A

Project Report
On
"ARIS"

Prepared by
RAJ PATEL(D21DCS161)
HARSHIT TRIPATHI(D21DCS165)
PRITESH SORATHIA(D21DCS166)

Under the guidance of

Ms. Chintal Raval

Assistant Professor

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CSE

DEPSTAR

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CHARUSAT

CERTIFICATE

This is to certify that the report entitled "**ARIS (AUGMENTED REALITY FOR INTERACTIVE STUDIES)**" is a bonafied work carried out by **RAJ PATEL(D21DCS161), HARSHIT TRIPATHI(D21DCS165), PRITESH SORATHIA(D21DCS166)** under the guidance and supervision of **Assistant Prof. Ms. CHINTAL RAVAL** for the subject CE255 - **Software Group Project-II** (CSE) of 4th Semester of Bachelor of Technology in **DEPSTAR** at Faculty of Technology & Engineering – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfils the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

Ms. Chintal Raval
Assistant Professor
Information Technology
DEPSTAR, Changa, Gujarat.

Prof. Parth Goel
Head of Department – Computer Science & Engineering, DEPSTAR
CHARUSAT, Changa, Gujarat.

Dr. Amit Ganatra
Principal, DEPSTAR
Dean, FTE
CHARUSAT, Changa, Gujarat.

ABSTRACT

Augmented is a breakthrough technology that mixes virtual and actual reality, making available to the user new Reality tools to ensure efficiency in the transfer of knowledge for several processes and in several environments. AR technology mainly works with the help of the sensors and is also a stretched virtual reality technology. The users will be able to experience a real experience while using this technology, for e.g. if we are watching a live telecast of a game, AR will give us the same ambiance of sitting inside that stadium. This is an application to make studies of younger children more interactive and fun based in learning.

ACKNOWLEDGEMENT

We, the developers of augmented reality android application "ARIS", with immense pleasure and commitment would like to present the project assignment. The development of this project has given me wide opportunity to think, implement and interact with various aspects of coding skills as well as the new emerging technologies.

Every work that one completes successfully stands on the constant encouragement, good will and support of the people around. I hereby avail this opportunity to express my gratitude to number of people who extended their valuable time, full support and cooperation in developing the project.

We express deep sense of gratitude towards our Head of the CSE Department, **Prof. Parth Goel** and project guide **Prof. Chintal Raval** for the support during the whole session of study and development. We would also like to thank our respected Principal **Dr. Amit Ganatra**. It is because of them, that I was prompted to do hard work, adopting new technologies.

We would also like to thank my mentor **Prof. Nilesh Dubey** for his guidelines throughout the development phase of the AR application. He helped us, whenever we were stuck in the Augmented Reality concepts.

We are sincerely thankful to all the people at AR/VR Labs who helped us complete the project in one way or the other.

ARIS

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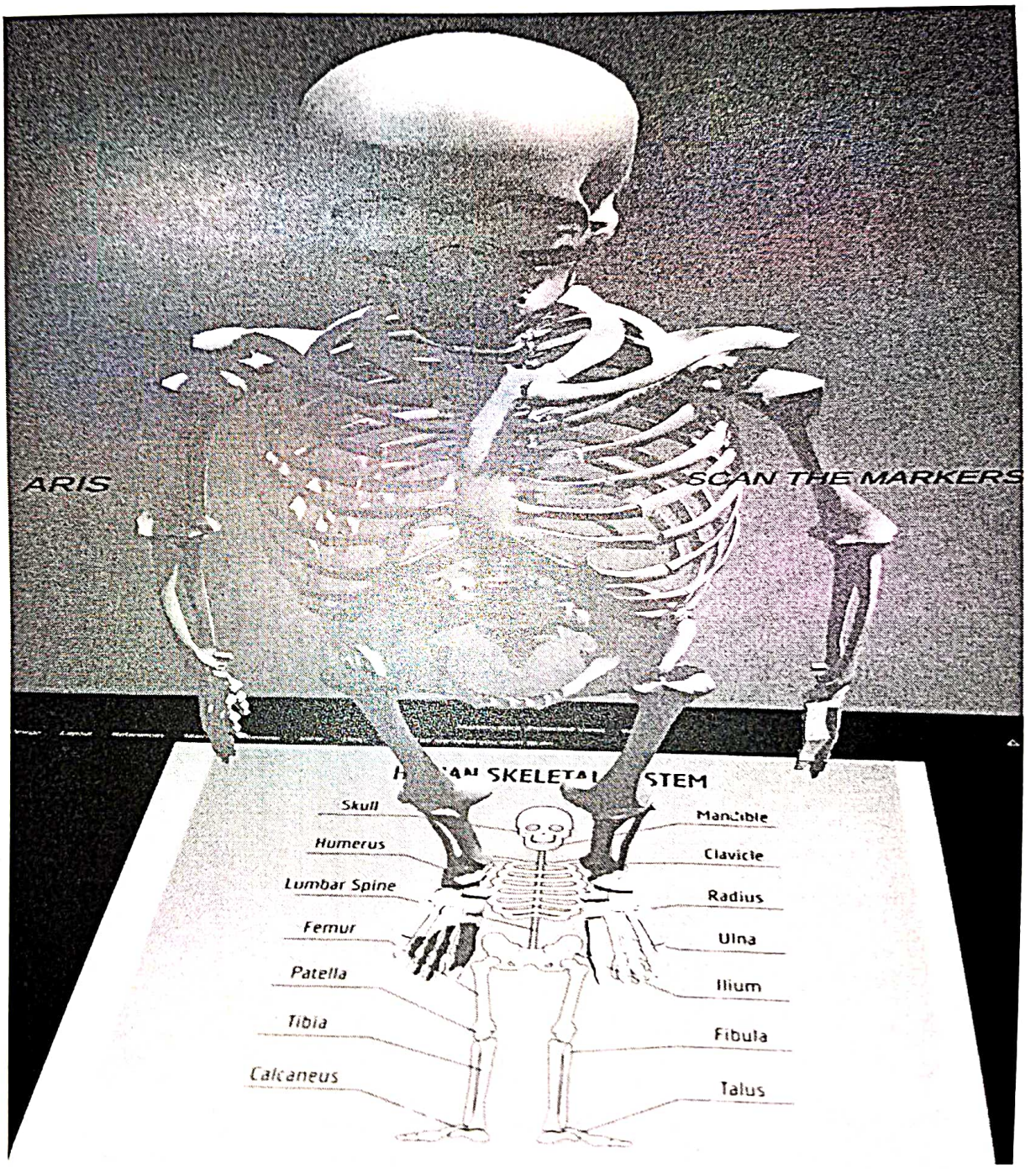
INTRODUCTION OF PROJECT

INTRODUCTION

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information.

AR can be defined as a system that fulfills three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects.



1.1 PROJECT OVERVIEW

This is a "C#" based "AR" application. This application has wide variety of utilization in day-to-day life. Augmented Reality is one of the most prominent, emerging technologies. Augmented Reality is a technique of showing virtual objects on real world images. This project presents the study of Augmented Reality as one of the most innovative technologies. With this informative graphics appear in your field of view and audio concludes with whatever you and your camera see. Our proposal is to develop an Application that acts as a CHATBOX with multiple features Augmented reality is used to enhance natural environments or situations and offer perceptually enriched experiences. With the help of advanced AR technologies (e.g. adding computer vision, incorporating AR cameras into smart phone applications and object recognition) the information about the surrounding real world of the user becomes interactive and digitally manipulated.

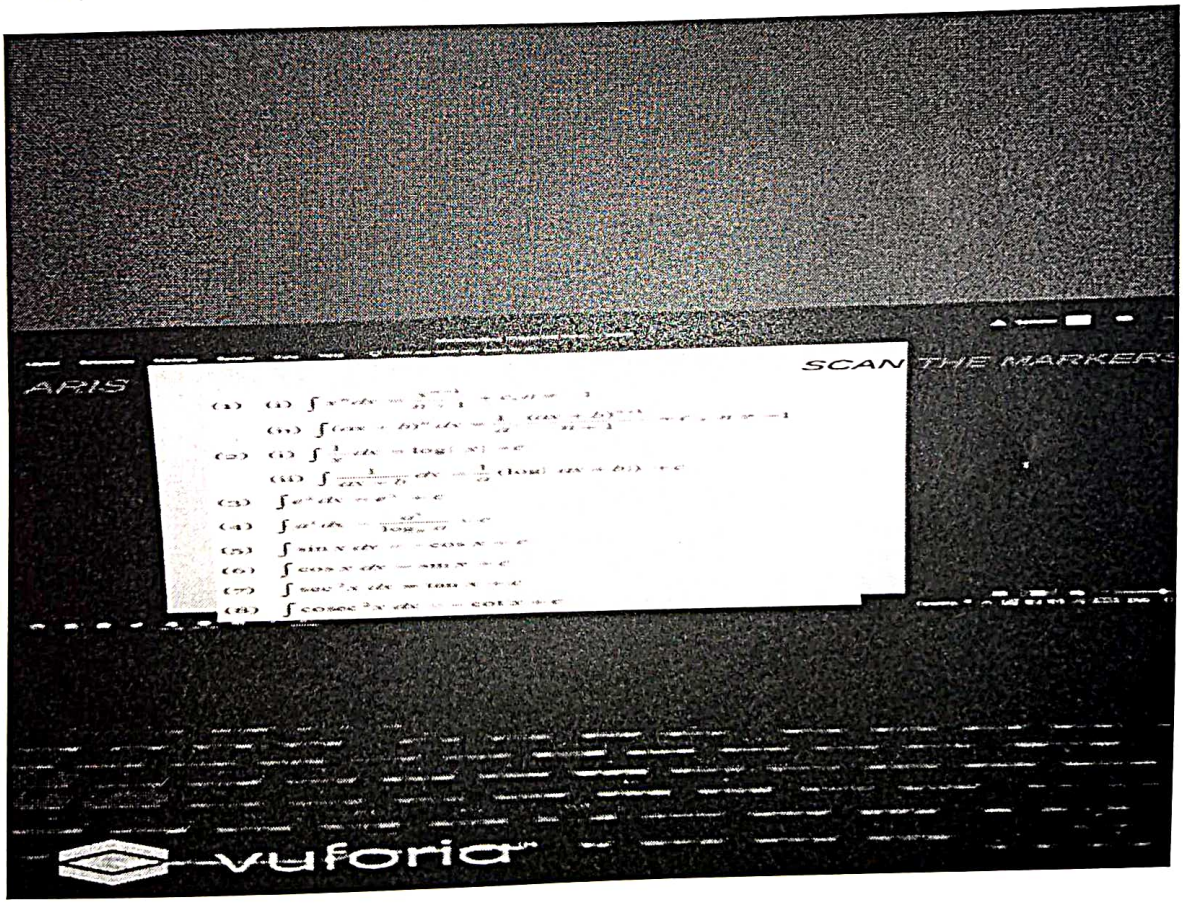
- Animated characters generation by scanning nearby markers.
- Video playing system on the scanned markers of the objects in front of the camera for interactive studies and better understanding.
- 2D images to 3D conversion on screen for better study and analysis purpose.
- Much helpful in architecture, designers, medicines, better study of defense tools used by armies, improves communication between specialists and provides simplification.

1.2 OBJECTS AND SCOPE OF OUR PROJECT

When it comes to technological advancements, the word augmented reality is thrown around a lot these days. But apart from being used to catch Pokemon and adding filters on your Snap Chat, Augmented reality is a whole new universe, waiting to be explored. Augmented reality is when a computer-generated image is projected in a user's environment. It is a way of blurring the lines between the real world and digital world by superimposing virtual images within the contents of the real world.

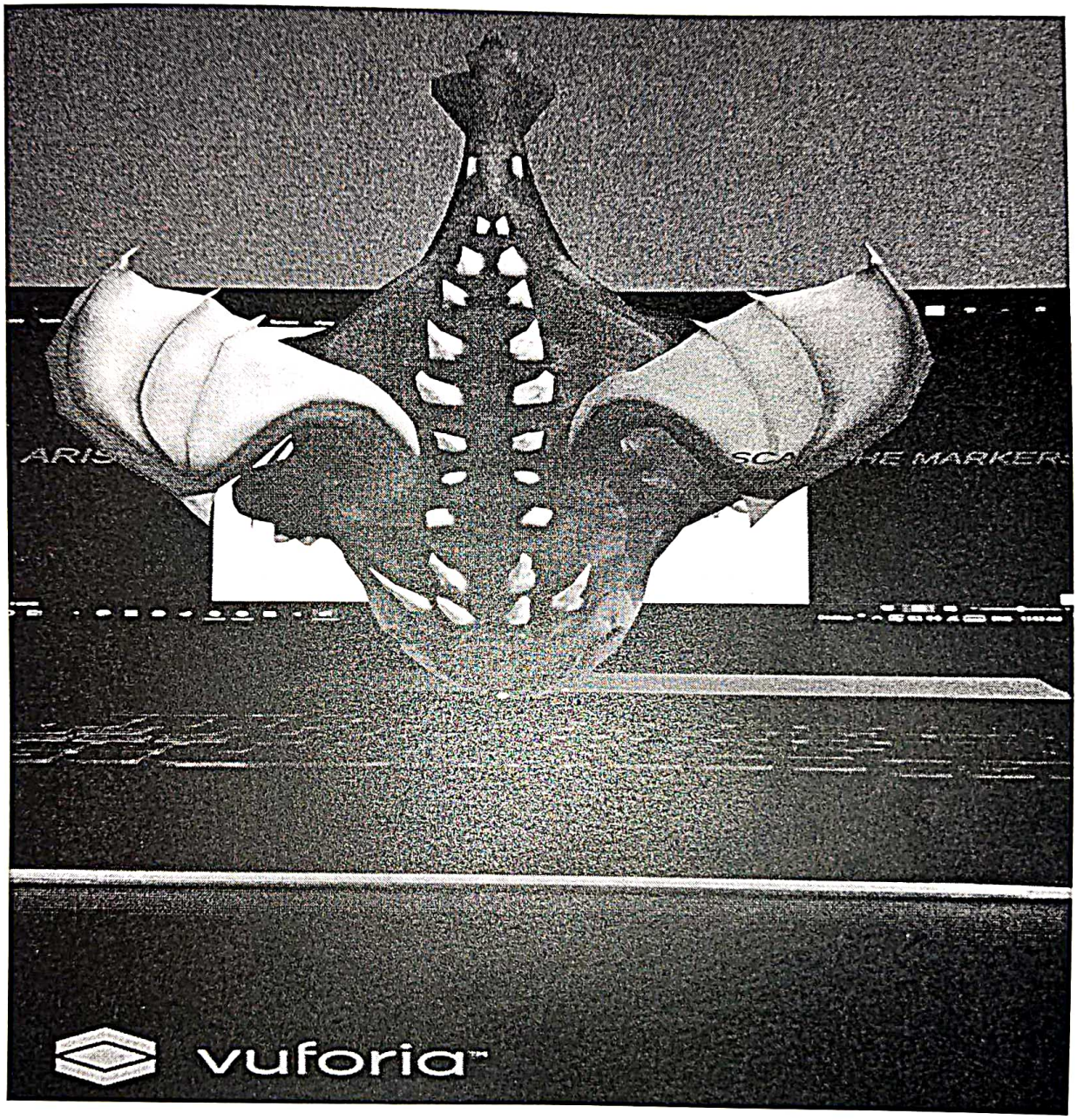
EDUCATION

There are numerous ways of implementing augmented reality in classrooms. Students can experience different cities within the four walls of the school; view animals live, learn the parts of a plant through a real-time dissection explaining every detail through Augmented Reality. A real-life experience is a much more memorable way of learning.



DESIGNING FUN

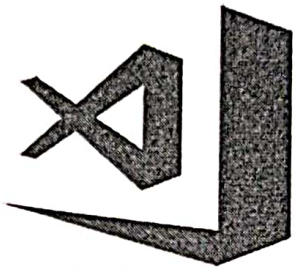
Architectural design and engineering design through Augmented Reality can help students to design products with instructions. They can view the finished product in 3D to ensure that they meet the users' expectation and deliver the desired results.



1.3 TOOLS AND TECHNOLOGIES

BACKEND TECHNOLOGY

VISUAL STUDIO CODE



Visual Studio Code

Visual Studio Code is a streamlined code editor with support for development operations like debugging, task running, and version control. It aims to provide just the tools a developer needs for a quick code-build-debug cycle and leaves more complex workflows to fuller featured IDEs, such as Visual Studio IDE.

Visual Studio Code supports macOS, Linux, and Windows - so you can hit the ground running, no matter the platform.

Visual Studio Code features a lightning fast source code editor, perfect for day-to-day use. With support for hundreds of languages, VS Code helps you be instantly productive with syntax highlighting, bracket-matching, auto-indentation, box-selection, snippets, and more. Intuitive keyboard shortcuts, easy customization and community-contributed keyboard shortcut mappings let you navigate your code with ease.

VUFORIA ENGINE

vuforia® engine™

Vuforia is an augmented reality software development kit (SDK) for mobile devices that enables the creation of augmented reality applications. It uses computer vision technology to recognize and track planar images and 3D objects in real time. This image registration capability enables developers to position and orient virtual objects, such as 3D models and other media, in relation to real world objects when they are viewed through the camera of a mobile device. The virtual object then tracks the position and orientation of the image in real-time so that the viewer's perspective on the object corresponds with the perspective on the target. It thus appears that the virtual object is a part of the real-world scene.

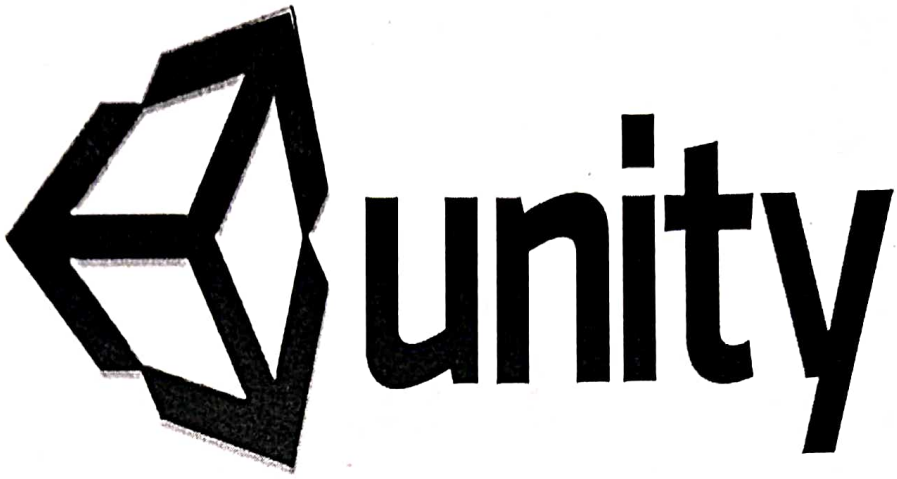
The Vuforia SDK supports a variety of 2D and 3D target types including 'marker less' Image Targets, 3D Model Target, and a form of addressable Fiducial Marker, known as a VuMark. Additional features of the SDK include 6 degrees of freedom device localization in space, localized Occlusion Detection using 'Virtual Buttons', runtime image target selection, and the ability to create and reconfigure target sets programmatically at runtime.

Vuforia provides Application Programming Interfaces (API) in C++, Java, Objective-C++, and the .NET languages through an extension to the Unity game engine. In this way, the SDK supports both native development for iOS, Android, and UWP while it also enables the development of AR applications in Unity that are easily portable to both platforms.

Vuforia has been acquired by PTC Inc. in November 2015.

SOFTWARE INTRODUCTION

↓ UNITY 3D SOFTWARE



Unity3D is a powerful cross-platform 3D engine and a user-friendly development environment. Easy enough for the beginner and powerful enough for the expert; Unity should interest anybody who wants to easily create 3D games and applications for mobile, desktop, the web, and consoles.

The engine can be used to create three-dimensional, two-dimensional, virtual reality, and augmented reality games, as well as simulations and other experiences. The engine has been adopted by industries outside video gaming, such as film, automotive, architecture, engineering and construction.

Unity gives users the ability to create games and experiences in both 2D and 3D, and the engine offers a primary scripting API in C#, for both the Unity editor in the form of plugins, and games themselves, as well as drag and drop functionality.

Unity is a cross-platform engine. The Unity editor is supported on Windows, macOS, and the Linux platform, while the engine itself currently supports building games for more than 25 different platforms, including mobile, desktop, consoles, and virtual reality.

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System Requirements Study

2.1 Hardware and software requirements

2.1.1 Hardware Specifications

- ASUS ROG STRIX G15 CORE STRIKE LAPTOP
- INTEL CORE i7 10th GEN
- 8 GB DDR4 RAM
- 4GB GRAPHIC PROCESSOR-NIVIDIA GeForce GTX 1650Ti
- ANDROID SMART PHONE

2.1.2 Software Specifications

- WINDOWS 10 OS (64-bit)

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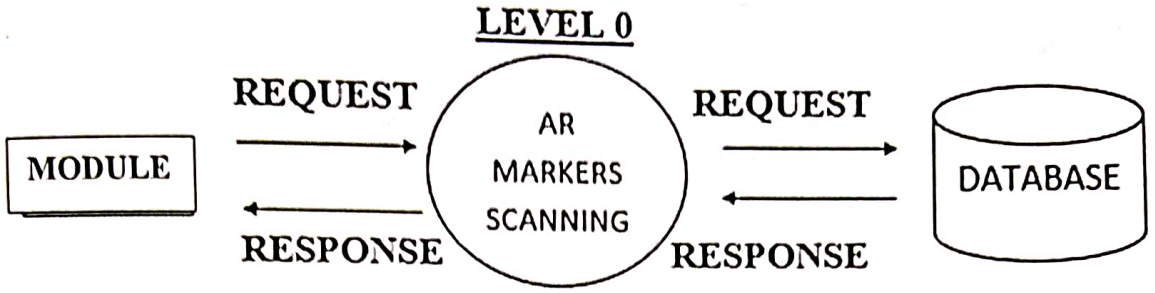
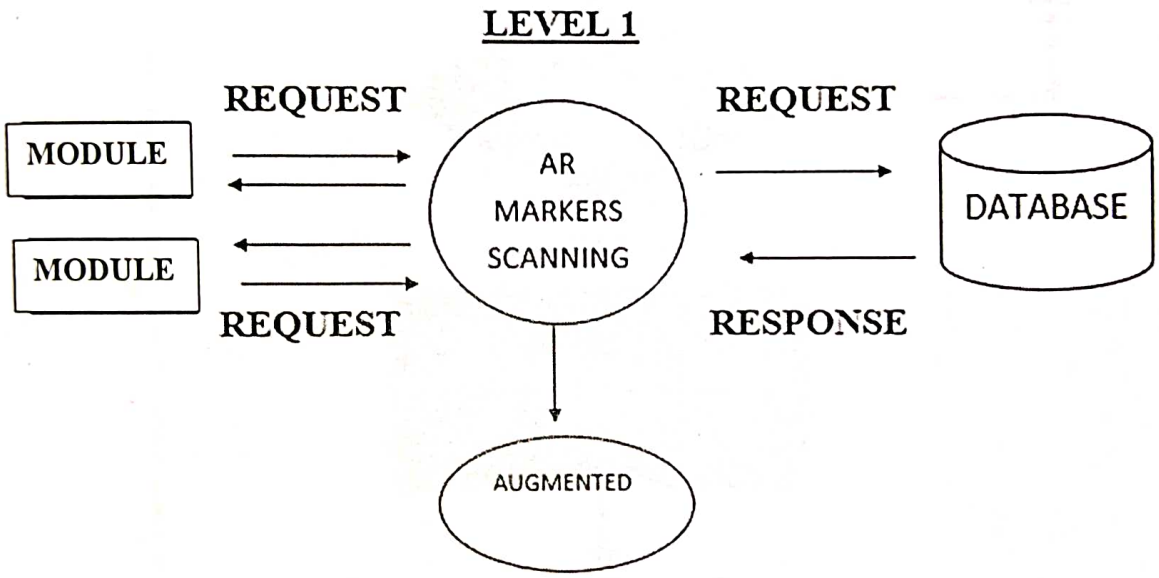
System Analysis

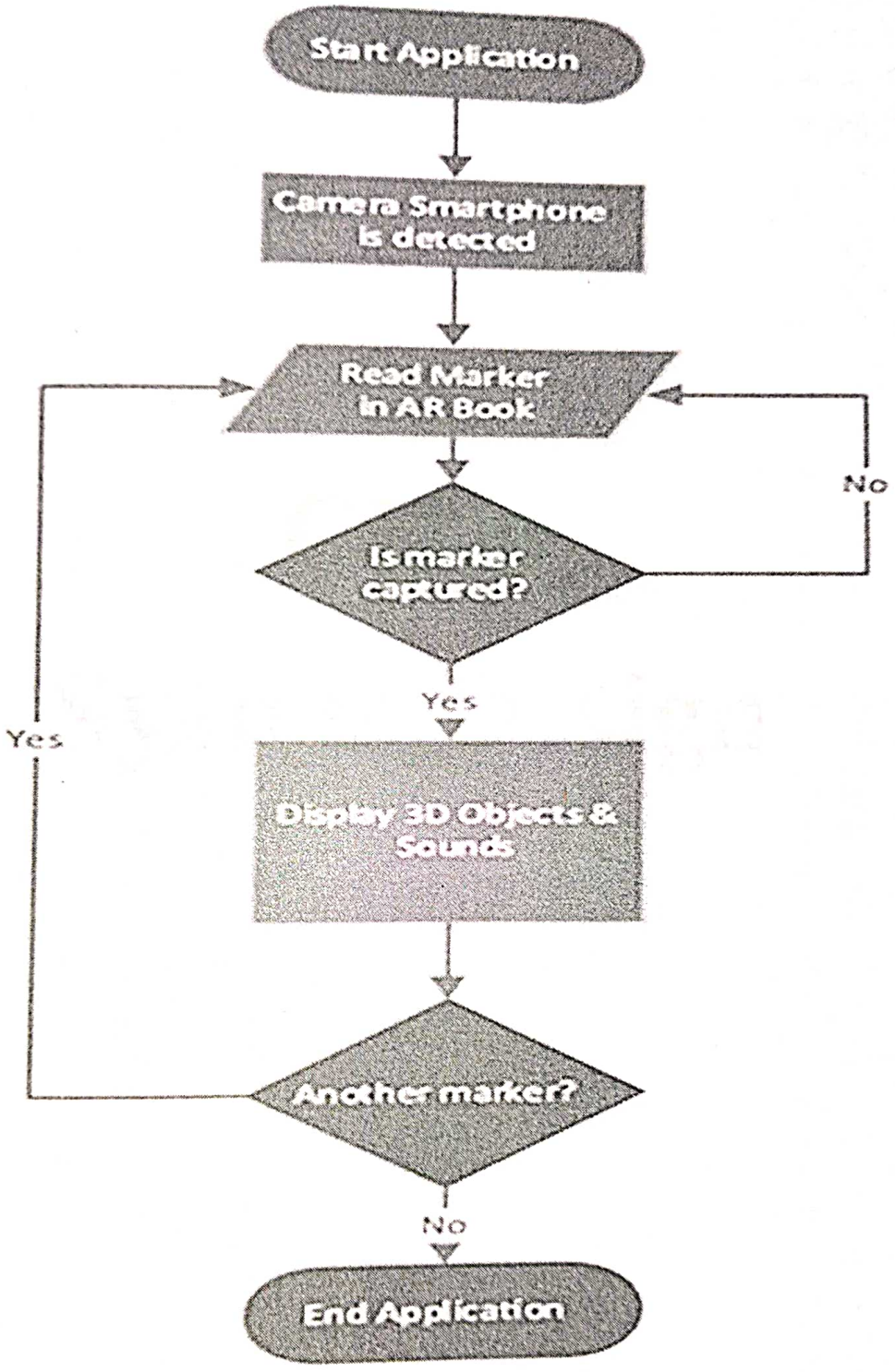
3.1 System Diagrams

3.1.1Dataflow





3.1.2 Flowchart



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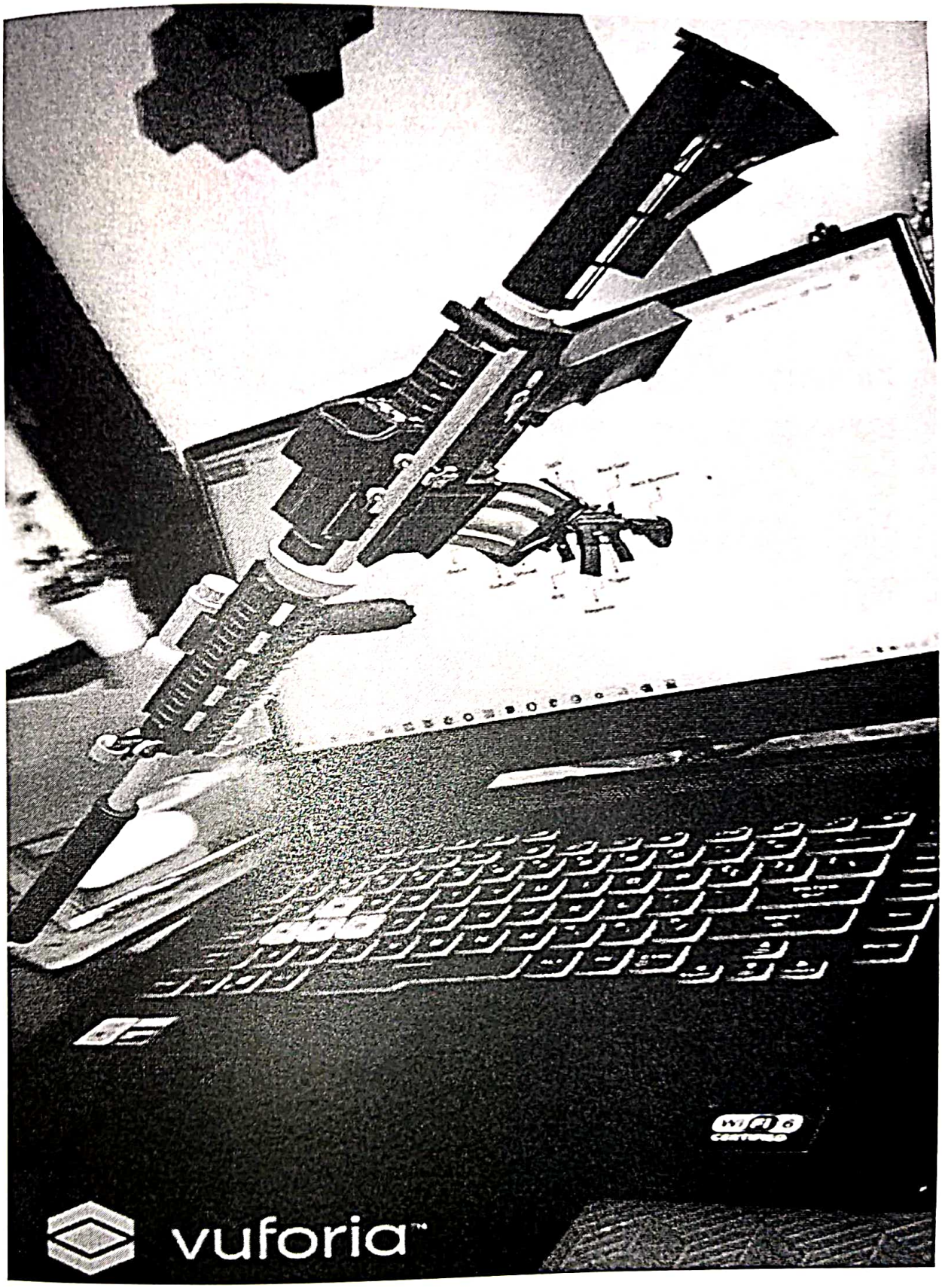
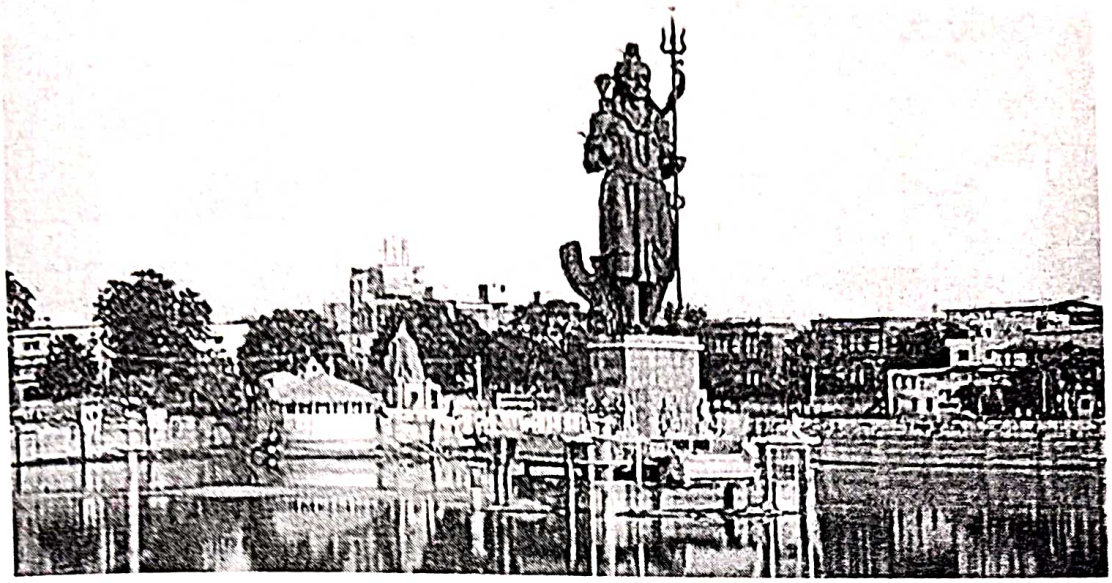
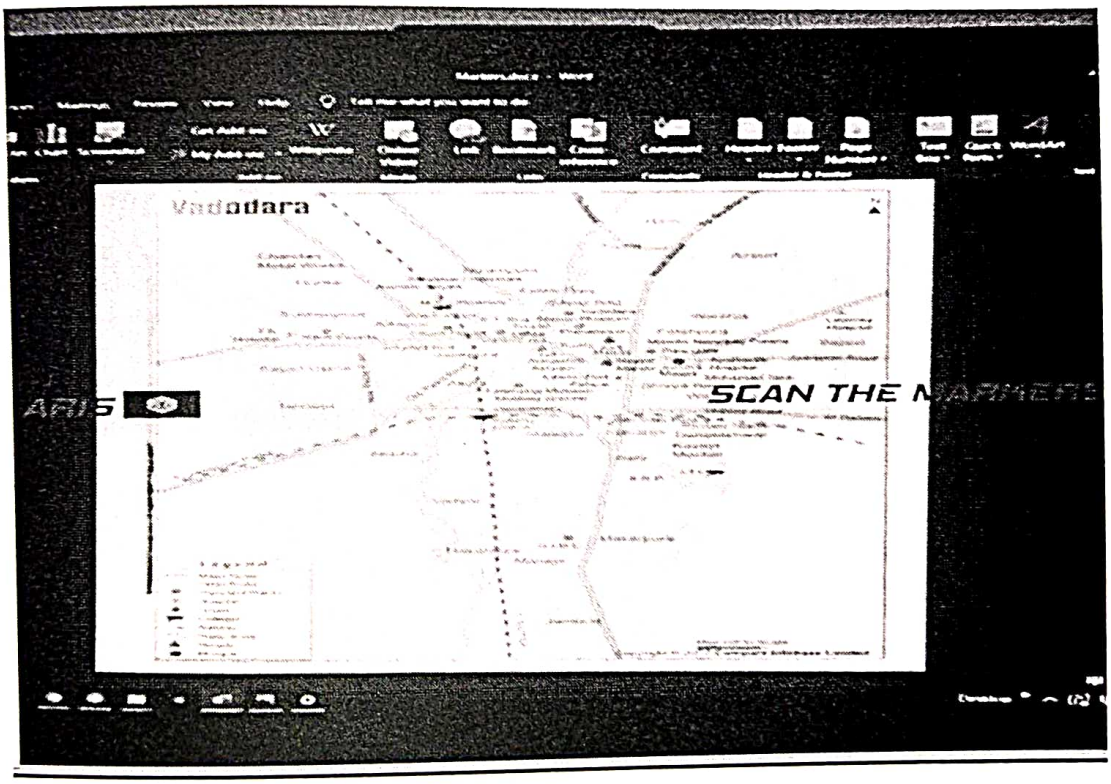
System Design

4.1 Screen layout



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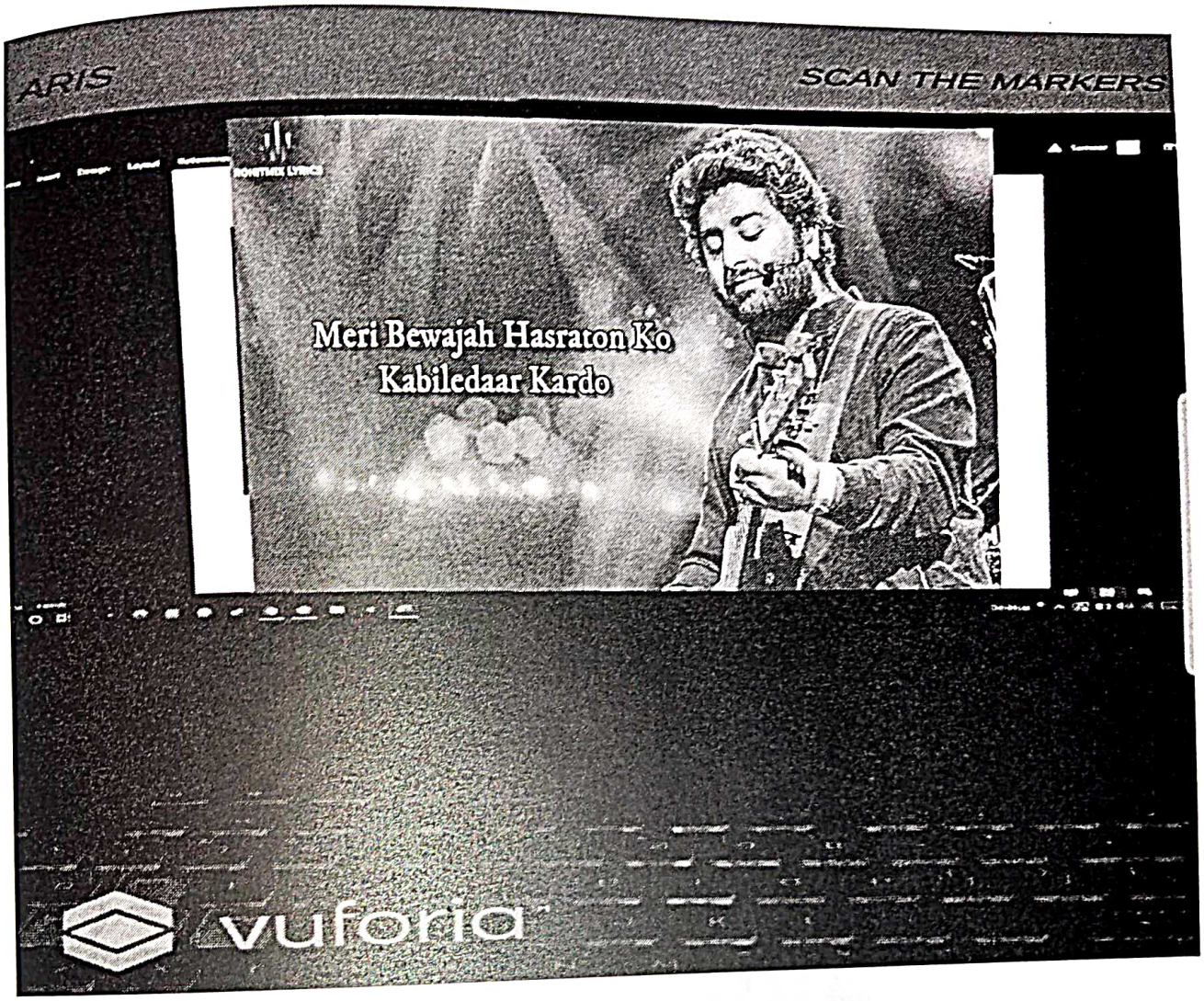
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CH-5

System Implementation and testing

5.1 Implementation Environment

- UNITY 3D

5.2 Coding Standards

- C# SCRIPTS

5.3 Testing methods

- BUILDING AND RUNNING APPLICATION ON ANDROID DEVICES.

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Future Enhancements

FUTURE ENHANCEMENT

- The whole world is looking forward to the future of augmented reality because it can make our lives more secure and hassle-free. AR can make the impossible possible. Humans have always strived to improve themselves through exploration and invention. Augmented reality is a representation of this intrinsic human trait.

- We will be adding more functionalities to our application by adding numerous other models, infographics and other potential of augmented reality to increase student focus on course content while at home. This technology will be upgraded making learning modes at home more diverse by expanding visual content for more visual-focused learners. This can help break up monotonous video conferencing and recorded lecture note-taking to improve student engagement.
- One of the primary advantages of augmented reality in the educational space is the ability for a student to inspect a model from many different angles on their own. We will allow the scaling of our models and adding voice packs and other buttons developing our UI of the application user-friendly. By moving around a virtual object or rotating it in space, they can better examine and understand certain concepts with the upcoming features. This kind of learning is more likely to be remembered and understood by students compared to other methods.
- Adding and combing our application with VR, MR, XR with new features and methods to make it more and more interactive for the students and teachers.

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Conclusion

7.1 Problems Encountered and their solutions

Preparation and placements of 3D models on various scenes in the unity software. C# scripts coding and applying animations on the models were a real target. The UI building was a great challenge.

7.2 Summary of project work

Prepared an android application to make interactive studies for younger students and teachers.

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- AUGMENTED REALITY: INNOVATIVE PERSPECTIVES ACROSS ART, INDUSTRY, AND ACADEMIA BY JOHN TINNELL AND SEAN MOREY
- AUGMENTED REALITY: WHERE WE WILL ALL LIVE BY JON PEDDIE