business communities.

The print media (images, panaflex, print outs) influence is not capable and sufficient to satisfy designers and architects to visualize their ideas and complicated stuff in their desired way in the real-world environment.

1.5 RESEARCH OBJECTIVE

- The objective of this project is to design and develop a augmented reality app as an effective tool which can decrease the gap between industrial company and customer in addition to other applicable business communities.
- To help in visualizing architect plans and interior designs. A virtual model of real environment can be designed before its physical implementation, it will allow interior designers/architects to implement their idea in the given workspace virtually and then view it in real environment.
- To allow architects to view their 3D visualizations on their 2D drawings.

1.5.2 Contributions

This is a cost-effective solution that primarily reduces the overheads that interior designer and architects confronts on daily basis. The software exhibits all the features that might be required by interior designers and architects respectively.

CHAPTER 2 : LITERATURE SURVEY

2.1 Introduction

Augmented reality remarkably facilitates, to resolve real lifestyles issues. Issues are in particular, primarily based on elements i.e., money and time. The hassle encountered turned into the overhead of architectural/interior designing and its growing demand these days. Hardware implementations are required in Head-mounted displays and monitors and are in particular designed for expert users.

2.2 Related Works

The use of computer vision in the field of Architectural construction is not new. Augmented reality had its applications in this field from the 1990s but the work related to our project started in 2012([2] Virtual reality simulated environment. Integration with VR Platform and Architecture Design Technology. Enhance the VR Interactive Performance in Architecture Simulation.) and further in the year 2014 ([3] Use of Virtual 3D furniture. Using the in-depth camera in real time as an input. Estimation and optimisation of the available space in a room. The friendly User Interface) and then in year 2018 ([6] Uses AR for previewing. User interactivity. Uses AR trackers. Virtualising the real world in 2D.

Our project will be using an gesture recognition and 3D virtualisation of the real world objects and the interface will provide customisation of 3D models.

2.3 Study of Tools/Technology

Android application for augmented reality was the key to resolve these issues considering the fact that it is an android application, it was supported by means of android devices such as smart-phones that are easily available to the end-users. the provision of numerous tools for the implementation of Augmented Reality as an android app, research on applications of Augmented Reality within the discipline of architecture and its usefulness in promoting precision in decision making. Hence, saving money and time therefore it can be regarded as a reliable cost-effective solution.

2.4 Summary

It is troublesome for an architect to envision how any object will appear in a room or in an open area with lot of aspects left to end-user's imagination. The scale, color, and the way it integrates with the existing surroundings. Augmented reality, technology that places computer graphics on the real environment has several applications within the discipline of architecture and engineering and has been used to address some issues of the real environment. Earlier it was referred to as mediated reality wherein a view of reality is changed by means of a computer; the technology has changed one's notion about reality. Head-mounted display (HMD), contact lenses, eyeglasses, monitors are some of the gadgets wherein augmented reality has been integrated. Many advanced gadgets typically assist professional users. Common people or the non-professional people also can make the most out of the augmented reality functions for solving their real existence issues.

CHAPTER 3: SYSTEM REQUIREMENTS SPECIFICATIONS

3.1 General Description

An IOS or Android application supporting device capable of providing basic features to support Augmented or Mixed Reality [GPS, accelerometer and gyroscope].

3.2 System Requirements

3.2.1 Hardware

1. AR/MR Lens
2. Android/IOS [dependent on AR core & kit] supporting device

3.2.2 Software

Any x86 or x86_64 based AVD:

Requires Android 8.1 (API 27) or later.

The rear-facing (world) camera is emulated with a virtual scene.

The front-facing (selfie) camera is not supported.

3.2.2.1 Functional Requirements

- End Users (Architects and Interior Designers) will have to enter the basic measurements of the room and should be able provide images for the custom objects to create its 3 dimensional model.
- They must follow the gesture guide to resize, reposition, reorient the objects.

3.2.2.2 Non-functional Requirements

- Templates for different room, basic objects and furniture.
- MAINTAINALIBILITY:- This application can be used for the duration of 5 years without any additional enhancement in the hardware and the software. For enhanced experience an AR/MR lens could be used.
- REALIBILITY and ACCURACY:- The product is expected to provide 95% accurate results.

1. SOURCES OF DATA

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2. CONCLUSION

This application is relatively new, this application allows the user to add multiple object to the screen in real-time. The user can manipulate the object like, move, rotate, resize and change the color or texture of the object on selection. Thus, allowing the interior designer and architects to implement their design and evaluate them in real- environment.

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