Project Report

On

Virtual try-on system for watches using augmented reality.

By

Prasad Nimse BC258
Kajol Kumbhar BC256
Ankita Bhikule BC249
Pooja Ganeshkar BC251

Under the guidance
of

Ms.Swati Shekapure

DEPARTMENT OF COMPUTER ENGINEERING
Marathwada MitraMandal's College of Engineering
Karvenagar
Savitribai Phule Pune University
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Marathwada Mitra Mandal's
College of Engineering
Karvenagar, Pune
Accredited with 'A' Grade by NAAC

CERTIFICATE

This is to certify that **Prasad Nimse BC258, Kajol Kumbhar BC256, Ankita Bhikule BC249, Pooja Ganeshkar BC251** from **Fourth Year Computer Engineering** has successfully completed his seminar work titled **"Virtual try-on system for watches using augmented reality.."** at Marathwada Mitra Mandal's College of Engineering, Pune in the partial fulfillment of the Bachelors Degree in the Engineering.

Date:
Place:

Ms. Swati Shekapure	Dr.H.K.Khanuja	Dr.S.M.Deshpande
Guide	Head of the Department	Principal

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Prasad NimseBC258
Kajol Kumbhar BC256
Ankita Bhikule BC249
Pooja Ganeshkar BC251
Class:BE-2

ABSTRACT

In this, we present a system that enhances the visualization of customized watches using augmented reality techniques. Instead of viewing yourself in a real mirror, sophisticated 3D image processing techniques are used to verify the appearance of new watches. A single camera captures the person and outputs the mirrored images onto a large display which replaces the real mirror. Computer graphics models of the watches are augmented into the video such that the person seems to wear the virtual watches.

Virtual try-on applications make it possible for buyers to watch themselves wearing different watches without physically trying on them. Within couple of seconds a virtual Watch appears above the place holder on user phone screen. Now user can examine the watch from a variety of angles, and tapping the one icon on the screen lets you know more about the watch. This feature puts list of AR watches at user's finger tips for purchase. The rapid and ever-increasing growth of online shopping is leaving traditional pattern. AR watch showed a potential where customer interact with or see how it might fit them.

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Chapter 1

INTRODUCTION

Augmented Reality (AR) is a new technology that involves the overlay of computer graphics on the real world . One of the best overviews of the technology is, that defined the field, described many problems, and summarized the developments up to that point.Virtual Reality is a term used for computer generated 3D environments that allow the user to enter and interact with synthetic environments.The users are able to "immerse" themselves to varying degrees in the computers artificial world which may either be a simulation of some form of reality. Virtual try-on applications make it possible for buyers to watch themselves wearing different watches without physically trying on them.Within couple of seconds a virtual Watch appears above the placeholder on user phone screen.

In recent years, AR has gained significant attention in different emerging applications. As an interactive display technology, AR makes it possible to increase the understanding of viewed objects by combining real and synthesized information. We classify virtual try-on systems into image-based, live AR, and model-based categories.In, segments from the picture of a model wearing a watch are shown on the picture of a user hand. In, a virtual try-on based on watch 2D images is proposed, in which an image warping technique is applied to map the apparel image onto the individualized hand. Some methods such as employ a technique to select the best matching pictures of watches in a previously recorded database that contains all watches.The field of Augmented Reality has existed for just over one decade, but the growth and progress in the past few years has been remarkable

1.1 PROBLEM DEFINATION

In earlier days people used to try watches physically which was very time consuming but now a days by sitting at home virtual try-on systems make it possible for buyers to see themselves wearing different watches without actually wearing the watches. Such system can improve the shopping experience by assisting customers to make purchase decisions.

1.2 PROJECT SCOPE AND LIMITATIONS

• The rapid and ever-increasing growth of online shopping is leaving traditional pattern. AR watch showed a potential where customer interact with or see how it might fit them.
• Scope of this project can be extended further Like Amazon or another web application .
• Apart from watch we can build that application for multiple accessories which will get displayed into the 3d form.

1.3 TECHNICAL KEYWORDS

Augmented Reality,Augmented Reality Technologies,Realistic Rendering,Viewpoint Switching,AR Acceptance,Mobile Learning,Android,Mobile Applications.

1.4 DOMAIN NAME

Augmented Reality.

1.5 DOMAIN DESCRIPTION

Augmented reality (AR) gives 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 appears in direct view of an existing environment and adds sounds, videos, graphics to it. When people here about augmented reality they often think about the hollywood movies but now-a-days augmented reality has also moved in different sectors like Retail, healthcare, education and training etc. Augmented reality (AR) adds digital elements to a live view often by using the

camera on a smartphone.Virtual reality (VR) implies a complete immersion experience that shuts out the physical world. Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio, and other virtual enhancements integrated with real-world objects." – Gartner's IT Glossary. "Augmented reality is the rendering of digital images or data onto real-world objects." As our problem statement is Virtual try on system using augmented reality So in this by using augmented reality we are going to provide a real-time experience for the user's without actually wearing the watches

1.6 MOTIVATION

1. Lenskart

The company was one of the early entrants into the AR space, but it's continued to evolve its offering, and when we tested it while researching this article, we were really impressed by how powerful the experience is, and how easy the guided setup was. The Lenskart app and website both support the '3D Try On' feature. How it works is simple - give Lenskart access to your camera, and it'll show you what a frame looks like on your face. That's pretty basic, but what Lenskart does is records your face from multiple angles - there's a short setup required where you follow onscreen prompts to look left and right, letting it map your face - and then when you "try" on a frame, you can swipe on the image to turn your head to the left and right as well, to get a view of the glasses from different angles. The frames are aligned impeccably, and the experience was pretty smooth and powerful in our experience.

2. CaratLane

Like Lenskart, CaratLane also lets you try on its products when shopping. Unfortunately, it won't work on your computer and it doesn't work directly from the CaratLane app either. In addition to the CaratLane app, you need to install the Virtual Try On (VTO) app from CaratLane onto your phone to see your virtual self. Using the VTO app is pretty straightforward but for first time, you'll need to set it up. Frame your face in the camera view, turn left and right, and then place the markers for where earrings go in, and you're good to go. Look for things in the CaratLane app, and once you find something you like, you can see it modelled against your face. Getting started is a little cumbersome compared to the same setup on the Lenskart app, but otherwise the overall experience was good, and the placement of the products works really well, so

3.Tinkle

The great granddaddy of Indian comics, Tinkle holds a special place in the heart of many Indians. The comic is an institution, and in many ways, it stays true to its classic style and sense of humour. That doesn't mean that the comic is stuck in the past though. Tinkle has integrated with augmented reality, so you can do things like scan your copy of the comic book to play games on your phone, or see bonus content. To do all this, you have to download the Blippar app, and then scan tags and images in the comic using the app.

4. SIB Mirror

The South Indian Bank is doing a number of interesting things in the app, such as physical gestures and patterns, detailed reports, and easy P2P transfers. In terms of AR, it has a very simple feature that other banks should copy - an ATM and branch finder. This shows you a list view, with locations and distances, and tapping the augmented reality button switches to a camera

overlay, showing you exactly where the ATMs are. If you've ever been stuck outside a big complex and can't find the ATM, and there's no one nearby that you can ask, then you know exactly why something like this could be useful, as it'll help you pinpoint where you've got to go.

5.Makaan

We recently wrote about Makaan adding its AR feature MakaanView, which allows you to look for houses simply by moving your phone around to look at the world around you. The app has a number of other cool features, but the AR feature is actually something we quite liked. When you look for nearby properties, the phone goes into camera view, and you can point the phone at a tower to see how many units are available for rent in the building, for example. If you've narrowed down on the locality you're interested in renting or buying in, then this can be a clever way to quickly find available options, and to see whether you like the ones on offer or not.

1.7 METHODOGY

1.7.1 Authentication:

• The Vuforia Web Query API allows you to pair a submitted image on your Cloud databases.
• All requests to the Web Query API require to be verified. The authentication plan is described in this section.
• Authorization: VWS
serverkey : Signature
Signature : Signature = Base64(HMAC SHA1(serverkey, StringT oSign))); StringT oSign = HT T P port + Content MD5 + Content T ype + Date + Request P ath; Aactualtime stamp(usingtheHT T P Dateheader)isnecessaryforverif iedoffers.
I. Make a filter to reduce the noise an AR Model.

• It comes to image-based targets, there are a range of parts that define its trackability and its target player number when uploaded on the Vuforia Target Manager.
• Image Target with parallel axes for clarification.
• Image displaying the natural features that the Vuforia Engine uses to identify the image target.
• The augmentable number can rank from 0 to 5 for any provided image.
• The more expensive the augmentable number of an image target, the more powerful the way to detection and tracking technique it contains.
• Some zero associates that a target is not tracked at all by the AR system, whereas a star number of 5 determines that an image is followed by the AR system.

II. working with Camera
• To Access the Camera Picture in Unity Using Vuforia. Image class To Use the Camera Projection Matrix: x-direction is to the right y-direction is upwards in the game face z- direction views out of the target- plane Effects of Camera projection: An target with correlative ¡0,0,1¿ displays up in the core of the viewport (doing one image part continuously from the camera center).
• If we put the object to ¡0,0,2¿then it will still live in the middle of the viewport at half the size as before. If we forward the object to ¡1,0,1¿ then it forwards to the right of the viewport focus.
• If we move the object to ¡0,1,1¿ then it moves to lower than the viewport center.
• trackable pose :- const Vuforia::Matrix34F

QCAR::TrackableResult::getPose() const;

III. Augment 3D object in target place

• Open or create a Unity project Fixed target image,add in to GameObject • Then GameObject is upload in to Vuforia that it created a dataset provide a key this key assign to prefabs. • Prefabs it having 3d model that place in target image. • Create a C-sharps script, call it MyPrefabInstantiator, for instance, and attach it to the image target object.

1.8 ARAM LIBRARY

In our system, a library of augmented reality is currently being implemented for store applications (e.g. surgical tool tracking). This method detects automatically markers on live video. The basic label detection procedure consists of the following steps:

1. Image acquisition
- Acquisition of an emphasis image.

2. Square model detection
- Edge detection
- Line fitting
- Marker's corners area Estimation

3. Detection of possible markers and discard of obvious non-markers
- Fast dismissal of obvious non- markers
- Fast approval test for potential markers

4. Classification and decoding of markers
- Template matching (template markers)
- Data markers decoding.

5. Computation of marker's poses
- Estimation of camera's location
- Iterative location computation.

The first task of the label detection process is to find the limits of the possible labels, using point detection program which is necessary for image processing. The Canny point detector is one of the most generally used image processing tools.It provides the high-precision detection of reduced points. But, this method has two main disadvantages: start parameters and time computation. In fact, due to defects in either the image data or the point detector parameters, there may be lost pixelson the wanted curves. A form closing program is developed based on the work of Milgram et al.The selected points are then linked together into lists of consecutive segments using Freeman series code algorithm Then, a line simplification is performed using the recursive Douglas-Peucker algorithm to defeat the number of points in a poly line according to a defined tolerance. Since the labels are enclosed in closing polygons, just the forms composing the 4-vertex abridged polylines are then provided by minimization of an external function defining the virtue of a feature (point) regarding the associated collection of data points. The precise corners' positions are taken from the crossing of the fitted lines.

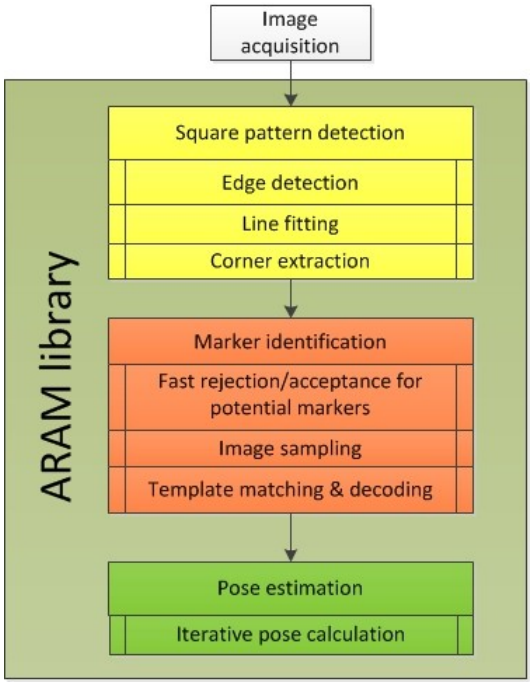


Figure 1.1: Block Diagram of the ARAM library .

1.9 CAMERA POSE ESTIMATION PROBLEM

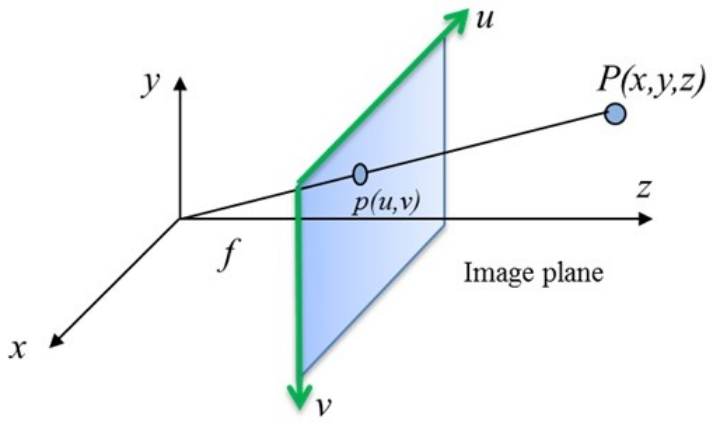


Figure 1.2: Projection geometry from the 3D world.

Camera pose view is the problem of defining the location and orientation of an inside calibrated camera from known 3D source edges and their images. When the family geometry of n characteristic is applied, this problem is called the Perspective-n-Point problem (PnP).
A camera is normally defined by applying the so-called pinhole.It is well-known that one can set a collineation P3 → P2,which maps the projective time to the retinal level of the camera. It follows the coordinates of a 3D position P = [x, y, z], displayed in a Euclidean world coordinate system can be linked to the retinal picture coordinates p = [u,v] by the comparison heaven:

$$\lambda \begin{bmatrix} u \\ v \\ 1 \end{bmatrix} = \begin{bmatrix} f_x & s & 0 & u_0 \\ 0 & f_y & 0 & v_0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} \boldsymbol{R} & \boldsymbol{T} \\ \boldsymbol{O}_3^T & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \\ 1 \end{bmatrix}$$

Figure 1.3: Literature Survey.

where lambda is a balance factor the coordinates of the important point? and are the focal lengths displayed in the x and y paths, s is the skew perspective, and R and T are extrinsic parameters characterizing the location of the camera in the scene concerning the world source coordinate system. R is a 3 × 3 turn matrix, which describes the camera coordinate axes with those of the source coordinate system. T is the key vector, in the x, y and z directions, describing the camera centerin the source coordinate system.

Chapter 2

LITERATURE SURVEY

2.1 EXISTING METHODS

1.Object detection methods:

The general structure of any application based on image processing is following: We will acquire an image from a camera and store it into an inner rep-resentation (a kind of RGB color matrix). Further we will make an image analysis and identify a possible wanted object, its position and orientation. This potentially wanted object is compared with a predefined pattern or patterns. In the case of suc-cess, the last step is insertion of the artificial object. This process is illustrated on This process is quite common for all AR applications.

2. Artificial marker detection:

An example of the marker detection process could be described by following steps. The whole process is also outlined. Our presented method is not the only possible solution, however it is widely used by many well tested applications. As been already mentioned, from an input device a color image is taken and stored into the inner representation of the image processing library. Further, this image is transformed into the gray scale. It is possible to make a standard conversion of all color channels or prefer a specified color channel (e.g. green). The grey value now presents the brightness of the pixel (hence an object). Such image contains a number of objects – markers, persons, furniture, etc. For performance improvement it is necessary to remove most of these objects from the image. This step is usually done via threshold.

3. Design a 3D Modelling of Product Image:
The 3D version of the product is modelled as per the manufacturer instructions using Blender. The material and texturing is performed to give a realistic look for the product this done by UV unwrapping process. The material and texturing is performed to give a realistic look for the product. The movements and actions are defined using key frame animation if needed.

4.Composite 3D object with target image:
In this module, the 3D model and the target image which is given by the product advertiser are combined for tracking by the target images. The target images and the 3D models are linked through the unity website in a database.

5. Configure Vuforia Database:
The target images are uploaded in a created database, the images can be in png or jpg format. The uploaded images are rated based on its quality and with the parameter width. The created targets are downloaded as a Unity project file and the project file is opened.The 3D models are mapped with the target images and the this can be repeated for multiple targets.

6. Design Mobile App:
The Augmented Reality app is build and can run on the android mobile devices. Essential features and the UI interfaces are designed in this phase to make the app user friendly. The user can manipulate the product in different ways depend upon the category of the product. Also the product Manufacturer can submit their details to advertise their products through this interface.

2.2 LITERATURE SURVEY

Liturature Review

Sr. No.	Title of paper	Year	Technology used	Understanding
1	Is Augmented Reality Technology an Effective Tool for E-commerce? An Interactivity and Vividness Perspective	2018	AR and Web-based	This study evaluates the effectiveness of augmented reality (AR) as an e-commerce tool using two products—sunglasses and watches. Study 1 explores the effectiveness of AR by comparing it to a conventional website. The results show that AR provides effective communication benefits by generating greater novelty, immersion, enjoyment, and usefulness, resulting in positive attitudes toward medium and purchase intention, compared to the web-based product presentations.
2	Image and augmented reality based networks using mobile devices and intelligent electronic glasses	2016	Variants of Glasses	In the prior art the primary methods of communication are primarily Voice based such as by means of a communication device such as the telephone, cellular telephone or other mobile devices augmented as needed by textual methods such as handwriting. In recent times the communication methods have expanded to include Such digital and electronic methods as e-mail with the ability to receive files of voice, audio, video and data files as attachments and the means for recoding, playing and or viewing these files. In the prior art these files are discrete and separate and do not necessarily exist as one composite file thus limiting utility.
3	TDTOS – T-shirt Design and Try-On System	2015	Augmented reality, Image Retrieval, Memory Control, Image Processing and Detection, and Input/output Interface.	In this paper, a new framework for T-shirt design and try-on simulation based on FPGA is presented. Users can not only gain realistic try-on experience, but also design the T-shirts all on their own. The design approach of this system consists of three major parts. First, collect relevant information from the camera and identify the position of the clothes. Second, process the retrieved data and modulate the color of the clothes with folds and shadows remained.
4	Virtual reality and mixed reality for virtual learning environments	2020	Virtual reality; Mixed reality; Cooperative/collaborative; Virtual learning environment (VLE); Edutainment	This paper explores educational uses of virtual learning environment (VLE) concerned with issues of learning, training and entertainment. We analyze the state-of-art research of VLE based on virtual reality and augmented reality. Some examples for the purpose of education and simulation are described. These applications show that VLE can be means of enhancing, motivating and stimulating learners' understanding of certain events, especially those for which the traditional notion of instructional learning have proven inappropriate or difficult.
5	Object Detection in the Context of Mobile Augmented Reality	2020	DNN-based object detection model, AR	During a live AR session, a user moves around a scene to view virtual objects from different viewing angles while holding the phone using different orientations.The image sequence is consumed by the mobile AR framework (e.g.,ARCore or ARKit), which uses VIO to track the pose of the mobile device in real-time.
6	A Cloud Service Framework for Virtual Try-on of Footwear in Augmented Reality	2018	Augmented reality, object tracking, virtual try-on, design evaluation, cloud service	Most software tools used to design fashion products have been constructed from the perspective of designers instead of consumers. Those tools offer limited capability of engaging end users to participate in the design process. Enabling users to express their design ideas and instantly interact with product prototypes is desirable in modern product development.

Chapter 3

SOFTWARE REQUIREMENT SPECIFICATION

3.1 FUNCTIONAL REQUIREMENTS

1. Possible for buyers to wear different watches without physically trying on them.
2. Display watches in very interactive way.

3.2 EXTERNAL INTERFACE REQUIREMENTS

3.2.1 User Interface:

Mobile Phone,Tab,Single Screen with Camera

3.2.2 Software Interface:

Unity 3D,Visual Studio

3.2.3 Hardware Interface:

2GB RAM,Internal 16GB

3.3 NON-FUNCTIONAL REQUIREMENTS

1.Performance
2.Usability
3.Reliability
4.Availability

3.4 SOFTWARE REQUIREMENT AND HARDWARE REQUIREMENT

Operating System : 64 bit Windows
Software Requirements : Unity 3D, Vuforia.
Hardware Requirements : Mobile Phone with Camera

Chapter 4

SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

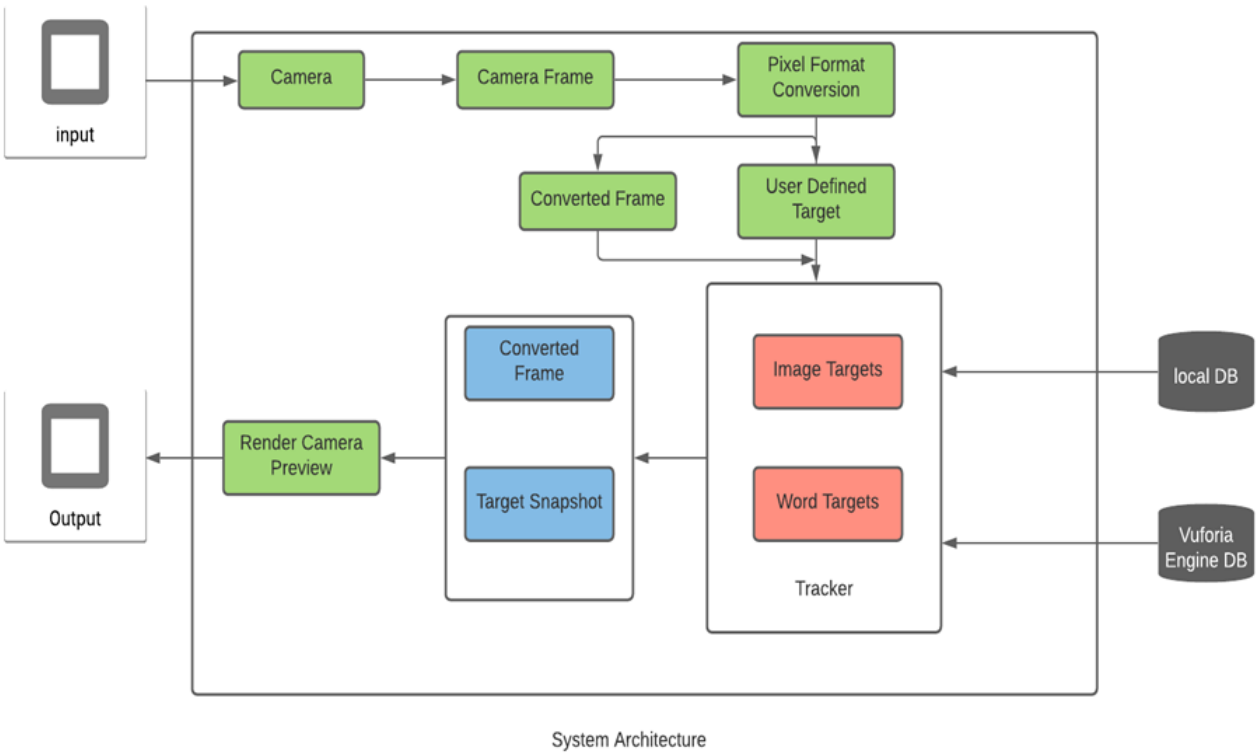


Figure 4.1: System Architecture .

In system architecture, we take input from the camera in that click an image. then it goes through the second phase that is the camera frame its work to capture all the content in the camera frame then its image is ok then goes next phase that pixel format conversion in that phase camera manly with pixel that why because of AR camera is most identify dark color or some mark/tags in the image.

Image Targets are detected based on natural features that are extracted from the target image and then compared at run time with features in the live camera image. The star rating of a target ranges between 1 and 5 stars. Although, targets with low ratings (1 or 2 stars) can usually detect and track, aim for targets with 4 or 5 stars for best results. To create a trackable that is accurately detected, you should use images according to the above attributes for an ideal Image Target. we used Marble Augmented reality in that most important medium in image. in the Image Target phase when you identify an image target that is converted into a different format that like signature, authentication, binary format, port number, String type. in that, we check that image is traceable or stable. if target is identified used database in local or cloud then it camera working with to display rendering 3d object no top to the target.

Table 4.1: Coefficient values for Basic COCOMO

4.2 MATHEMATICAL MODEL

4.2.1 Estimation

- Estimate the effort in person-month or person-hours.
- Estimate the duration in calendar month.
- Estimate the cost in currency.

4.2.2 Estimation Technique Used

COCOMO (Constructive Cost Estimation Model) was proposed by Boehm [1981]. COCOMO predicts the efforts and schedule of a software product based on size of the software. COCOMO stands for "Constructive Cost Model". According to Boehm, software cost estimation should be done through three stages: Basic COCOMO, Intermediate COCOMO and Complete COCOMO. We are going to used Basic COCOMO that categorized projects into three types:
i. Organic: Suitable for organization that has considerable experience and requirements.
ii. Semidetached: Examples of this type are developing new database management system.
iii. Embedded: Organization has little experience and stringent requirements. The Basic COCOMO formula takes the form:
E=ab (KLOC)(bb) [person-months]
D=cb (E)(db) [months]
P= E / D [persons]
Where E is the effort applied in person-months, KLOC is the estimated number of thousands of delivered lines of code for the project, D is total time duration to develop the system in months, and P is number of persons required to develop that system. The coefficient ab, cb and the exponent bb , db are given in the next table.

Software project	ab	bb	cb	db
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

4.2.3 Effort Estimation

The value ab and bb according to the system is
ab=2.8 and bb=1.20
The system falls in the system category.
Total LOC (approx) of project is:20000LOC=2.00KLOC
Effort (E) =ab(KLOC)(bb) [Person -Month]
E=3.6*$(2.00)^{1.20}$
$E = 10PM$
$Person - Month = 10PM(approx)$

4.2.4 Duration Estimation

Duration (D) = cb(E)(db)[months]
= 2.5*$(10)^{0.32}$
$= 2.5 * 2.34$
= 5.6
$Duration12[months]$

4.2.5 Person Required

Person Required = Effort Applied (E) / Development Time (D) [count]
= 10/6
= 1.66[count]
Person Required =1 [Persons]

4.2.6 Cost Estimation

We take the assumption 4 person charges 2500 rupees per month.
Total Estimation= 2500*6= Rs.15000/-
Total Estimation=Rs.15000/-

4.3 UML DIAGRAMS

4.3.1 Activity Diagram for scanning image.

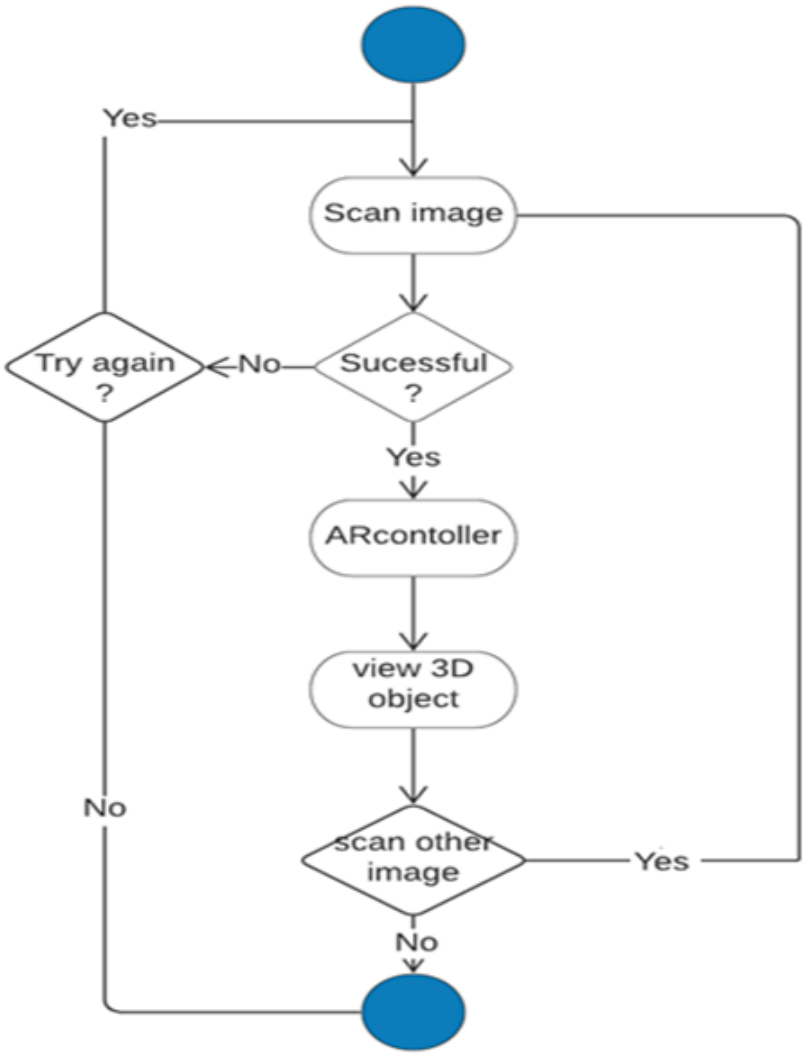


Figure 4.2: Activity Diagram to Scanning image.

Activity diagram is used understand the flow of the system. In that user will scan the image using AR camera,then that camera will capture an image and will send that image information to vuforia cloud to display the animation of particular scan component or information of that component.

4.3.2 Use case Diagram

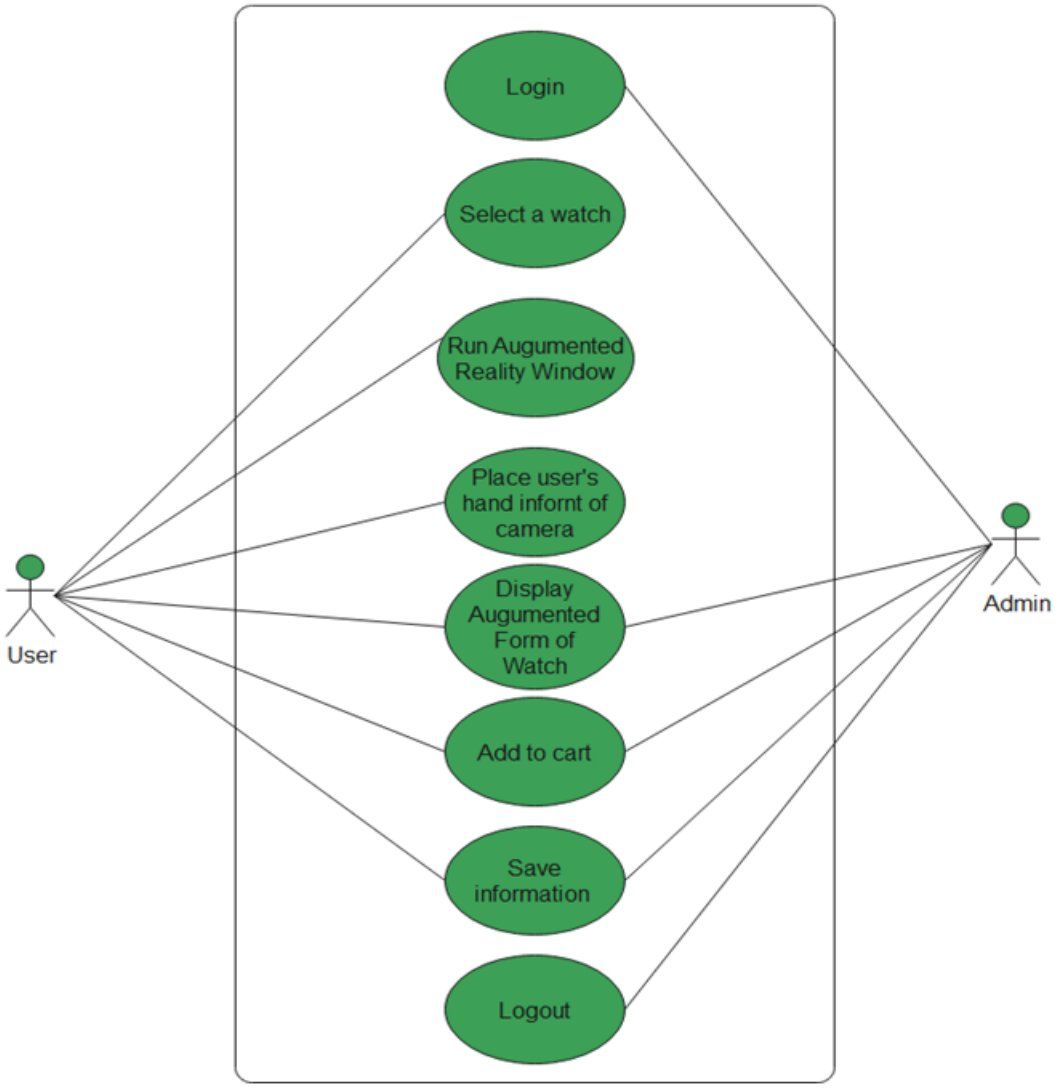


Figure 4.3: Use case Diagram.

Use-case diagram shows the various user activities that can be performed on the system. The following use-cases are described below:

User Activities

1. User will select the watch
2. Run augmented reality window
3. User will place his/her hand in front of the camera
4. Display the watch in augmented form
5. Add to cart
6. Save all the

Admin Activities

1. Login into the system
2. Display the watch in augmented form
3. Add to cart
4. Saves all the information
5. Logout from the system

4.3.3 Class Diagram

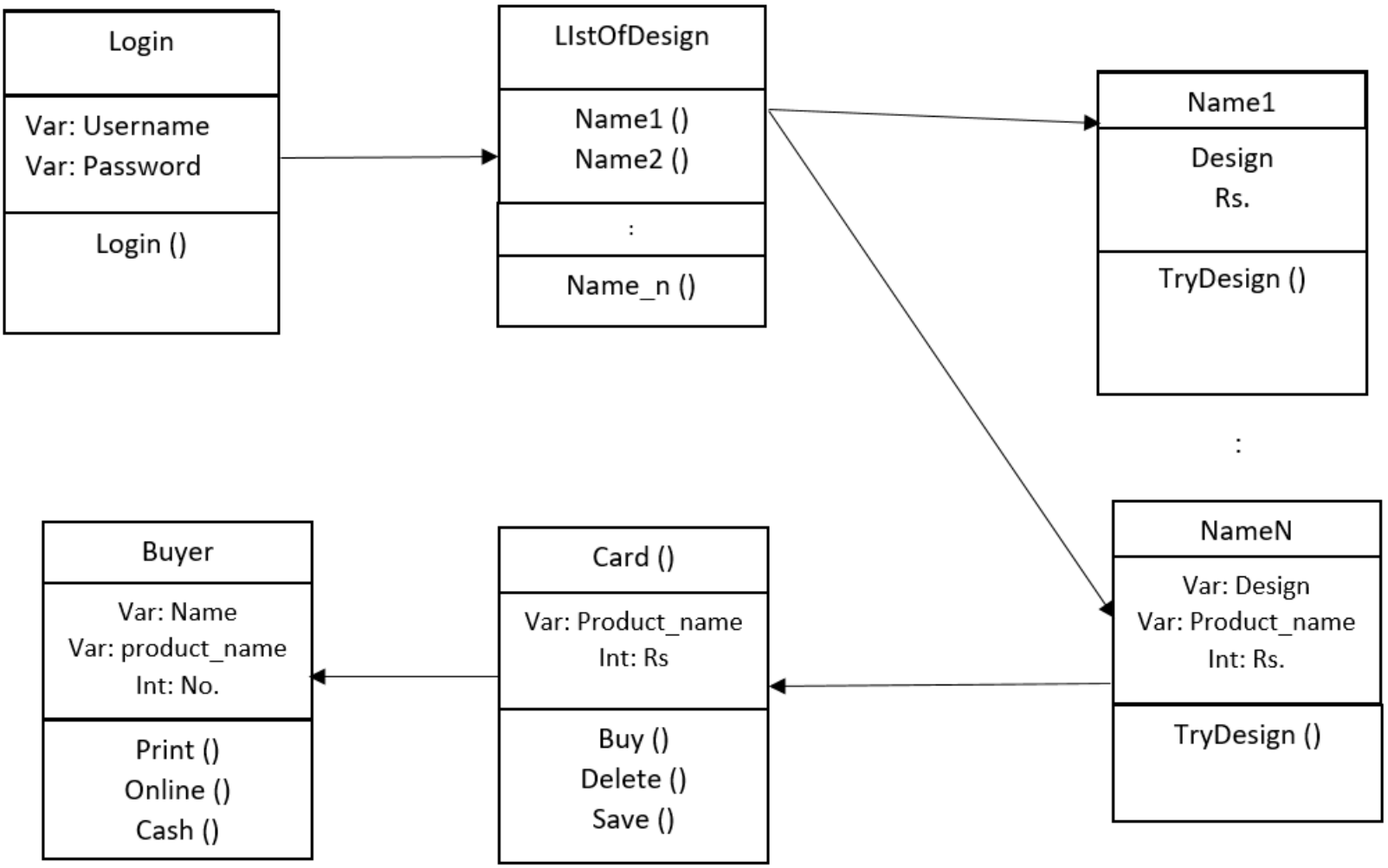


Figure 4.4: Class Diagram.

Class diagram is a graphical notation used to construct and visualize object oriented systems. A class diagram is a type of static structure diagram that describes the structure of a system by showing the system's:

- classes
- attributes
- operations
- and the relationships among objects.

4.3.4 Sequence Diagram

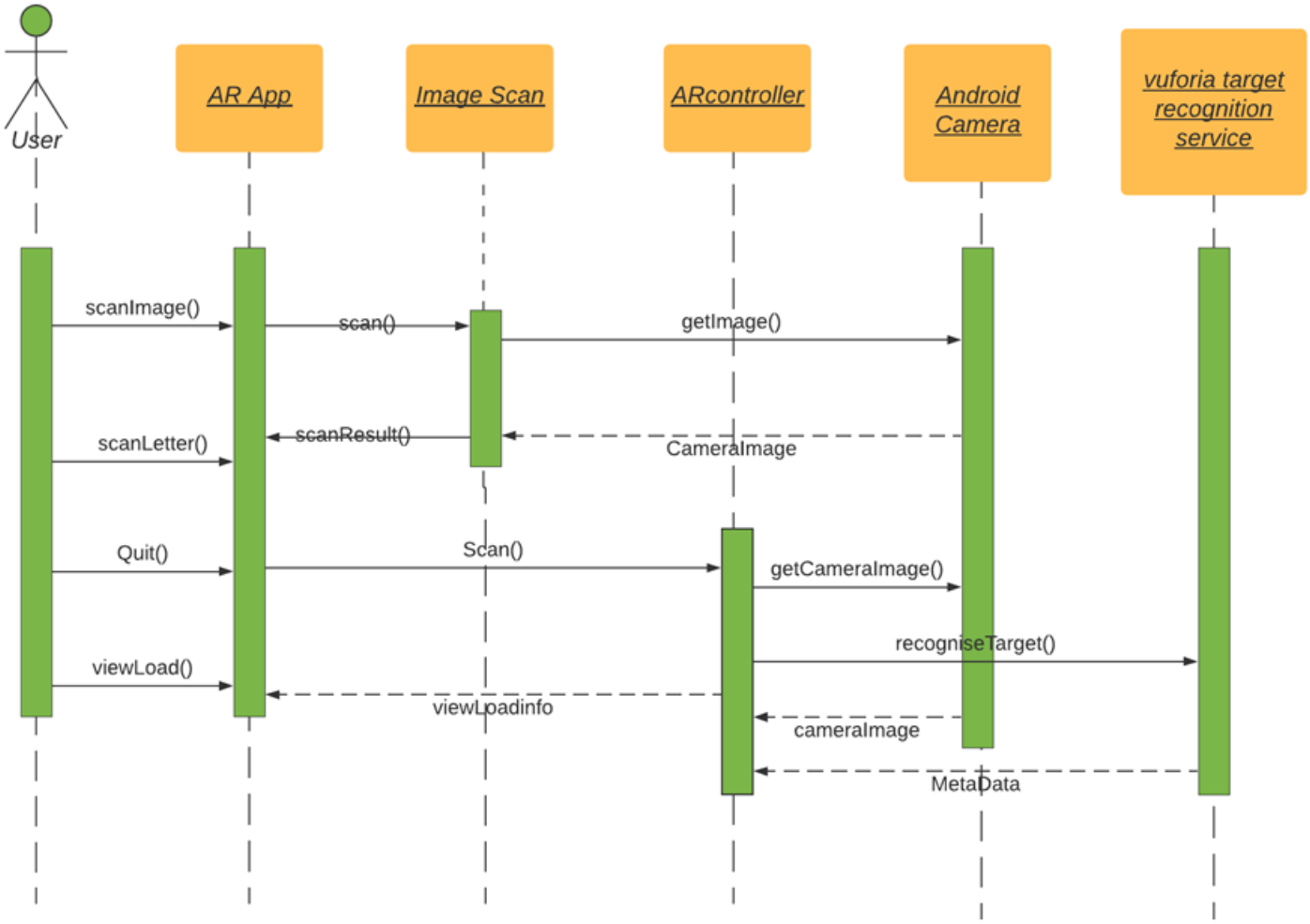


Figure 4.5: Sequence Diagram.

sequence diagram shows component interaction arranged in time sequence. In this system a camera scans an image that data sending to AR Mobile App, Images Scanner, AR Controller, the Android Camera and the Vuforia Target Recognition Service (VTRS) in the flow to match a target that shows information about this components.

Chapter 5

PROJECT PLAN

5.1 RISK MANAGEMENT

Risk management is the process of identifying, assessing and controlling threats to an organization's capital and earnings. These threats, or risks, could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disasters.

5.1.1 Risk Identification

Risk identification is the process of determining which risks may affect the project and documenting their characteristics. The key benefit of this process is documentation of existing risks and the knowledge and skills offered by the project team anticipate risk events.

5.1.2 Risk Analysis

Risk analysis involves examining how project outcomes and objectives might change due to the impact of the risk event. Once the risks are identified, they are analysed to identify the qualitative and quantitative impact of the risk on the project so that appropriate steps can be taken to mitigate them.

5.1.3 Overview of Risk Mitigation,Monitoring,Management

Risk Mitigation is a problem avoidance activity, Risk Monitoring is a project tracking activity,Risk Management includes contingency plans that risk will occur. The goal of the risk mitigation, monitoring and management plan is to identify as many potential risks as possible.

5.2 PROJECT SCHEDULE

5.2.1 Project Task Set

Sr. No.	Name of task	Subtask	Period
1	Feasibility Study	1.1 Problem Definition: • Collecting detailed problem definition of the system to be implemented	15/7/2020 To 26/7/2020
		1.2 Initiation: • Visiting different websites. • Studying existing system with its limitation • Going through Journals, magazines • Studying the reference books	27/7/2020 To 8/8/2020
2	Requirement Analysis and Specification	2.1 Project Plan: • Preparing for complete project plan • Verify and Validate Requirement	9/8/2020 To 24/8/2020
		2.2 Requirement Analysis: • Software requirements • Hardware requirements • Database	25/8/2020 To 10/9/2020
3	Design	3.1 Design: • Describing relationships between modules and sub modules • Decompose project work packages into schedule activities.	11/9/2020 To 28/9/2020
		3.2 UML documentation: • UML Diagram • Data Flow Diagrams	29/9/2020 To 10/10/2020
		3.3 Form Designs: • Showing relationship among different menus and submenus	11/10/2020 To 22/10/2020
4	Coding	• Graphical User Interface • Creating c# classes for the system • Linking those classes for the entire Functioning • Coding Back-End • Connecting Back-End & Front-End	1/1/2021 To 20/3/2021
5	Testing	5.1 Testing for the Performance of system is being carried out	21/3/2021 To 7/4/2021
6	Deployment of system	6.1 System deployment: • Delivery of project • Support • Feedback	8/4/2021 To 14/6/2021
7	Final Document preparation and Submission	7.1 Project submission: • Preparing final project report • Submitting final project report	14/6/2021 To Onwards

Figure 5.1: Project Task Set

5.2.2 Timeline Chart

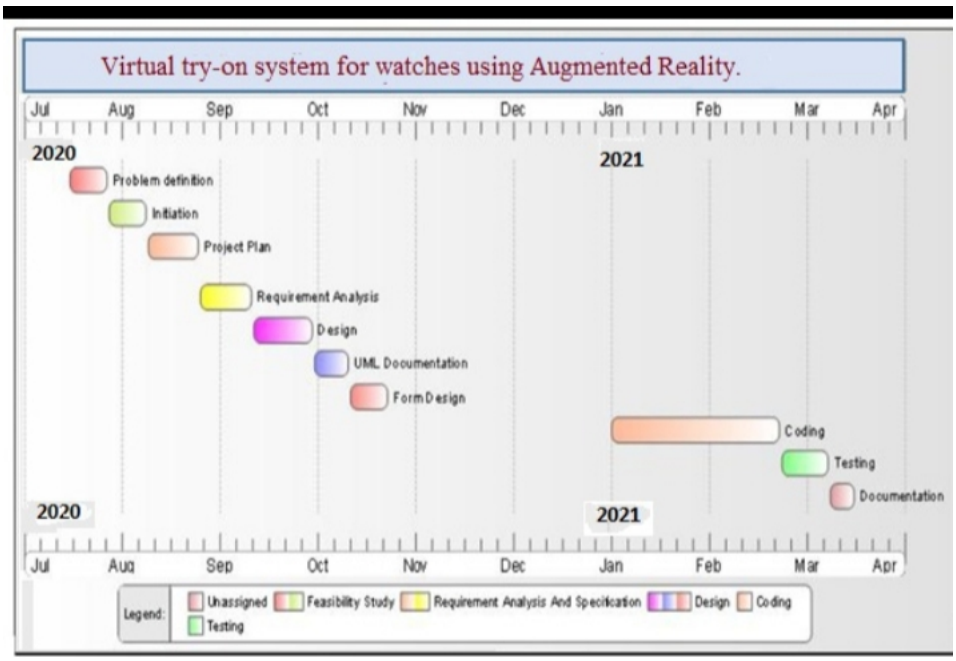


Figure 5.2: Timeline Chart

Chapter 6

PROJECT IMPLEMENTATION

6.1 OVERVIEW OF PROJECT MODULES

Registration Process:-

By taking necessary fields such as email id , username and password one can get register into the system.

Login:-

If the username and password are valid the user can login into the system.

Try On Window:-

Instead of viewing yourself in a real mirror, sophisticated 3D image processing techniques are used to verify the appearance of new watches. A single camera captures the person and outputs the mirrored images onto a large display which replaces the real mirror. Computer graphics models of the watches are augmented into the video such that the person seems to wear the virtual watches.

Virtual try-on applications make it possible for buyers to watch themselves wearing different watches without physically trying on them. Within couple of seconds a virtual Watch appears above the place holder on user phone screen. Now user can examine the watch from a variety of angles, and tapping the one icon on the screen lets you know more about the watch.

Filtering Watches:-

Filter function is used to choose the watch depending on parameters such as price, company of the watch etc.

Add To Cart:-

Add to Cart is a way to create a temporary list of items by adding them to your cart, which will keep track of the items until you leave our website. You can export items in your cart by saving the list to a file

Buy Watch:-

A payment is the voluntary tender of money or its equivalent or of things of value by one party (such as a person or company) to another in exchange for goods, or services provided by them, or to fulfill a legal obligation the use of money, cheque, or debit, credit or bank transfers.

Logout:-

After completion of whole process by clicking on logout button user can logout from the system.

6.2 TOOLS AND TECHNOLOGIES USED

1.Game Engine :

Unity is a cross-platform game engine developed by Unity Technologies, first announced and released in June 2005 at Apple Inc.'s Worldwide Developers Conference as a Mac OS X-exclusive game engine. As of 2018, the engine had been extended to support more than 25 platforms. Texture 3D-Modeling Scripting Animation

2. Blender:

Blender is a free and open-source 3D computer graphics software toolset used for creating animated films, visual effects, art, 3D printed models, motion graphics, interactive 3D applications, virtual reality and computer games. Texture 3D-Modeing Animation.

3. Microsoft Visual Studio:

C (pronounced "see sharp") is a computer programming language. It is developed by Microsoft. It was created to use all capacities of .NET platform.

6.3 ALGORITHM DETAILS

Algorithm Steps:-

1. Authentication

The Vuforia Web Query API allows you to pair a submitted image on your Cloud databases.
All requests to the Web Query API require to be verified. The authentication plan is described in this section.

Authorization: VWS server$_{a}ccess_{k}ey : Signature$

$Signature : Signature = Base64(HMAC - SHA1(server_{s}ecret_{k}ey, StringToSign))); StringToSign = HT$

$Aactualtime - stamp(usingtheHTTPDateheader)isnecessaryforverifiedoffers.$

2. Make a filter to reduce the noise an AR Model.

$itcomestoimage-basedtargets, therearearangeofpartsthatdefineitstrackabilityanditstargetplayernumberu$

$ImageTargetwithparallelaxesforclarification.$

$Imagedisplayingthenaturalfeaturesthattheo V uforiaEngineusestoidentifytheimagetarget.$

$Theaugmentablenumbercanrangefrom0to5foranygivenimage.$

$Thehighertheaugmentablenumberofanimagetarget, thestrongerthedetectionandtrackingabilityitcontains.$

$Aratingofzerointimatesthatatargetisnottrackedatallbytheo ARsystem, whereasastarratingof5showsthatan$

3. working with Camera

$ToAccesstheCameraPictureinUnityUsingV uforia.ImageclassToUsetheCameraProjectionMatrix :$

$x-directionistotherighty-directionisupwardsinthevictimplanez-directionpointsoutofthetarget-plane$

$EffectsofCameraprojection : Anobjectwithcoordinate < 0, 0, 1 > showsupinthe middleoftheviewport(beingonedisplayunitcontinuouslyfromthecameracenter).$

$Ifweputtheobjectto < 0, 0, 2 > thenitwillstillbeinthemiddleoftheviewportathalfthesizeaspreviously.$

$Ifwemovetheobjectto < 1, 0, 1 > thenitmovestotherightoftheviewport focus.Ifwemovetheobjectto < 0, 1, 1 > thenitmovestolowerthantheviewportcenter.$

$trackablepose : -constV uforia :: Matrix34FQCAR :: TrackableResult :: getPose()const;$

4. Augment 3D object in target place

$OpenorcreateaUnityprojectFixedtargetimage, addintoGameObject$

$ThenGameObjectisuploadintoV uforiathatitcreatedadatasetprovideakeythiskeyassigntoprefabs.$

$Prefabsithaving3dmodelthatplaceintargetimage.$

$CreateaC-sharpsscript, callitMyPrefabInstantiator, forinstance, andattachittotheimagetargetobject.$

Chapter 7

SOFTWARE TESTING

7.1 TYPES OF TESTING

Testing is the process of executing a program with the aim of finding errors. To make our software perform well it should be error-free. If testing is done successfully it will remove all the errors from the software.
Principles of Testing:-
1. All the test should meet the customer requirements.
2.To make our software testing should be performed by a third party
3. Exhaustive testing is not possible. As we need the optimal amount of testing based on the risk assessment of the application.
4. All the test to be conducted should be planned before implementing it

7.1.1 Unit Testing

It focuses on the smallest unit of software design. In this, we test an individual unit or group of interrelated units. It is often done by the programmer by using sample input and observing its corresponding outputs.

7.1.2 Integration testing

In which individual software modules are combined and tested as a group.

7.1.3 Black Box testing

It is used for validation.

7.1.4 White Box testing

It is used for verification.

7.1.5 System Testing

System Testing is a type of software testing that is performed on a complete integrated system to evaluate the compliance of the system with the corresponding requirements. In system testing, integration testing passed components are taken as input. ... It has both functional and non-functional testing.

7.1.6 Regression Testing

Every time a new module is added leads to changes in the program. This type of testing makes sure that the whole component works properly even after adding components to the complete program.

7.2 TEST CASES AND TEST RESULT

7.2.1 Test Case 1

Test Case ID	1
Test Case Description	Application Should Start Successfully.
Steps	Open application in android phone.
Test Case Result	Application should be successfully run and open the home window.
Action Result	Application start successfully.
Status	Pass.

7.2.2 Test Case 2

Test Case ID	2
Test Case Description	Detect Camera.
Steps	Allow camera permission.
Test Case Result	Camera should start successfully
Action Result	Camera start successfully.
Status	Pass.

7.2.3 Test Case 3

Test Case ID	3
Test Case Description	Detect the image on your hand.
Steps	1. Capture image through camera.
Test Case Result	Image should get place on users hand.
Action Result	3d Model of watch get place on user hand.
Status	Pass.

7.2.4 Test Case 4

Test Case ID	4
Test Case Description	Image not found error.
Steps	Capture wrong image.
Test Case Result	Application should show the error i.e. Image not Found.
Action Result	Error message Display.
Status	Pass.

7.2.5 Test Case 5

Test Case ID	5
Test Case Description	3D Model Popup.
Steps	1.2D image detection. 2.3D model popup.
Test Case Result	Application should popup the 3D model.
Action Result	Application successfully popup the 3D model.
Status	Pass.

7.2.6 Test Case 6

Test Case ID	6
Test Case Description	Display information in text format.
Steps	Click on Information Button.
Test Case Result	Application should successfully display text information of model.
Action Result	Application successfully displays information in text format.
Status	Pass.

7.2.7 Test Case 7

Test Case ID	7
Test Case Description	Information in audio format.
Steps	Click on Information Button.
Test Case Result	Application should successfully provide audio information of model.
Action Result	Audio Information successfully provided.
Status	Pass.

Chapter 8

ADVANTAGES AND DISADVANTAGES

8.1 ADVANTAGES

1. Increase user knowledge and information.
2. Interaction with the environment.
3. User can see and even feel the shaped surfaced under the his/her fingertips.
4. Ability to share experience with other people in real time over long distances.
5. User interface.

8.2 DISADVANTAGES

1. Tracking and orientation might not be accurate.
2. Might be less accessible for small business.
3. It is very expensive to implemented and develop AR technology based projects and to maintain it.
4. Extreme engagement with AR technology can lead to major healthcare issues such as eye problems and obesity etc.

Chapter 9

RESULTS

9.1 SCREEN SHOTS

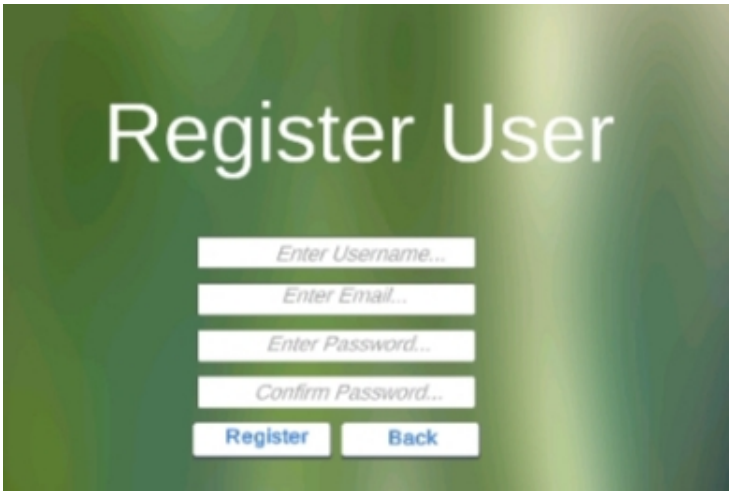


Figure 9.1: Registration Page

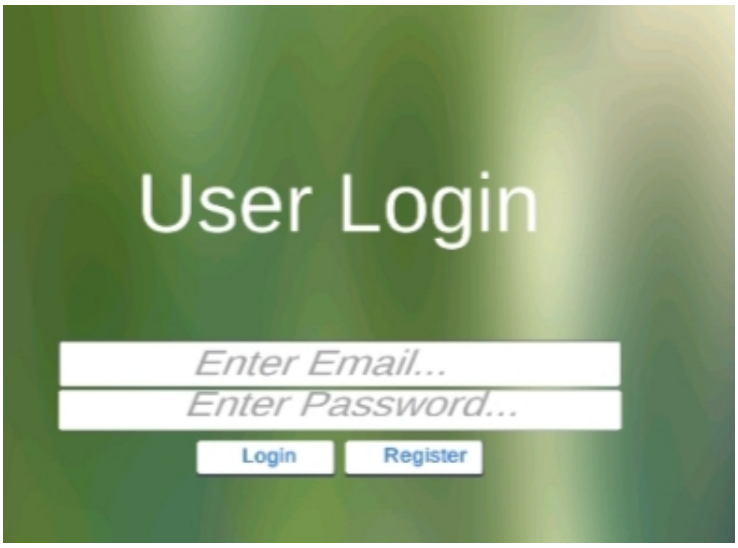


Figure 9.2: Login Page

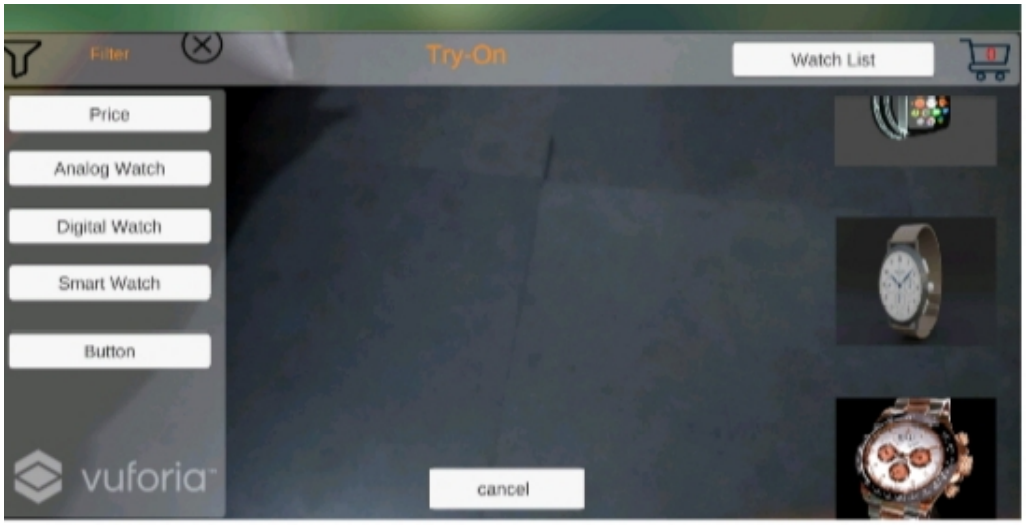


Figure 9.3: List of Watches.

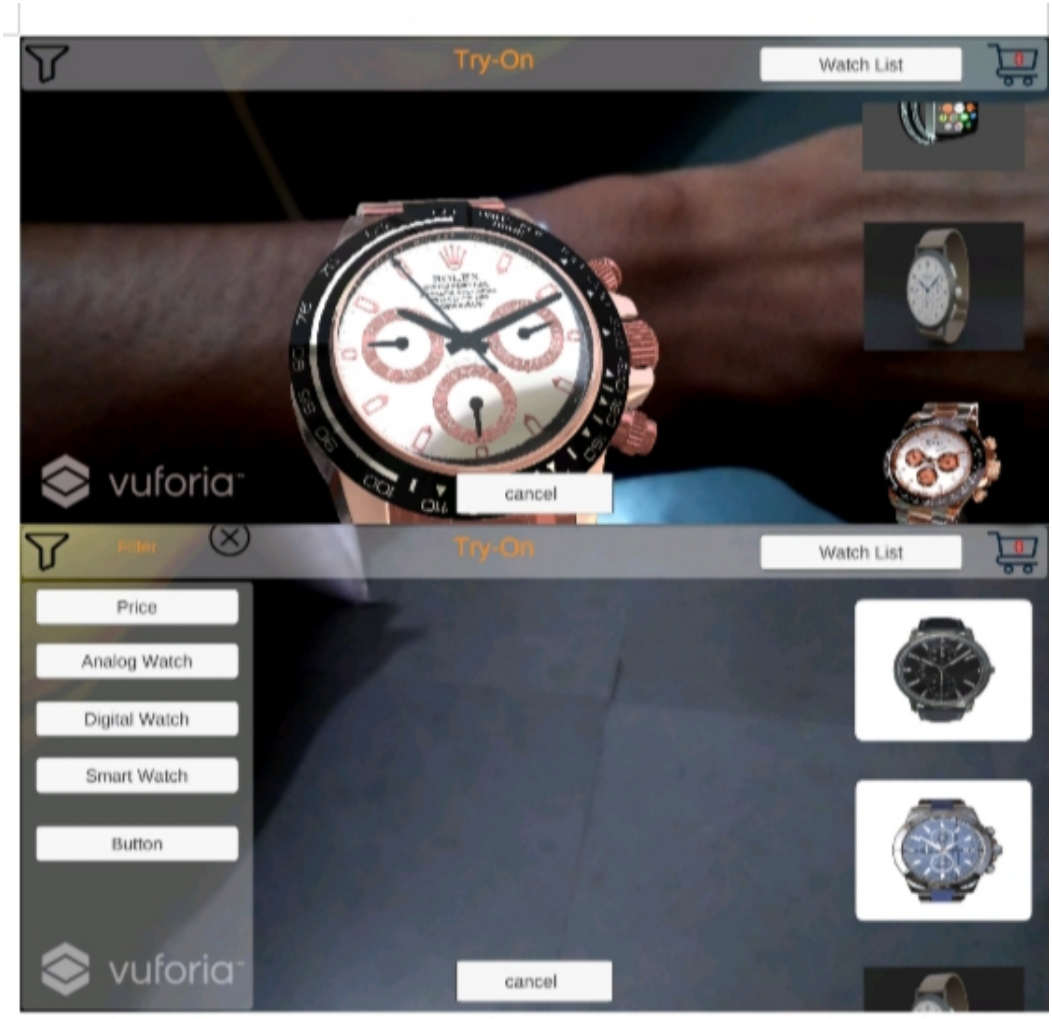


Figure 9.4: Try on Window.

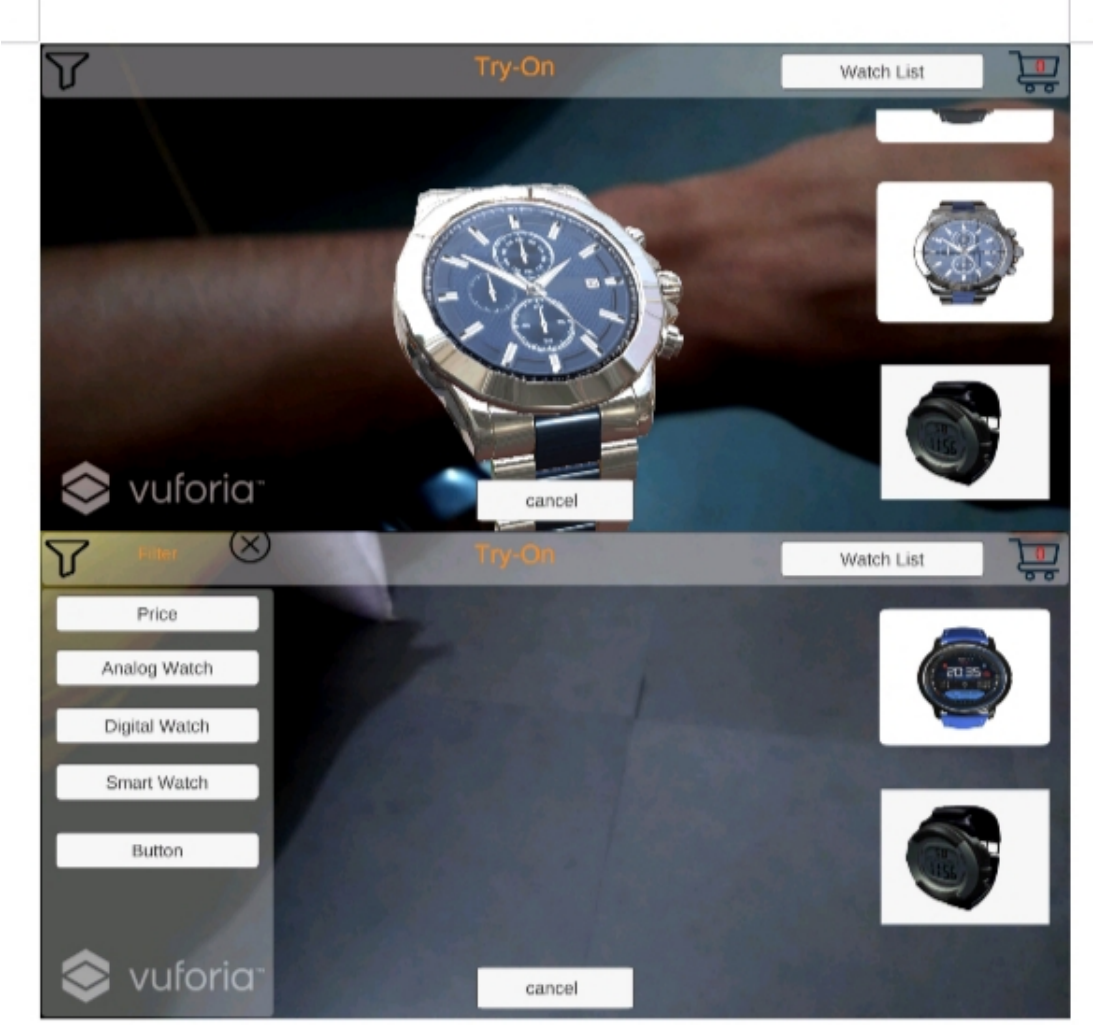
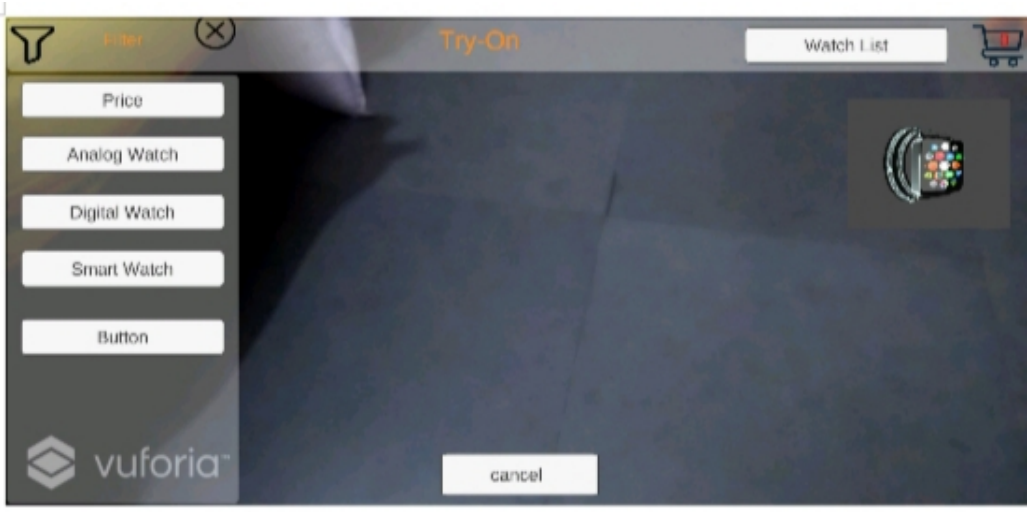


Figure 9.5: Try Watches


Filter
Try-On
Watch List
Price
Analog Watch
Digital Watch
Smart Watch
Button
vuforia
cancel

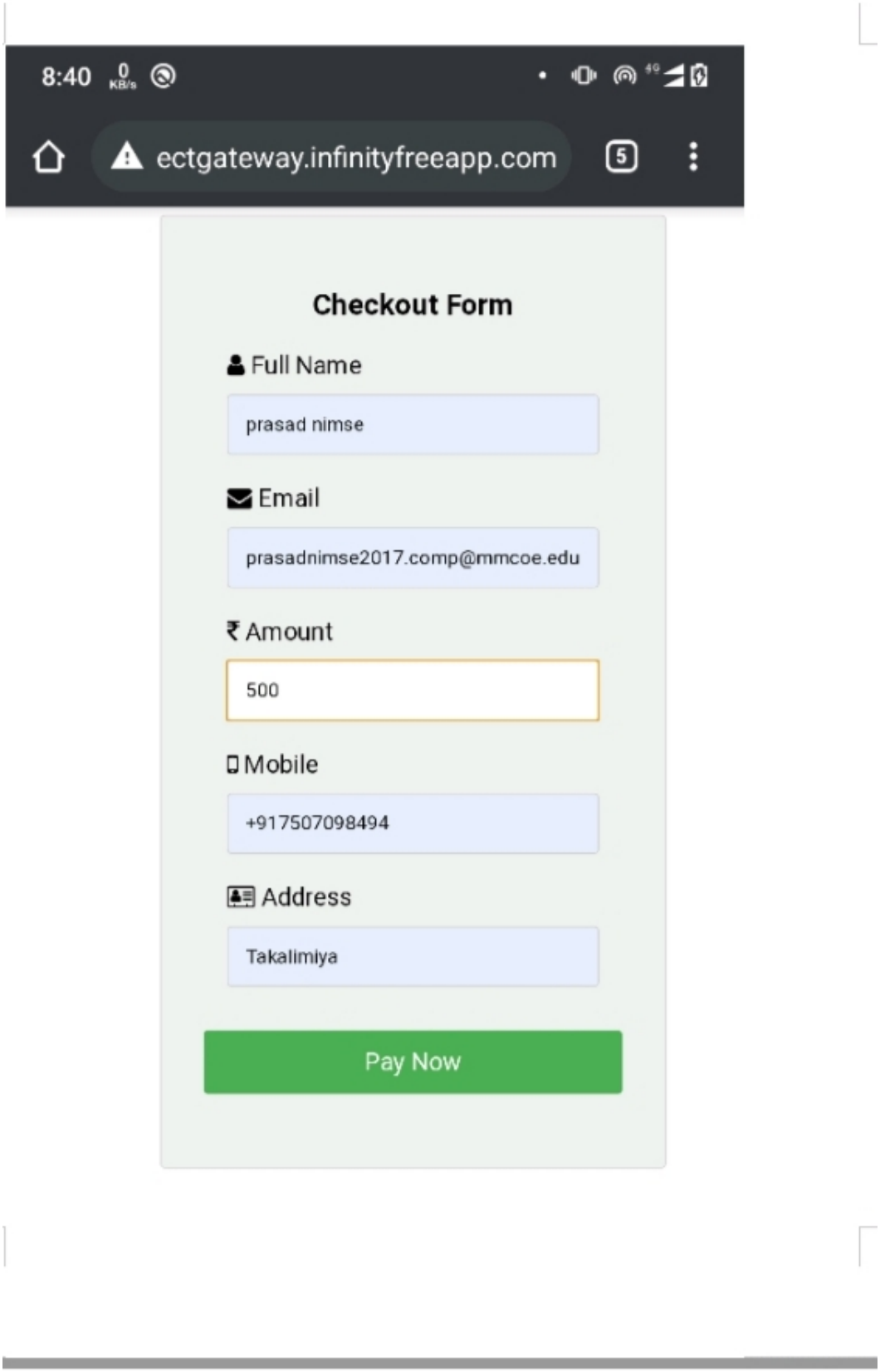


Figure 9.6: Checkout Form.

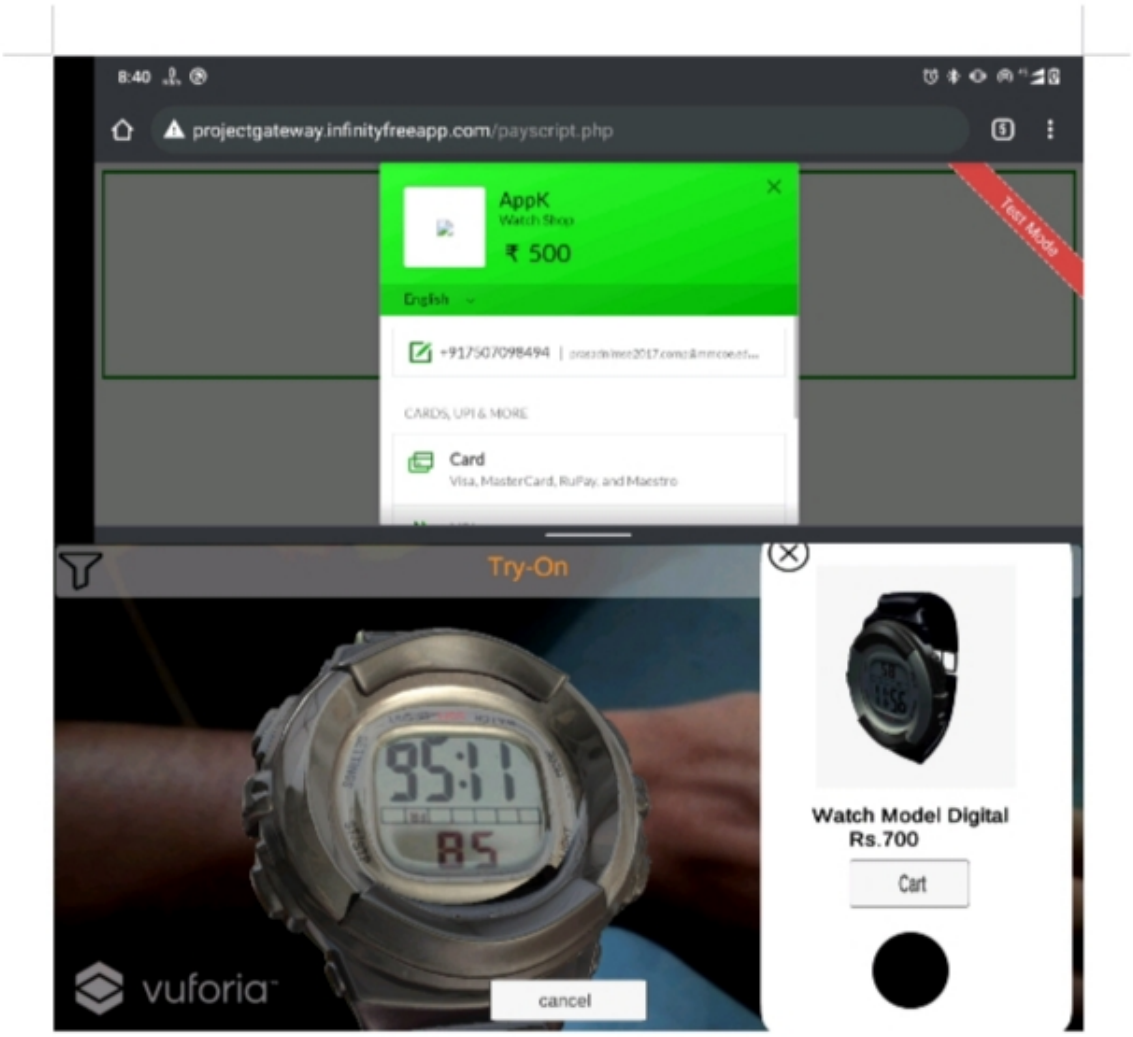


Figure 9.7: Payment Window.

Chapter 10

CONCLUSIONS

10.1 CONCLUSION

Despite of the many recent advances in AR, much work remains to be done. Application developments can be helped by using the available libraries. One of them is AR Tool kit that provides computer vision techniques to calculate a camera's position and orientation relative to marked cards so that virtual 3D objects can be overlaid precisely on the markers. Virtual try-on applications make it possible for buyers to watch themselves wearing different watches without physically trying on them.Within couple of seconds a virtual Watch appears above the placeholder on user phone screen. Now user can examine the watch from a variety of angles, and tapping the one icon on the screen lets you know more about the watch. This feature puts list of AR watches at user's fingertips for purchase. The rapid and ever-increasing growth of online shopping is leaving traditional pattern. AR watch showed a potential where customer interact with or see how it might fit them.

10.2 FUTURE WORK

• Apart from watch we can build that application for multiple accessories which will get displayed into the 3d form.

• Scope of this project can be extended further Like Amazon or another web application .

• The rapid and ever-increasing growth of online shopping is leaving traditional pattern. AR watch showed a potential where customer interact with or see how it might fit them.

10.3 APPLICATIONS

1. The Augmented Reality technology has many possible applications in a wide range of fields, including entertainment, education, medicine, engineering and manufacturing.
2. Another application for augmented reality in the medical domain is in ultrasound imaging,
3. Accessible learning materials: anytime, anywhere. Augmented reality has the potential to replace paper textbooks, physical models, posters, printed manuals. It offers portable and less expensive learning materials. As a result, education becomes more accessible and mobile.
4. No special equipment is required: Unlike VR, augmented reality doesn't require any expensive hardware.
5. Interactive, gamified AR learning can have a significant positive impact on students.
6. Improved collaboration capabilities: Augmented reality apps offer vast opportunities to diversify and shake up boring classes.
7. Interactive lessons, where all students are involved in the learning process at the same time, help improve teamwork skills.

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