

Magicc Houzz

Augmented Reality Application

A work submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science

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UNIVERSITY
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**FACULTY OF COMPUTER SCIENCE & INFORMATION
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University of Sargodha

Magicc Houzz
INTERIOR DESIGN APPLICATION

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Project Team:

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Certificate of Approval

It is certified that the work presented in this Project titled

Magic Houzz **AUGMENTED REALITY INTERIOR DESIGN APP**

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Under my supervision and that in my opinion, is fully adequate, in scope and quality, for the degree of BS in
Computer Science.

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Department: _____

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Kiran walidad

Aleeza rauf

Maryam bashir

Chapter 1 : Introduction

1.1. Purpose of document

Augmented reality is one of the fastest growing technologies out there, and one that regular folks are eager to adapt. That's because with just our smart phone, we can re-imagine and re-design our space, so we can see what new paint, decor and furniture will look like in our home before you buy.

Augmented Reality in real time change the color, style and covering of furniture in a real environment. This allows complex and varied designs to be explored and visualized. This project provides an attractive and interactive interior design application using Augmented reality, virtual information techniques are required in architectural field. Nowadays, people are busy with their work thus limiting their time to go to various stores to buy furniture for their everyday use. There is difficulty to fulfill the customers contentment of decorate their room without imaginary view of how the place would actually appear. A printed furniture catalogue is paper based containing textual information and images which does not provide any interaction for the user. We intend to use marker based AR for implementing a new design approach for interior design. This AR environment will allow the user to select from a range of furniture and then display the virtual furniture selected on the real environment. The user can also modify the virtual furniture in real-time on the screen allowing the user to have an interactive experience with the furniture in a real-world environment. This will provide a better view of the furniture placement and simplify the process of interior designing for users to save their time and effort. AR considered as new design approach for interior design. In AR environment, virtual furniture can be displayed and modified in real time on screen, allowing the user to have an interactive experience with virtual furniture in real world environment.

1.2. Problem Statement

Visualizing how a particular table or chair will look in a room before it is decorated is a difficult challenge for anyone. Hence, Augmented Reality (AR) technology has been proposed for interior design applications by few previous authors. Tracking markers are placed on the floors or walls to define the scale and coordinate system of the room. Next, the user selects virtual furniture on the screen and places it in the design space. In the AR scene, the 3D virtual furniture is integrated into areal environment and can be arranged along sidereal furniture. Experiments are implemented using basic home computer equipment, including a PC, HMD (or web camera), and printer. As a result, it is hoped that the proposed system will allow a broad range of users. The user can interact with virtual furniture using a Tangible Augmented Reality in real time, and change the color, style, or covering of furniture in a real environment. Therefore, this allows complex and varied designs to be explored and visualized, making AR technology for interior design accessible to both professionals and amateurs.

AR technology can become a new animated simulation tool for interior design, allowing the user to see a mixed AR scene through a web camera, video display, or PDA. It is also anticipated that the interactive potential can be increased according to user's needs. Augmented reality is one of the fastest growing technologies out there, and one that regular folks are eager to adapt. That's because with just our smart phone, we can re-imagine and re-design our space, so you can see what new paint, decor and furniture will look like in your home before you buy it. AR support auxiliary information to people when decorating and selecting furniture, help user feel the placement of furniture in the room in advance before putting them in.

1.3. Scope and Objectives

The scope of this project is that Technology opens up many new research fields in engineering and architecture. Augmented reality technique has been used in the field of computer vision technology, with its different user experience, slowly and deeply changing people life which include many different field

The following aspects were considered in the choice of a design solution:

Time savings

- Reliability
- Power consumption
- Maintenance
- Expandability

A critical consideration is the installation costs, since costs generally determine the feasibility and viability of a project.

Three types of gestures have been provided in this application such as drag, pinch and rotation gesture. User can drag, rotate, enlarge and minimize the furniture model in order to fit in their house. At the same time, user can view different dimension of the 3D virtual object such as the front view, side view and back view of the model by rotate the model with fingers.

Chapter 2 : Research and Requirements

2.1. Functional requirement

1. Signup
2. Login
3. Open camera of application
4. Capture image of room
5. Set tracking pattern
6. Set dimension
7. Max or minimize size
8. Save changes
9. Save image
10. Logout

2.2. Non-Functional requirement

2.2.1. Performance Requirements

The Android application should have a very quick performance capability to make the system efficient enough to act upon the generated command. All devices connected to it will confirm their duties within Nano seconds or within no time after receiving a notification from it. Talking about performance concerns all devices connected to the system are nicely communicating to each other to send and receive information. All modules are well integrated and process is running in an adequate flow.

2.2.2. Availability

The system will be available 24/7. By using androidsmartphone, the user can select the specified direction displayed within the four quadrants on the screen of the android smartphone to 3D furniture.

2.2.3. Security

The application will provide database security. Only the registered person that has been installed would be able to log in and can operate at any time. User would be able to set log in passwords of their suitable safety requirement.

2.3. External Interface Requirement

2.3.1. Hardware Requirement

In hardware requirements need a camera for capturing 3D pictures..

| Sr.No | component | Description |
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Table 2: The Table of Components

2.3.2. Software Requirement

| Sr.No | component | Description |
|-------|--------------------------|---------------------------------------|
| 1 | Software used in project | , Android studio , AR ToolKit Library |

Table 3: The Table of Components

Chapter 3 : Detailed Design and System Architecture

3.1. System Level Architecture

3.1.1. System Block Diagram

Diagram shows separate control architecture for target of Augmented Reality Interior design application.. The first one shows, controlling data communication architecture from android interior application. After that separate controlling ~~data~~ will communicate with the device. The concept of Android control architecture is like an Android game that we play on our Androidphone.

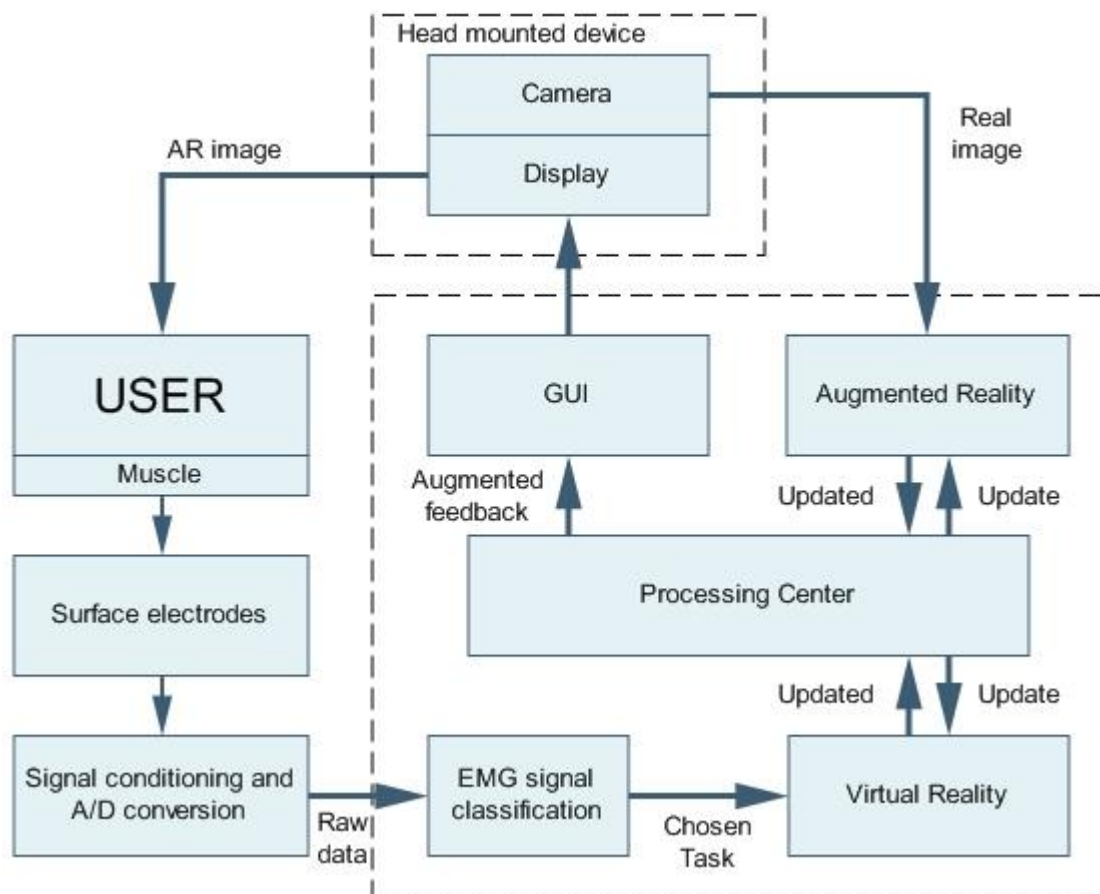
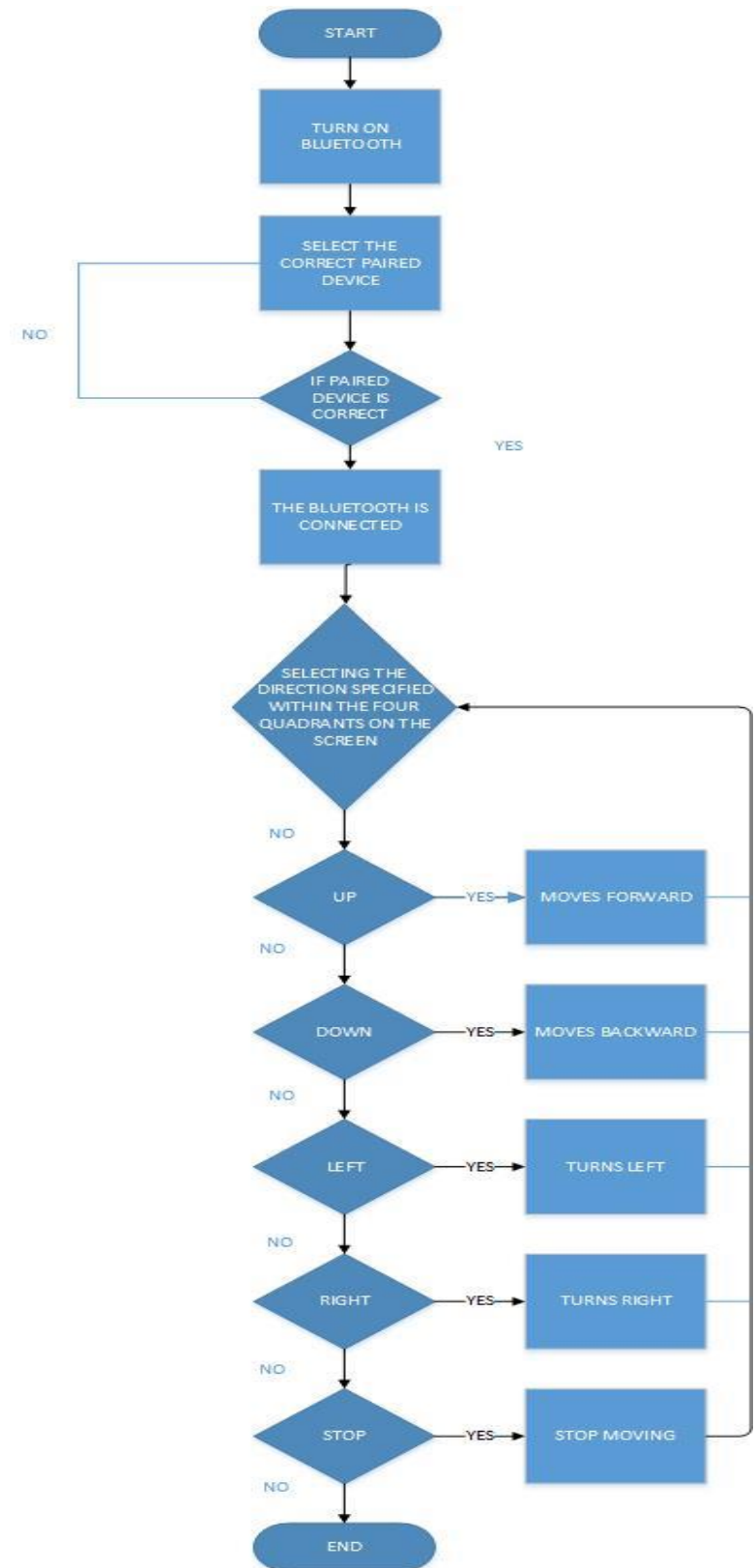


Figure 1: System Block Diagram

3.1.2. Activity Diagram of System

Our product will consist of furniture infrastructure and an android application that work and communicate effectively with each others.



convert the commands given by the user in a binary format and send them to the Arduino Uno. Arduino Uno will read and execute the command and lastly send the digital values to the motor driver device.

Figure 2: Activity Diagram of System

3.1.3 Use Case Diagram of System

In Figure-7shows Use Case diagram of system level architecture.

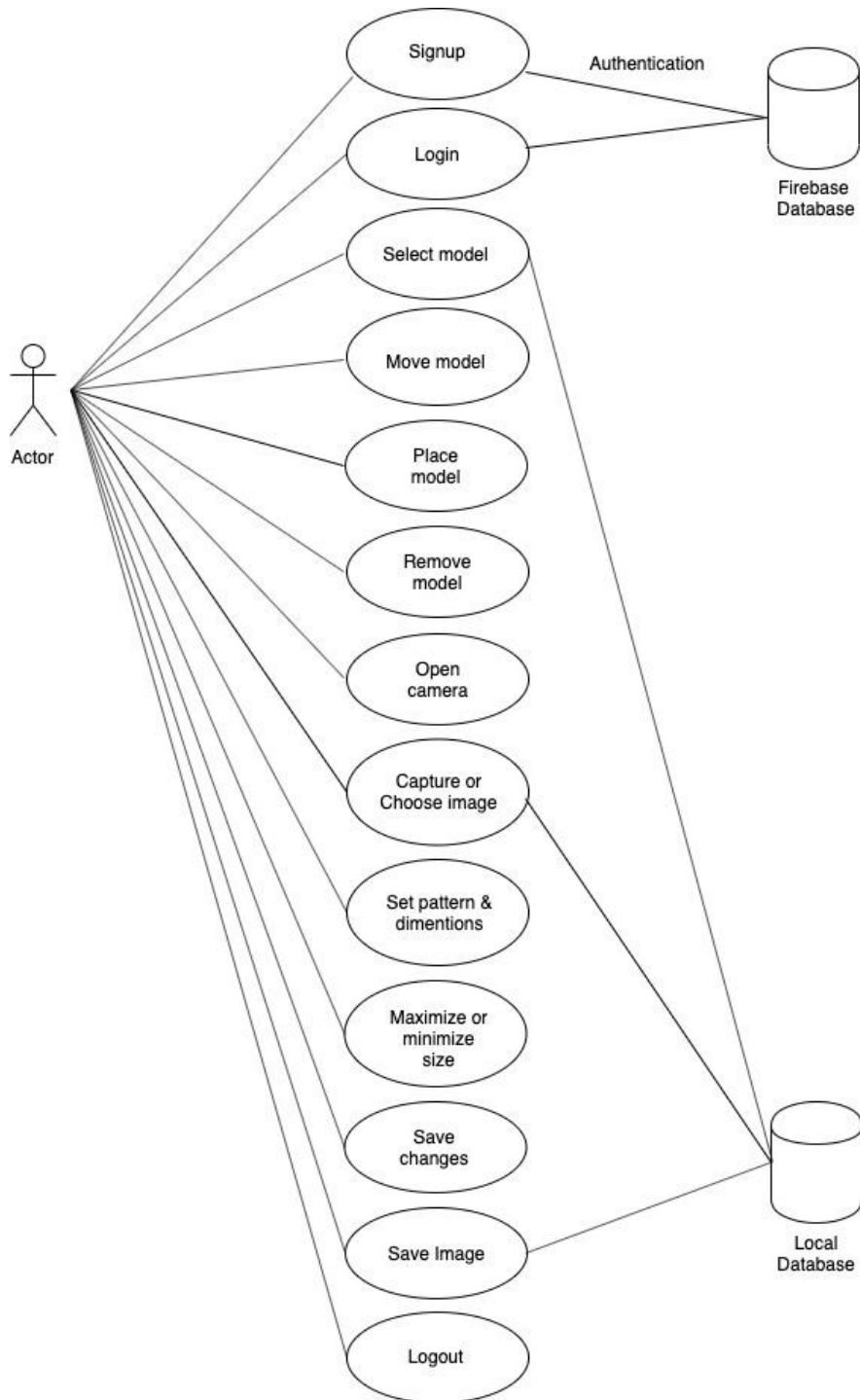


Figure 3:Use Case Diagram of System

3.15 Entity Relationship Diagram of System

In Figure Entity Relationship diagram show the whole system working.

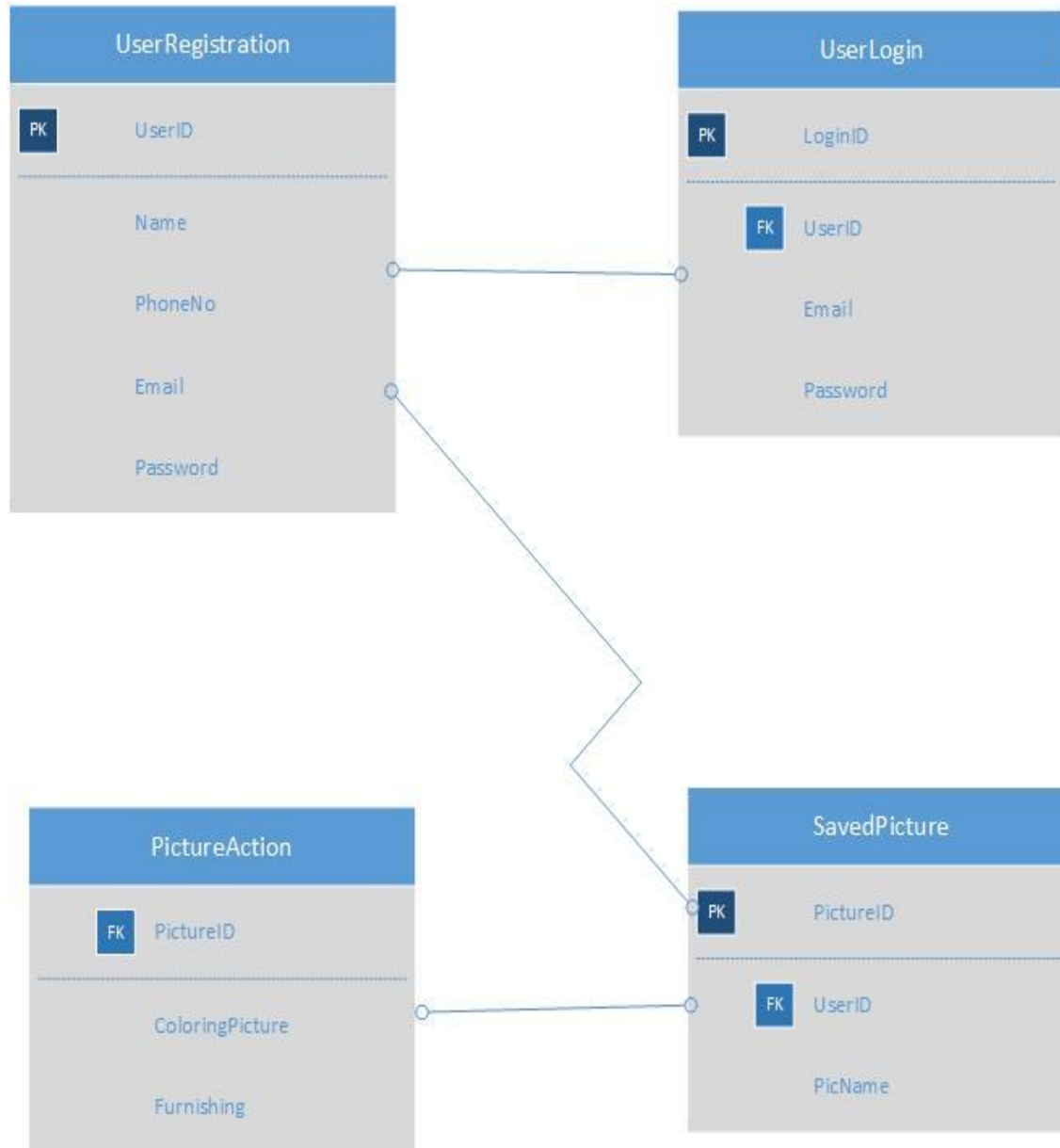


Figure 4:Entity Relationship Diagram of System

3.2. Mechanical Structure of interior design Application and its Dimensions

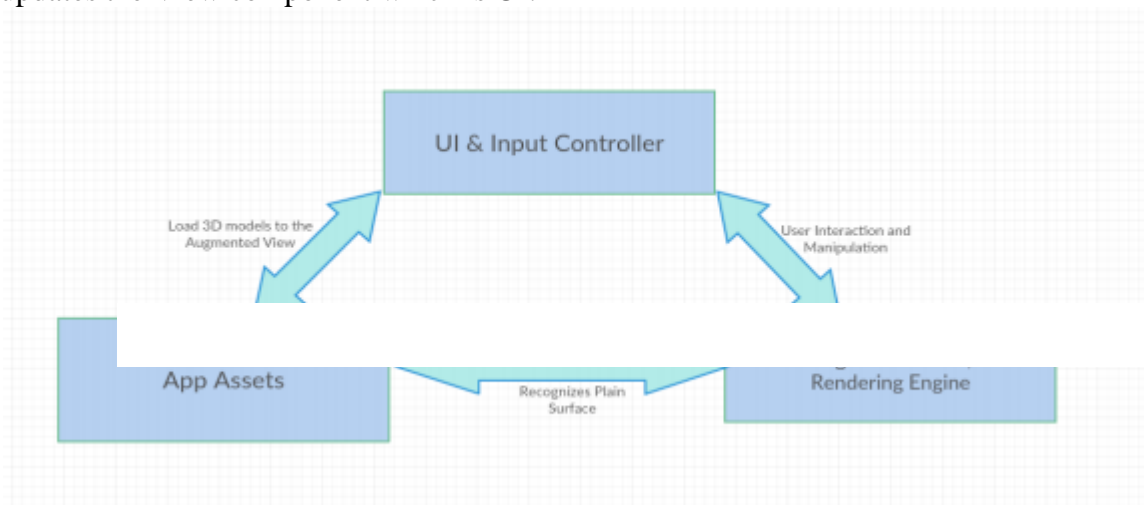
The following figure illustrates the important interior design terminologies that need to be considered while designing a interior design application.

Design and Construction:

implemented our Interior design app using Marker-less AR, we initially started with Marker-based approach because of the lack of support for Marker-less augmented reality. Mixed Reality headsets like HoloLens could easily solve the problem because it uses spatial mapping using different sensors, however HoloLens is still in its infancy, not a lot people have access to it and it is very expensive. Recently, Google announced its ArCore platform that would allow developers to create Marker-less AR experiences so we built our app around android ecosystem primarily because of its availability, discoverability, reliability, and agility. The development environment included Unity Game Engine, C# Programming Language, Visual Studio IDE .

Architecture:

The entire app is developed using Model View Controller architecture because whenever user invokes a functionality, UI Controller receives requests for the application and then works with the Model to prepare any data needed by the View. The View uses generated data to create the final presentable response and updates the UI. For instance, when the user selects a 3D Furniture from the UI, It is mapped to the Controller which grabs the 3D Furniture from the Model and updates the View component which is UI.



3.2.3 Front End Development:

We have created minimal User Interface for our app. Our primary rule was that at any time the user should be able to view the camera stream and the rendered model. We designed transparent menus and sliders that would only come up when the user needs it. Instead of having buttons we used touch gestures to manipulate and select rendered 3d models



Figure 5:Use menu slider of System

With the menu slider, the user can select different furniture. Once the user selects the furniture one can just tap on the colored plane. A 2-d vector is then shown from the tap action which we convert into vector3 that gives the actual location where the furniture is going to be placed. Once the furniture has been rendered, the user can view the furniture from different perspectives. In addition, the user can manipulate the furniture by using gestures. The furniture can be dragged to move it around the environment. The user can utilize pinch gestures to rotate the furniture. The app provides variations of tap actions to remove or select the rendered furniture. Once the user selects one of the rendered furniture, an additional button is displayed through which user can change the material of the selected furniture.



Figure 6:App rendering different furnitures.

