**AR Interior Design**

**(Visualize Your Imagination In 3D)**

A project submitted in partial fulfilment of the COMSATS University (CUI) Degree of Bachelor in Computer Science.

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### DEPARTMENT OF COMPUTER SCIENCES

# COMSATS UNIVERSITY ISLAMABAD,

##### ATTOCK CAMPUS – PAKISTAN

SESSION 2017-2021

**AR Interior Design**

**(Visualize Your Imagination In 3D)**

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A DISSERTATION SUBMITTED AS A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

### DEPARTMENT OF COMPUTER SCIENCES

# COMSATS UNIVERSITY ISLAMABAD,

##### ATTOCK CAMPUS – PAKISTAN

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| **PROJECT ID** | |  | |  | **NUMBER OF MEMBERS** | 2 |
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**Abstract**

Do you remember the time, once you were buying a chair, a lamp, a carpet, or anything else? Remember how excited you were about the fortunate purchase, rushing home… and determine that an item didn't fit in the room? Argh there have been only two further options: either return the products and return to the beginning where you start from, or leave and accept it. Fortunately, people don’t have pretty much time to go back to the interior designer again and again and wasting their time and money. With new tech advances and stuff like Augmented Reality (AR) these times are gone. Selecting colors for the interior, creating a drawing or a model of a room, staging it with the 3D objects and electronic components all of this is possible using AR application .once augmented reality came to their smartphones. Redecorating a room, your whole house, or just picking out a new couch is easier than ever. we are providing them a platform where they can design their room in a real time .this application empower them to organize things in their room, choose the best options according to their room dimensions in a fun and intellectual way just like playing game and they are designing or redecorating their room too

An augmented reality (AR) technology is combination of image and reality appearance. Nowadays, an augmented reality is accessible for smartphone cameras, tablet and webcam laptop. AR can be applied to marketing world by transforming the strategy from single piece of paper into real world. It can make an exclusive brand and also increase the brand by following the changing revolution. The problem statement is people are not interested for reading either book, magazine or catalogue. We proposed the development for furniture catalogue because people spend more time to their device. This application will be awakened by using a several software that is Android Studio, Maya, java, and the database.

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CHAPTER 1

##### **INTRODUCTION**

* 1. **Brief**

AR Interior Design is an augmented reality based Android application, With the Augmented Reality, you can visualize products to customers in the real-time and in the real world. AR technology also helps in increasing sales graph by raise the user experience in designed space. We provide the traditional Augmented Reality platform through an Android based application for various organizations and famous companies/industries like IKEA (European multinational group) or Interwood Mobel (Pakistan's leading furniture brand).

Want to know if a chair will look good in your room, or if a new door arch will add the guts to your room needs? AR Interior Design lets you see imaginary furniture, electronics and other 3D Models. So you will see what new color and 3D Models of Objects will appear as if in your home and what type of LCDs Models suits your wall before you purchase it. Just pick whatever item you are imagine for selecting and buying the preview Room 3D option below the product Models. Scan the surface and open the camera wherever you like to place the Objects in the room and a life-size version will appear in that place.

Our “AR interior design” application offers customize 3D experience of products that allow the customers to design their home interior in few clicks.

**Background**

Today, the world of information and communication technology supports the development of human communication with the physical, computer and virtual environment such as science, commerce, banking, education, etc. Augmented reality is live views of a physical real-world environment whose elements are uniting with virtual computer-generated imagery.

In the early days it was possible for the users to buy furniture without visiting the shops but it was impossible to look at what the object actually looked like in the home design. In our system, it is possible for a user to purchase furniture and virtually imagine that design at home without visiting stores. The main goal of the project is to develop an android application to virtually visualize the designs of home interiors. The application will save the time of people by physically visiting a furniture store which is a time-consuming task.

* 1. **Literature Review**

Following is the comparison between our application and previous apps

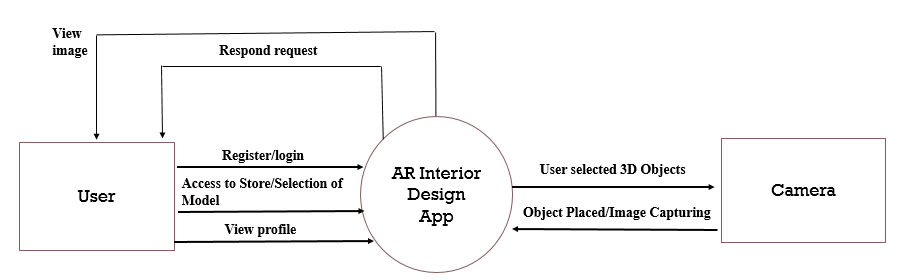
**ANALYSIS AND COMPARISON BETWEEN OUR AND PREVIOUS APPS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Android Applications*** | **3D customizable Objects** | **Accurate Dimensions** | **Free of cost** | **integrated in-app shopping experience** |
| **Magic plan room design** | **yes** | **no** | **yes** | **No** |
| **Housecraft designs** | **yes** | **no** | **no** | **Yes** |
| **Paint-Tester decorator** | **no** | **no** | **yes** | **no** |
| **AR**  **Interior Design** | **yes** | **yes** | **yes** | **yes** |

**Table (1.3)**

* 1. **METHODOLOGY**
* Android based application in which users have to place the marker in a room where they want to try out furniture items.
* The user’s mobile camera will be on and through camera they will capture the live feed of the room.
* Application captures the image and passes through pre-defined marker detection algorithm.
* Algorithm is based on image processing techniques using colour and other properties as the input to detect the marker. User initially selects the objects to be placed from the given database.
* The application superimposes objects on the original image with the centre coinciding with the markers centre in both directions.
* Furniture objects are overlaid on to the two dimensional image frame acquire from webcam. This will appear as if it is actually placed in the real world. And finally the user can view how the area looks with the objects present.

**Data Flow Diagram**



# **Figure(1.4)**

# **CHAPTER 2**

# **Problem Definition**

* 1. **Problem Statement**
* People have no time to go to stores to buy the furniture and furnishing.
* Difficult to fulfil the customers contentment of decorate their room without imaginary picture to refer.
* There are a lot of people who will throw off the catalogue.
* People can't view a better graphics of visualization

Even if people have time to go to the furniture shop, they may found out that there is none of the furniture that fulfils requirement. Hence there should have a way to let people use their mobile to view a 3D interior design in anyway and any time before it populate with the real items.

* 1. **Requirements**

**Software Requirements dependence:**

Android Studio

Firebase

Photoshop, Maya 3D

Microsoft Visio

Database: MYSQL or Firebase

Tools: Android Studio, JDK

C# Language. Java Application.

UNITY (Real Time Development Platform)

StarUML

MS Word / PowerPoint for presentations

**Hardware Requirements dependence**:

Smart Mobile Phone: Android which supports Augmented Reality

Android 7.0 or later (some models require newer versions as noted below)

**CHAPTER 3**

**Requirement Analysis**

**3.1 USE CASE DIAGRAM**

Camera

User

**(Figure 3.1)**

**3.2 Detailed Use Case**

* Describes a diagram of the application use case where a user encounters an application using an Android device that supports the AR camera.
* Initially we select the model we are interested in and scan the surroundings surface using the device's camera and set the model to ensure that it meets our needs, if we are satisfied we can go to the online store.
* The character is a user and uses the cases of choosing 3D Objects, scanning faces, placing 3D Objects, viewing details and redirecting to an online store if you are satisfied.

**3.3 Functional Requirements**

1: Login and Signup User Database Handling

2: Marker Detection

* Image acquisition for intensity.
* Promotes low-level image Processing line acquisition or correct line acquisition of markers.
* Identify potential markers and discard any obvious non-market signals immediate rejection of clear marks and rapid marking acceptance of markers.
* Identifying and formatting tags.
* Identify template matching (template tags) and decryption (data tags).
* Estimated marking area calculation.

3: Camera captures live video feeds in the real world and sends you to the app.

4. The application continues to search each video frame for any square types.

5. If any square shape is found, then the app calculates the camera area associated with the black square.

6. Once the camera position has been calculated the graphics model on the computer is drawn to the same location.

7. This model is drawn above the live video feed in the real world and therefore appears to be attached to the shaped square marker.

8. User can play with object by moving up and down or rotating the object in intellectual way, also capture the image in Real time.

9. The end result is a process and is displayed backwards with a portable display, so when the user looks at the screen they see the drawings set in the real world.

**3.4Non-Functional Requirements**

* Switch between Front and Back Camera.
* Auto Rotation Feature
* History Log
* Navigation system.
* App will run on any mobile Device.
* Only Admin can change the access permission.
* Communication between clients and system data must be encrypted.

**CHAPTER 4**

**Design and Architecture**

**4.1 System Architecture**

Environment

Live Video From camera

Android device With AR camera

Scan the Surface

Virtual Object

Display AR Objects

Rendering Module

Area Processing

Combine Live and Virtual Object

Select the Position

**(Figure 4.1)**

**4.2 Class Diagram**

Database Credentials

Login, Signup and

SQLite database

Model Target

AR Camera

3D Image

Animator

3D Models

Load 3D Models

Object

Rotation

Scale

Transform

**(Figure4.2)**

**4.3 Sequence Diagram**

Online Store

3D Objects

Image position

User

AR Camera

Application

Start (Login/Signup

Select Objects and use camera

Scan Surface

Augment the Selected Object

Display 3D Object (Models) On Live in Mobile

Go to online store if satisfied

Go to home Page

**(Figure 4.3)**

**4.4 Activity Diagram**

Start

Email verification

**Signup**

Log In

**Dashboard View for Selecting Model**

**Help user**

Profile

**Drawing room**

**Music**

**Electronic**

**Kitchen**

**Utility**

**Models**

**List of 3D Models**

**Camera**

**Scan the Surface**

**Place the 3D Model**

No

**Satisfied**

Yes

**(Figure 4.4)**

**Go to Store**

**4.5 ERD**

Go to Store If Satisfied

Scan Surface and Place model

Dashboard

Login

Signup

**Figure (4.5)**