Project II

"Enhancing Retail Shopping Through Augmented Reality"

Submitted in partial fulfillment of the requirements for the degree of

Bachelor of Engineering

by

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This is to certify that the project entitled *Enhancing Retail Shopping Through Augmented Reality* is a bonafide work of **Khan Afsha Ajaz Ahmed Ayesha Sultana (13CO06), Chavan Pravin Shrikant Bharati (13CO22), Khan Vajidali Nawabali Momina (13CO44), Sawant Ajinkya Mohan Madhavi (13CO53)** submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **Bachelor of Engineering** in **Department of Computer Engineering**.

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Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

Title :Enhancing Retail Shopping Through Augmented Reality

Shopping in malls are harmoniously considered as the ultimate defender of the retail expansion and customer preference, even in this era of online assault. This paper propose Enhancing Retail Shopping with the existence of augmented reality. The imperative functionality of this project is to provide a facility or a tool to the people from which they can view nearby malls with all available shops in them. Apart from this, indoor navigation is also provided for locating prefered shops inside the malls, coupled with product and shop review to make shopping experience easy for the customer. For speeding up the retrieving process a separate database will also be provided for every mall. The purpose of using augmented reality is to provide real life shopping experience through smart-phone. This project the Augmented reality module to design the software.

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Glossary :

A

Aggregation - a group or mass of distinct or varied things, persons, etc.

Assault - a sudden, violent attack; onslaught.

Augmented - to make larger, enlarge in size, number, strength, or extent, increase.

B

Biped - a two-footed animal.

Boom - to appear to be true, probable, or evident.

D

Database - a comprehensive collection of related data organized for convenient access, generally in a computer.

Data mining - the process of collecting, searching through, and analyzing a largeamount of data in a database,as to discover patterns or relationships.

F

Feasible - capable of being done, effected, or accomplished, probable, likely, suitable.

G

GPS - Global Positioning System : a global system of U.S. navigational satellites developed to provide precise positional and velocity data and global time synchronization for air, sea, and land travel.an electronic system that uses these satellites to determine the position of a vehicle, person,etc.

H

Harmoniously - forming a pleasingly consistent whole; congruous.

I

IBM - International Business Machines Corporation (commonly referred to as IBM) is an American multinational technology company headquartered in Armonk, New York, United States, with operations in over 170 countries.

Imperative - of the nature of or expressing a command; commanding.

Inertial - especially with regard to effort, motion, action, and the like;inactivity; sluggishness.

L

Localize -to make local, fix in, or assign or restrict to, a particular place, locality,etc.

M

MAC - A media access control address (MAC address) of a computer is a unique identifier assigned to network interfaces for communications at the data link layer of a network segment.MAC addresses are used as a network address for most IEEE 802 network technologies, including Ethernet and WiFi.

Marker-based - in a marker-based AR application the images (or the corresponding image descriptors) are provided beforehand. In this case you know exactly what the application should recognize while acquiring camera data. Marker-less - in markerless augmented reality systems any part of the real environment may be used as a target that can be tracked in order to place virtual objects.

Myriad - a very great or indefinitely great number of persons or things.

N

Navigation - the act or process of navigating.

NFC - set of communication protocols that enable two electronic devices.

Novel - a fictitious prose narrative of considerable length and complexity,portraying characters and usually presenting a sequential organization of action and scenes.

R

RFID - radio frequency identification: a technology that uses electronic tagsplaced on objects, people, or animals to relay identifying information toan electronic reader by means of radio waves:a toll road equippedwith an RFID payment system.

Retail - the sale of goods to ultimate consumers, usually in small quantities.

Retrieve - to recover or regain.

S

Seems - to appear to be true, probable, or evident.

Server - a computer that makes services, as access to data files, programs,and peripheral devices, available to workstations on a network.

T

Test bed - an area equipped with instruments, etc, used fortesting machinery, engines, etc, under working conditions.

Tracking - a line of travel or motion, a course or route followed.

V

Virtual - temporarily simulated or extended by computer software.

W

Wifi - Wireless Internet for Frequent Interface : a brand name certifying that a device or other product is compatible with a set of broadband wireless networking standards.

Wps - Wi-Fi Protected Setup : feature found on some NETGEAR wireless routers and how you can use it to connect devices to your wireless network.

Chapter 1

Project Overview

1.1   Introduction

Shopping is something that most of us like to do, let it be something as small as purchasing an earplug to purchasing LCD. Recent researches show that modern people spend up to 23 per-cent[1] of their life time in buying different products by reading magazines, advertisement on TV, checking on social site or during chatting.Smart-phones and tablets are rapidly becoming key tools for browsing and purchasing items because we can pick a product by sitting at home and it provides numerous options making it feasible to a great extent. But in this era of e-commerce aggregation the malls are losing their customer and are suffering lot of impact on their business. So the need of the decade is improvement in their business strategy and this can be done by using latest technology such as augmented reality.

Augmented Reality is a technology which merges factual scene view by user with virtual scene generated by computer. It can help for enhancement in real world in real time[2]
Augmented reality = factual scene + virtual scene

Figure 1.1: Augmented Reality

The goals of augmented reality are to enhance the persons visualization to relate products screen appearance with the real world. Create a system such that a user can not tell the difference between the real world and virtual augmentation of it.The augmented reality can be implemented by using two ways , either by marker-base AR or marker-less AR. In the case of marker-base AR application the images are provided beforehand.So application will know exactly what the application should recognize while acquiring camera data . On the other hand marker-less AR application recognize images that were not provided to the application beforehand.

For Indoor Navigation NFC tag are used. Near-field communication (NFC) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within 4 cm (1.6 in) of each other.NFC devices are used in contactless payment systems, similar to those used in credit cards and electronic ticket smartcards and allow mobile payment to replace/supplement these systems. NFC is used for social networking, for sharing contacts, photos, videos or files. NFC-enabled devices can act as electronic identity documents and keycards. NFC offers a low-speed connection with simple setup that can be used to bootstrap more capable wireless connections.

1.1.1 Background Introduction

In this project the major modules are

1. Web

2. android

In the web app we are allowing the vendor to enter the details of the shop that the vendor is owning. There also is an Admin who is responsible to add vendors and another admin to the system.

The admin can:

1. Add another admin

2. Add vendors to the mall

3. Verify the shops

4. Make a new mall entry

The Vendor can

1. Add the shops.

2. The types of shops that he owns

3. The rates of the items in his shop.

4. The discount rates that can be offered.

Once the vendor wants to make an account into the system he had to sign up into the system. Once the email id is provided for signup a mail will be sent to a legitimate id and further verification steps wil be guided accordingly.

In android apllication Registration and Login, Outdoor Navigation, Indoor Navigation, Scanning the text and providing all the vital details of the product through Augmented Reality, Providing realtime user reviews on the same android application through web scrapping this android application- Intelligent Shopping was thought to be developed to provide the user an all in one app that would featurise every required aspect in shopping.

1.1.2 Motivation

1. People are spending lot of money on online shopping for buying different products only sitting at home. modern people spend up to 23 per cent of their life time in buying different products by reading magazines, advertisement on TV, checking on social site or during chatting .

2. But in this era of e-commerce aggregation the malls are losing their customer and are suffering lot of impact on their business. So the need of the decade is improvement in their business strategy.

3. So by using an Augmented Reality Technology and NFC based Navigation this system try to achive improve in retail shopping buisness .

1.2 Problem Definition

People are constantly in the fight to save their time. Taking this into consideration This paper came up with an idea of using the latest augmented reality technique to make a virtual shopping mall so that on a lazy Sunday the mall is just available to them at their fingertips. In this busy world leaves are the day which allow people to utilize their time at home but leaves are also the days when shopping for the house also is necessary our app will help them do this with great ease . For that outdoor navigation and indoor navigation is proposed by using the augmented reality technique. And in addition to that customer review is fetched .Enhancing the use of augmented reality for the sake of saving the expensive time of biped .

1.3 Current Systems

1. IntelligShop:Enabling Intelligent Shopping In Malls Through Location Based Augmented Reality

2. Bringing Online Shopping Experience To Offline Retail Through Augmented Reality And RFID

3. Comparison Of consumer Purchase Intention Between Interactive And Augmented Reality Shopping Platforms Through Statistical Analysis

4. Location-based Mobile Augmented Reality Applications

5. Indoor Localization And Navigation Using Smartphones Augmented Reality And Inertial Tracking

1.4 The Problems with Current System

So far dealing with the relevant literatures based on this subject it has been found that there are gaps in the developed applications whether tested or under test, such as facility of only indoor navigation, facility of only outdoor navigation,facility of only viewing stuffs through AR technology and majorly not supporting online shopping and user reviews.

1.5 Goals and Objectives

1. To enhance retail shopping experiemce and improve there buisness.

2. Improve customer experience regarding retail shopping.

3. To bring the rare and latest technologies handy for the end users on a large scale.

4. To provide an all in one application for the people interested in shopping with all the unique and necessary feaures at their fingertips.

1.6 Scope and Applications

1.6.1 Scope

1. It can be enhanced more for other operating systems as well such as iOS and Mac.

2. It can be made more featuristic on the client side in the AR module.

3. It can be made popular among the masses within near future.

4. It can make the masses educated about new technologies such as use of Augmented Reality and NFC tags on a daily basis as everyone today uses smartphone on daily bais.

1.6.2 Application

1. This application can be used by almost all the vendors who are connected to different shopkeepers.

2. The shopowners/shopkeeprs can systematically decide and confirm which vendor to allow for what product in which shop of theirs.

3. The application can be used by all the android mobile customers who have a megre knowledge of how to login , how to use google maps and then the later modules are boon for users curiosity to explore.

4. It can be used by any mall and any shop owners inside the mall very easily.

5. It would help the users of any genre to finely decide that which product he should buy from which shop on the basis of malls he look for.

Chapter 2

Review Of Literature

2.1 IntelligShop:Enabling Intelligent Shopping In Malls Through Location Based Augmented Reality

2.1.1 Description

IntelligShop is the first indoor location-based augmented reality application that integrates heterogeneous-device wireless localization and automatic online content crawling for intelligent shopping. Technically, Intelligshop is a successful data mining application, upon novely addressing two challenging data mining problems on cold start: 1) supporting heterogeneous smartphones in wireless localization, 2) collecting retailer content for augmented reality.

2.1.2 Pros

Intelligshop a novel location based augmented reality application that support intelligent shopping experience in malls. People can simply use ubiquitous smartphones to face mall retailers,the retailer will be recognized automatically by the Intelligshop and it will fetch their online reviews from various sources to display on the phones.The demonstration of this system effectiveness has been done via a test bed established in a real mall of Singapore.[1]

2.1.3 Cons

One of the disadvantage of this paper is that is does not support the mall navigation , so user need to search for any of the shop. Also there is no feature of shop or product review [1]

2.1.4 How we overcome Those problem in Project

In our application we have beautifully accomplished the task of navigating indoors through NFC tags which store some data in then and guide the user regarding his interest of shop inside the mall. To provide the user a very handy analysis of any product he is interested in, we have added on the feature of Product Review in our app which would give the user a complete AR based interface displaying the product and all the user reviews from mysmartprice and he would also get know which product is available in which particular shop of the mall on his search.

2.2 Bringing Online Shopping Experience To Offline Retail Through Augmented Reality And RFID

2.2.1 Description

The objective of the project presented in this paper has been to develop and test one use case,namely browsing objects placed on a shelf in a retail store, obtaining the same comprehensive and thorough information about them one would expect from browsing about the same products in an online store., but with actually touching them or otherwise physically interacting with them. This usecase is one particular case of the more general concept of cricking which seeks to provide a user experience similar to that of clicking on a screen, but on the bricks and more mortar physical space.

2.2.2 Pros

It presents Augmented Reality(AR) interfaces developed for handheld devices to bridge the gap between offline and online retail . By preliminary evaluation it is shown or proved that the use is able to interact with the product in his/her physical space with having access to online shopping features a the same time. System is tested and validated with a number of products at Radio Frequency(RFID) based smart shelf .[2]

2.2.3 Cons

The disadvantage of this paper is that it uses RFID which in turn increases the cost. Also this application does not contain any such feature of navigation or any sort of review facility.[2]

2.2.4 How we overcome Those problem in Project

In our application we have replaced the concept of RFID with NFC tags which are more economic as well as a very latest technology for storing and detecting the preserved data in it. Our application is not bounded to one particular shelf or a particular indoor infrastucture. It is compatible for any indoor infrastructure and for any product.

2.3 Comparison Of consumer Purchase Intention Between Interactive And Augmented Reality Shopping Platforms Through Statistical Analysis

2.3.1 Description

ince brand experiences rely on consumer reactions to stimuli to generate specific sensations, feelings, cognitions, and behavioral responses, the present research aims to investigate and obtain understanding from those elements empirically. Pertinent constructs to be explored in the study for the purpose of assessment of an experimental event are participants personal emotions, opinions about a systemÃ TM s interface and features, as well as attitudes towards the brand and purchase intentions.The purpose of this study is to statistically evaluate a set of criteria for measuring the effectiveness of Markerless AR shopping platform and to compare it with to more conventional systems (Marker-based AR and Plain Interactive one). In terms of technological properties, effectiveness is seen as the extent to which the user can accept to benefit from the tasks accomplishes, however the focus here is also on exploring the cognitive constructs that determine the evaluation of an overall experience with a system. In other words the study aims at providing a understanding on whether Markerless AR system can operate as a tool for enriching consumer experiences for effectively in comparison to the use of simpler platforms, such as Plain Interactive and a Marker-based AR system.

2.3.2 Pros

It is a study to explore the effectiveness of three digital shopping platforms on the impressions and purchase intentions of consumers .The results shows that the Markerless AR system clearly out performs the Marker-based AR and the Plain Interactive in terms of positive attitude from the users .The Marker-based AR is the second best performing system, which closely follows the Markerless AR, while the Plain Interactive system obtains least approval.[3]

2.3.3 Cons

This was just a study based on computerized survey . There was nothing as such implementation. [3]

2.3.4 How we overcome Those problem in Project

Based on the results found in this paper we implemented our project including Markerbase AR as Markerless AR is more complicated and time consuming to bring to success.

2.4 Location-based Mobile Augmented Reality Applications

2.4.1 Description

The overall of this work is to show how to develop the core of a location-based mobile augmented reality engine for the mobile operating system iOS 5.1(or higher) and Android 4.0(or higher). The overall goal is to draw POIs on the camera view of the smart mobile device. The development of a mobile augmented reality engine constitutes a non-trivial task.The purpose of this paper is to give insights into the development of the core framework of an augmented reality engine for smart mobile device.The paper presents a sophisticated application architecture, which allows integrated augmented reality with a wide range of applications. However, this architecture must not neglect the characteristics of the AREA (Augmented Reality Engine Application).

2.4.2 Pros

The presented paper is about development of a generic mobile application which enables location based mobile augmented reality for realizing advanced mobile applications. The core challenges emerging from this context is discussed along with the lessons learned while implementing it in real world applications.[4]

2.4.3 Cons

The developed mobile application does not support any sort of indoor navigation or review features.[4]

2.4.4 How we overcome Those problem in Project

We have enhanced our application not only in terms of beautiful outdoor navigation through GPS but also in terms of accurate indoor navigation through NFC tags. The application is highly featured regarding Product Reviews through scrapping the mysmartprice website giving accurate and real-time user reviews og nay searched product.

2.5 Indoor Localization And Navigation Using Smartphones Augmented Reality And Inertial Tracking

2.5.1 Description

In this paper an evaluation is done regarding indoor-image based positioning system that takes advantage of smartphones augmented reality(AR) and inertial tracking. This paper shows some of the AR capabilities combined with inertial tracking for localization and navigation. This paper presents a new augmented reality system method for indoor localization and navigation, thus allowing users to be aware of their locations and making it easier to find places with reasonable accuracy. The use of image recognition indoors enables the system to run on any campus, provided the database for recognizing markers, obtaining the location and displaying the information in AR exists. Also, results show that inertial navigation provides a suitable approach to track the user location indoors.

2.5.2 Pros

Evaluation of an indoor image based positioning system that takes advantage of smart phones augmented reality (AR) and inertial tracking.[5]

2.5.3 Cons

The developed system is completely concerned with indoor aspects. It dose not support any feature for outdoor guidance to the user. Also this system is basically good only for any sort of campus inside a building.[5]

2.5.4 How we overcome Those problem in Project

We have come up with an application wherein the user could enjoy a very visceral and accurate outdoor navigation providing him with complete location details of any searched mall and any product inside the mall with regard to his choice of brand in that particular mall like whether a particular product he searched for is available in the concerened mall and particular shop or not and if available then at what price and discounts if any.

2.6 Technological Review

2.6.1 Java

Java is a general-purpose computer programming language that is concurrent, class-based, object-oriented, and specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation. Java applications are typically compiled to bytecode that can run on any Java virtual machine (JVM) regardless of computer architecture. As of 2016, Java is one of the most popular programming languages in use, particularly for client-server web applications, with a reported 9 million developers. Java was originally developed by James Gosling at Sun Microsystems (which has since been acquired by Oracle Corporation) and released in 1995 as a core component of Sun Microsystems' Java platform. The language derives much of its syntax from C and C++, but it has fewer low-level facilities than either of them.

2.6.2 JavaScript

JavaScript often abbreviated as "JS", is a high-level, dynamic, untyped, and interpreted run-time language. It has been standardized in the ECMAScript language specification. Alongside HTML and CSS, JavaScript is one of the three core technologies of World Wide Web content production; the majority of websites employ it, and all modern Web browsers support it without the need for plug-ins. JavaScript is prototype-based with first-class functions, making it a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles. It has an API for working with text, arrays, dates and regular expressions, but does not include any I/O, such as networking, storage, or graphics facilities, relying for these upon the host environment in which it is embedded.

2.6.3 HTML

Hypertext Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS) and JavaScript it forms a triad of cornerstone technologies for the World Wide Web. Web browsers receive HTML documents from a webserver or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects, such as interactive forms, may be embedded into the rendered page. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags, written using angle brackets. Tags such as <img /> and <input /> introduce content into the page directly. Others such as <p>...</p> surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags, but use them to interpret the content of the page.

2.6.4 CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language. Although most often used to set the visual style of web pages and user interfaces written in HTML and XHTML, the language can be applied to any XML document, including plain XML, SVG and XUL, and is applicable to rendering in speech, or on other media. Along with HTML and JavaScript, CSS is a cornerstone technology used by most websites to create visually engaging webpages, user interfaces for web applications, and user interfaces for many mobile applications.

CSS is designed primarily to enable the separation of document content from document presentation, including aspects such as the layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple HTML pages to share formatting by specifying the relevant CSS in a separate .css file, and reduce complexity and repetition in the structural content.

2.6.5 Json

In computing, JavaScript Object Notation or JSON is an open-standard format that uses human-readable text to transmit data objects consisting of attributeâ"value pairs. It is a very common data format used for asynchronous browser/server communication, including as a replacement for XML in some AJAX-style systems.

JSON is a language-independent data format. It was derived from JavaScript, but as of 2017 many programming languages include code to generate and parse JSON-format data. The official Internet media type for JSON is application/json. JSON filenames use the extension .json.

2.6.6 XML

In computing, Extensible Markup Language (XML) is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The W3C's XML 1.0 Specification and several other related specifications all of them free open standardsâ"define XML.

The design goals of XML emphasize simplicity, generality, and usability across the Internet. It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures such as those used in web services.

2.6.7 PHP

PHP is a server-side scripting language designed primarily for web development but also used as a general-purpose programming language. Originally created by Rasmus Lerdorf in 1994, the PHP reference implementation is now produced by The PHP Development Team. PHP originally stood for Personal Home Page, but it now stands for the recursive acronym PHP: Hypertext Preprocessor.

PHP code may be embedded into HTML or HTML5 markup, or it can be used in combination with various web template systems, web content management systems and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server software combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page. PHP code may also be executed with a command-line interface (CLI) and can be used to implement standalone graphical applications

2.6.8 Mysql

MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius' daughter, and "SQL", the abbreviation for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation. For proprietary use, several paid editions are available, and offer additional functionality.

2.6.9 Android Studio

Android Studio is the official[5] integrated development environment (IDE) for the Android platform. It was announced on May 16, 2013 at the Google I/O conference. Android Studio was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014. The first stable build was released in December 2014, starting from version 1.0.

Based on JetBrains' IntelliJ IDEA software, Android Studio is designed specifically for Android development. It is available for download on Windows, macOS and Linux,and replaced Eclipse Android Development Tools (ADT) as Google's primary IDE for native Android application development. .

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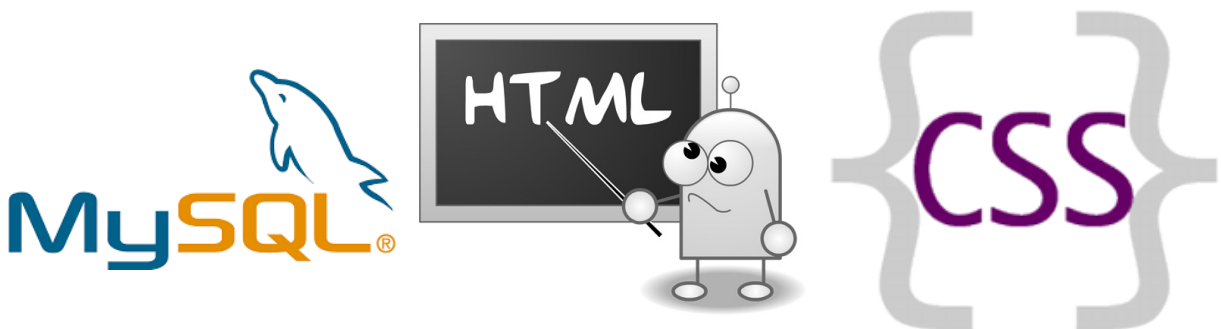
Chapter 3

Requirement Analysis

3.1   Platform Requirement :

3.1.1   Supportive Operating Systems :

The supported Operating Systems for client include:

1. Windows

2. Linux

Windows and Linux are two of the operating systems that will support comparative applications. Windows is a metafamily of graphical operating systems developed consists of several families of operating systems. The project is developed on Windows but also compatible with Linux too.

3.2   Software Requirement :

The Software Requirements in this project include:

3.2.1   Software Requirements For Implementation

1. Android Opearating system version 4.4.4 or newer

3.2.2 Software Requirements For Deployment

1. Android Studio IDE for developing android application

2. Artoolkit SDK

3. Vuforia SDK

4. Wikitude SDK

5. Java Development Kit version 8 or above

6. Windows OS/Linux Os

3.3 Hardware Requirement :

3.3.1 Hardware Requirements For Implementation

1. Device with NFC hardware support

2. Device with GPS support

3. Device with Magnetic Field sensor support

4. Device with Accelerometer Sensor support

5. Device Camera with object recognition support

6. NFC tags/device

3.3.2 Hardware Requirements For Deployment

1. Computer with minimum 4 gb system memory

2. Minimum 1.5 GB disk space for Android studio

3. 1 Gb disk space for above mentioned SDK

3.4 Feasibility Study

With respect to time, gives quick response and does not lag. It doesnt require any implementation cost, only for the purpose of sticking QR code required money and it doesnt cost much.

Chapter 4

System Design and Architecture

4.1   System Architecture

A system architecture is a conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

Following fig.4.1 shows System Architecture Enhancement in retail shopping experience through augmented reality which is based on client-server model.
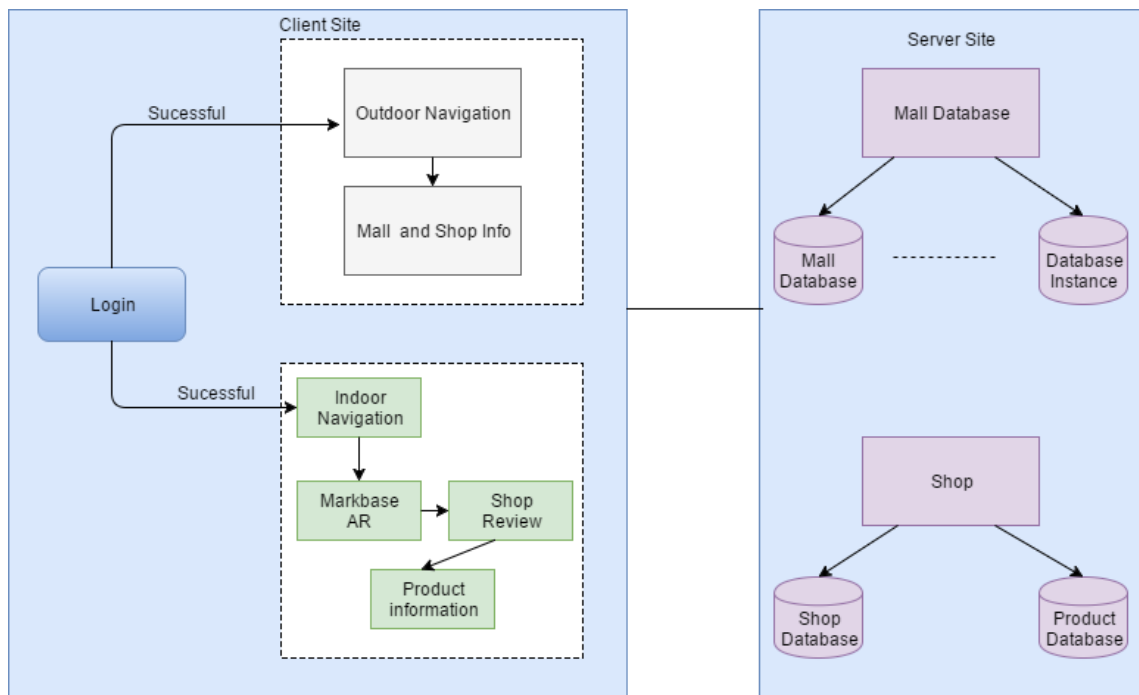
Figure 4.1: System Architecture

4.2 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well.

4.2.1 Use Cases for Enhancing Retail Shopping Through Augmented Reality For Outdoor Navigation.

Following figure 4.2 shows Use Case diagram for Outdoor Navigation for Enhancement in retail shopping experience through augmented reality.It represents user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved in outdoor part of system
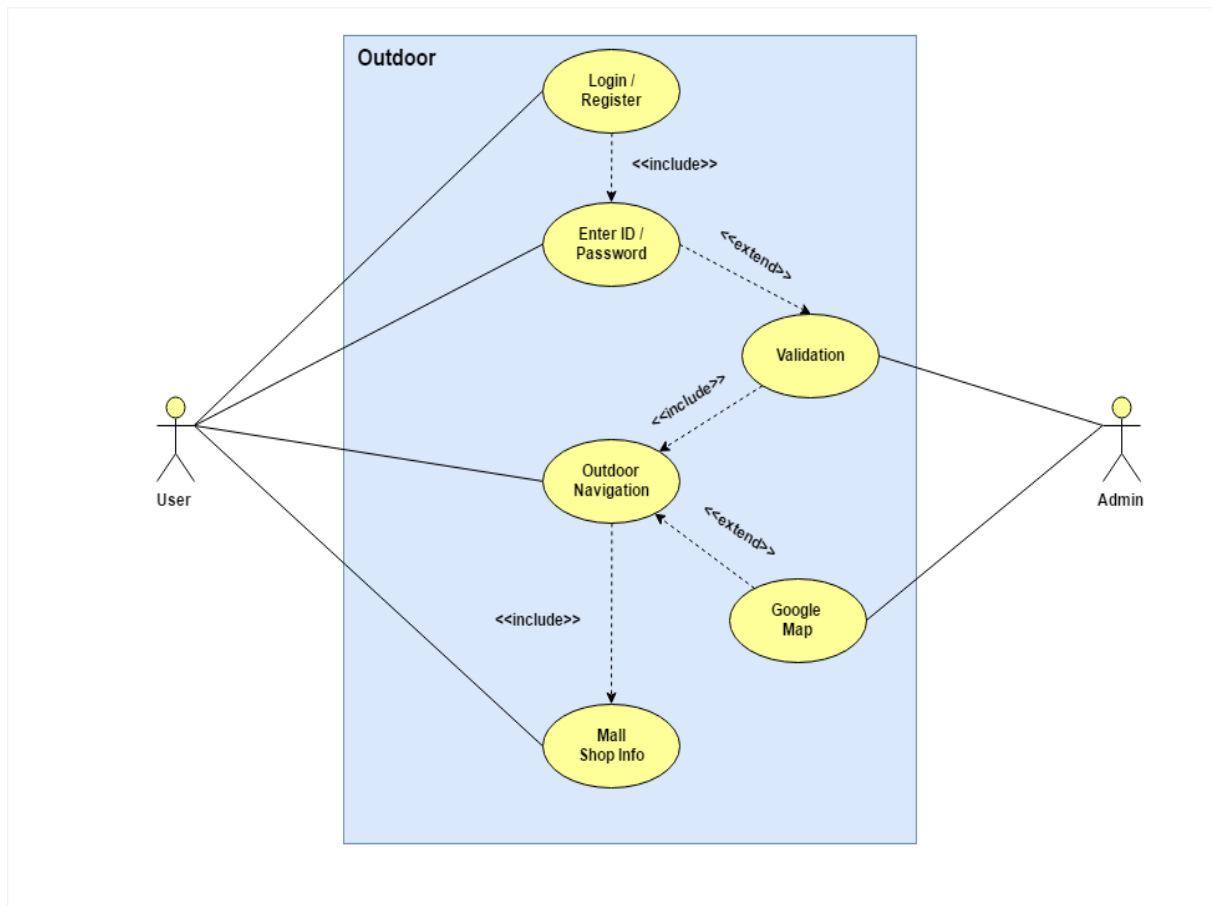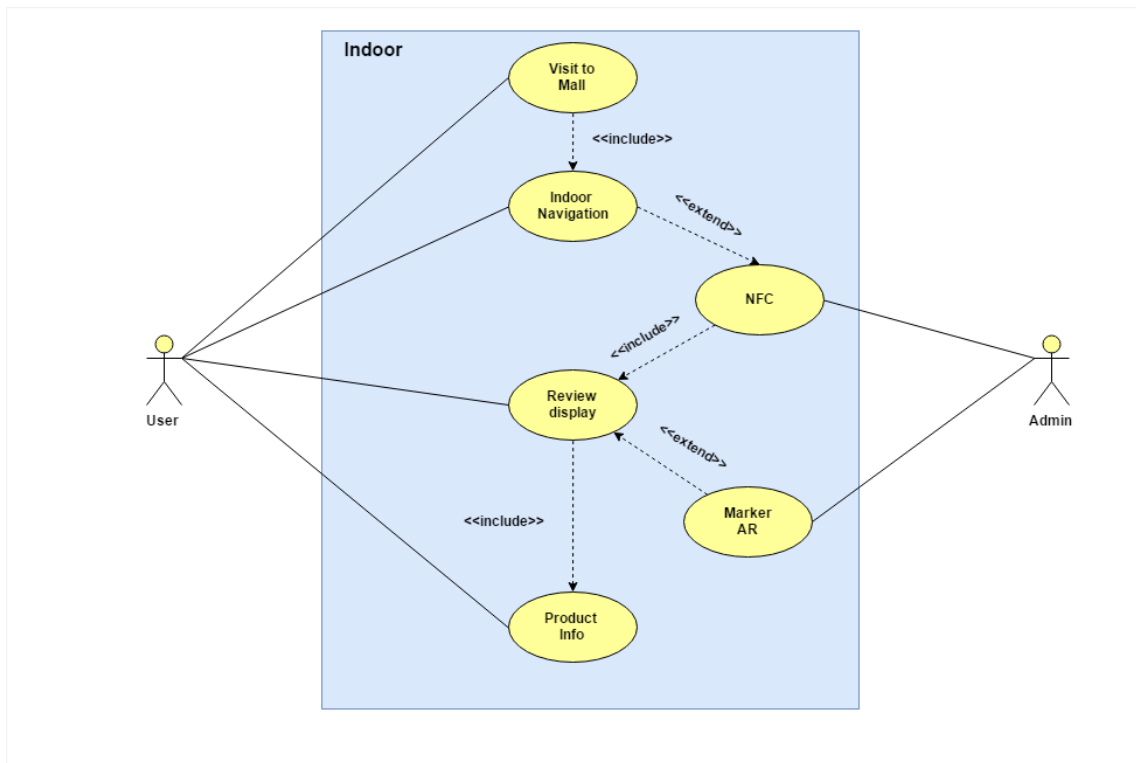

Figure 4.2: Use Case diagram For Indoor Navigation For Enhancing Retail Shopping Through Augmented Reality

4.2.2 Use Cases for Enhancing Retail Shopping Through Augmented Reality For Indoor Navigation.

Following figure 4.3 shows Use Case diagram for Indoor Navigation for Enhancement in retail shopping experience through augmented reality.It represents user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved in Indoor part of system

Figure 4.3: Use Case diagram For Indoor Navigation For Enhancing Retail Shopping Through Augmented Reality

4.3 Class Diagram

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.The class diagram is the main building block of object-oriented modelling. It is used both for general conceptual modelling of the systematics of the application, and for detailed modelling translating the models into programming code. Class diagrams can also be used for data modeling.

Following figure 4.4 shows Class diagram for Enhancement in retail shopping experience through augmented reality that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects..
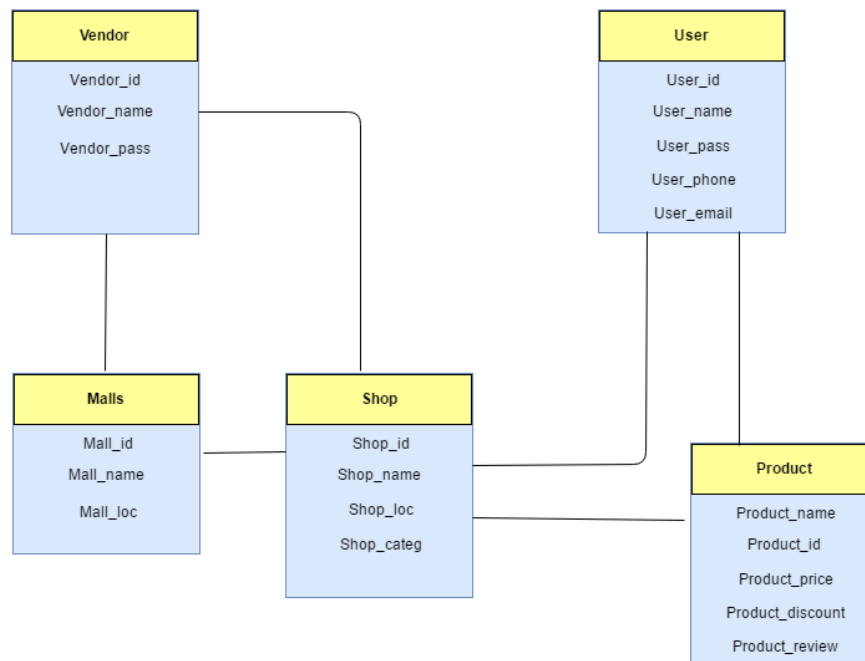
Figure 4.4: Class diagram For Enhancing Retail Shopping Through Augmented Reality

4.4 Data Flow Diagrams

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing.

4.4.1 Level 0 Data Flow Diagram For Enhancing Retail Shopping Through Augmented Reality

Following figure 4.5 shows Level 0 Data Flow diagram for Enhancement in retail shopping experience through augmented reality.
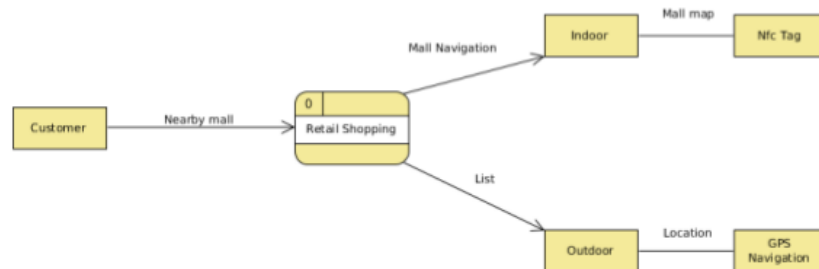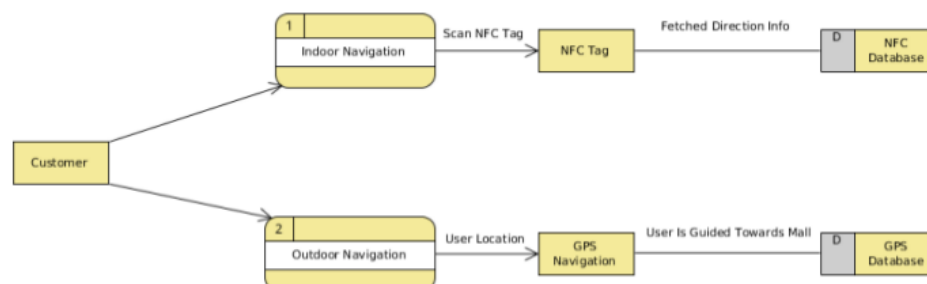
Figure 4.5: Level 0 Data Flow Diagram

4.4.2 Level 1 Data Flow Diagram For Enhancing Retail Shopping Through Augmented Reality

Following figure 4.6 shows Level 1 Data Flow diagram for Enhancement in retail shopping experience through augmented reality.
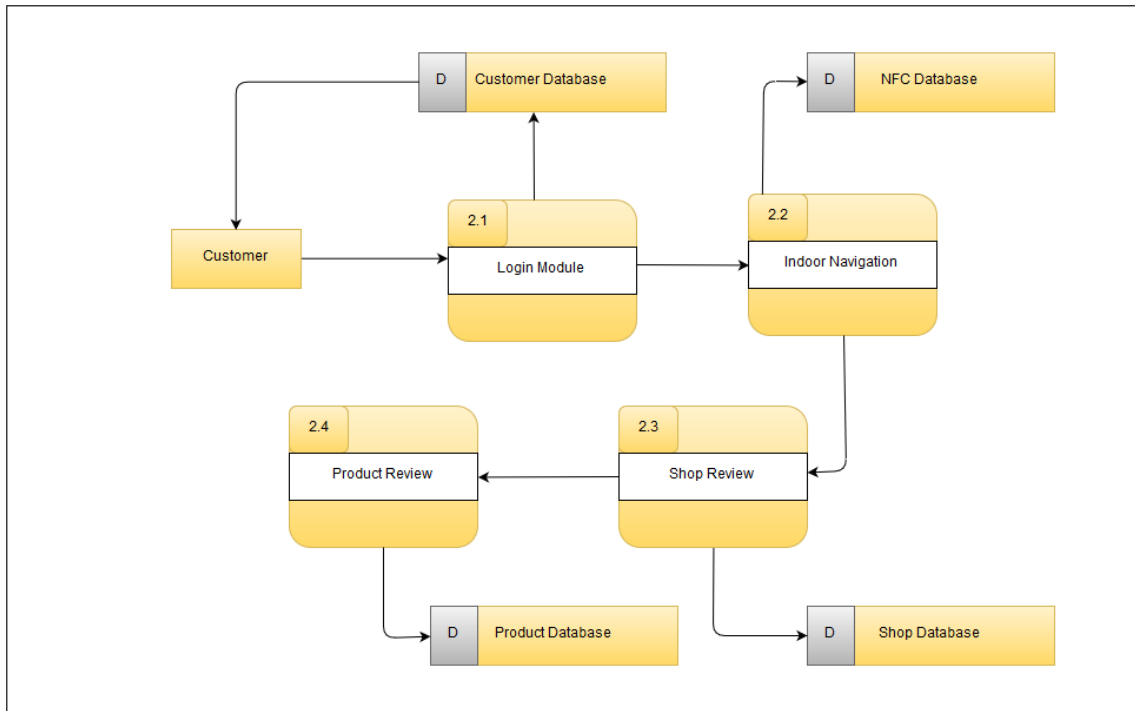
Figure 4.6: Level 1 Data Flow Diagram

4.4.3 Level 2.1 Data Flow Diagram For Enhancing Retail Shopping Through Augmented Reality

Following figure 4.7 shows Level 2.1 Data Flow diagram for Enhancement in retail shopping experience through augmented reality.
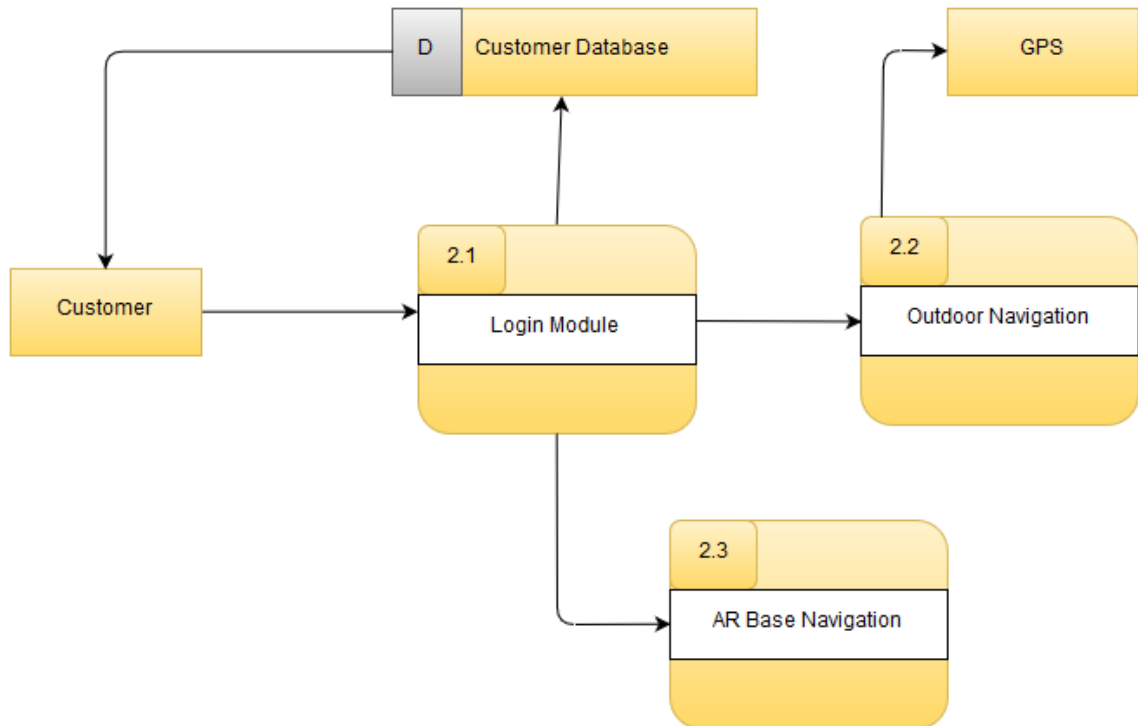

Figure 4.7: Level 2.1 Data Flow Diagram

4.4.4 Level 2.2 Data Flow Diagram For Enhancing Retail Shopping Through Augmented Reality

Following figure 4.8 shows Level 2.2 Data Flow diagram for Enhancement in retail shopping experience through augmented reality.

Figure 4.8: Level 2.2 Data Flow Diagram

4.5 Component Diagram

In the Unified Modeling Language, a component diagram depicts how components are wired together to form larger components or software systems. They are used to illustrate the structure of arbitrarily complex systems.

Following figure 4.9 shows component diagram for Enhancement in retail shopping experience through augmented reality.
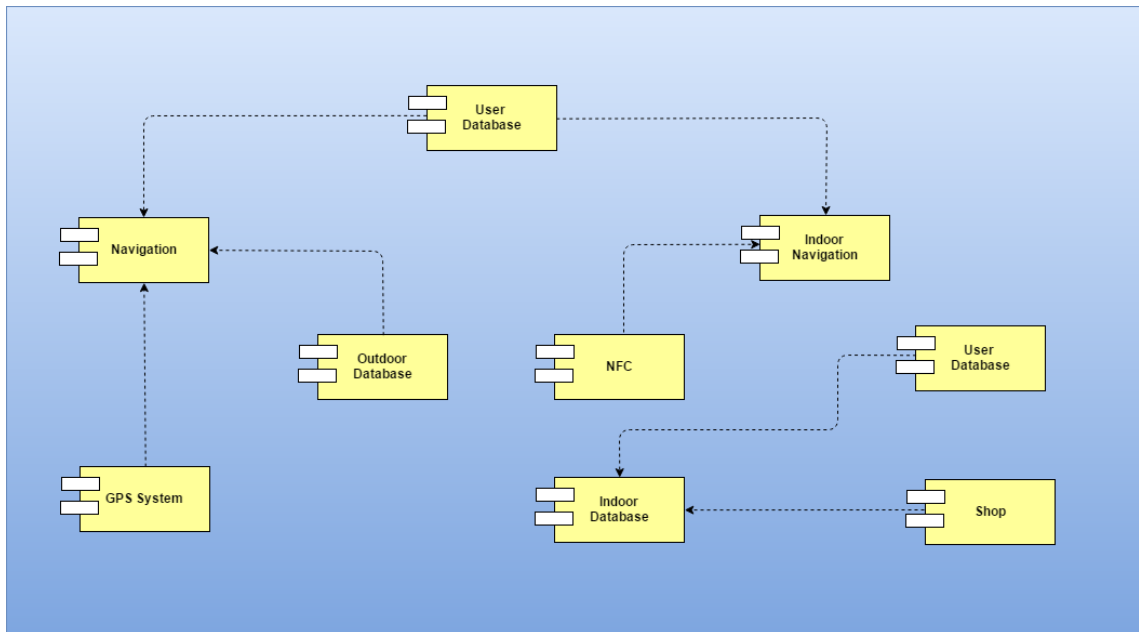

Figure 4.9: Component Diagram

Chapter 5

Methodology

5.1 Modular Description

5.1.1 Login Module

When user start the application first time user need to register and provide all the personal information. Using the same username and password the user can login into the application. All the credentials entered by the user is compared with server database for providing access to the application, or denying in case doesnâ™t matches with server data.

5.1.2 Outdoor Navigation

Outdoor navigation is implemented by using the GPS tracking. GPS tracking helps to track the location of the user, so based on user locations nearby malls in his vicinity will be visible to him on screen. So user can search for mall by entering location and marker will be pointed to that location.

5.1.3 Mall Shop Information

On selecting desired mall, user can view the information about the mall and list of all the shops available within that mall. All this information is pre fed in the database and fetched whenever requested by the user.

5.1.4 Indoor Navigation

In indooor Navigation user has to select current mall and shop he want to visit. Using the NFC tag current location of the user is updated and maker pointed to next NFC tag which come in the way. when

user reach to a destination marker pointed showing you reach at the destination.

5.1.5 Marker-base AR

Marker-base AR will used predefine mark to implement augmented reality . so when user hold the camera towards the shop than review will be fetch .

5.1.6 Shop Review

While purchasing a good or a product, most of time user is not sure whether he is buying the product from good shop in terms of after purchase services like warranty, customer satisfaction return policy on product. By using this feature, customer can get review after the shop from customer who had already bought product from the shop and posted their review about the shop. Thus in turn this feature aims at making the buying process easy for the customer.
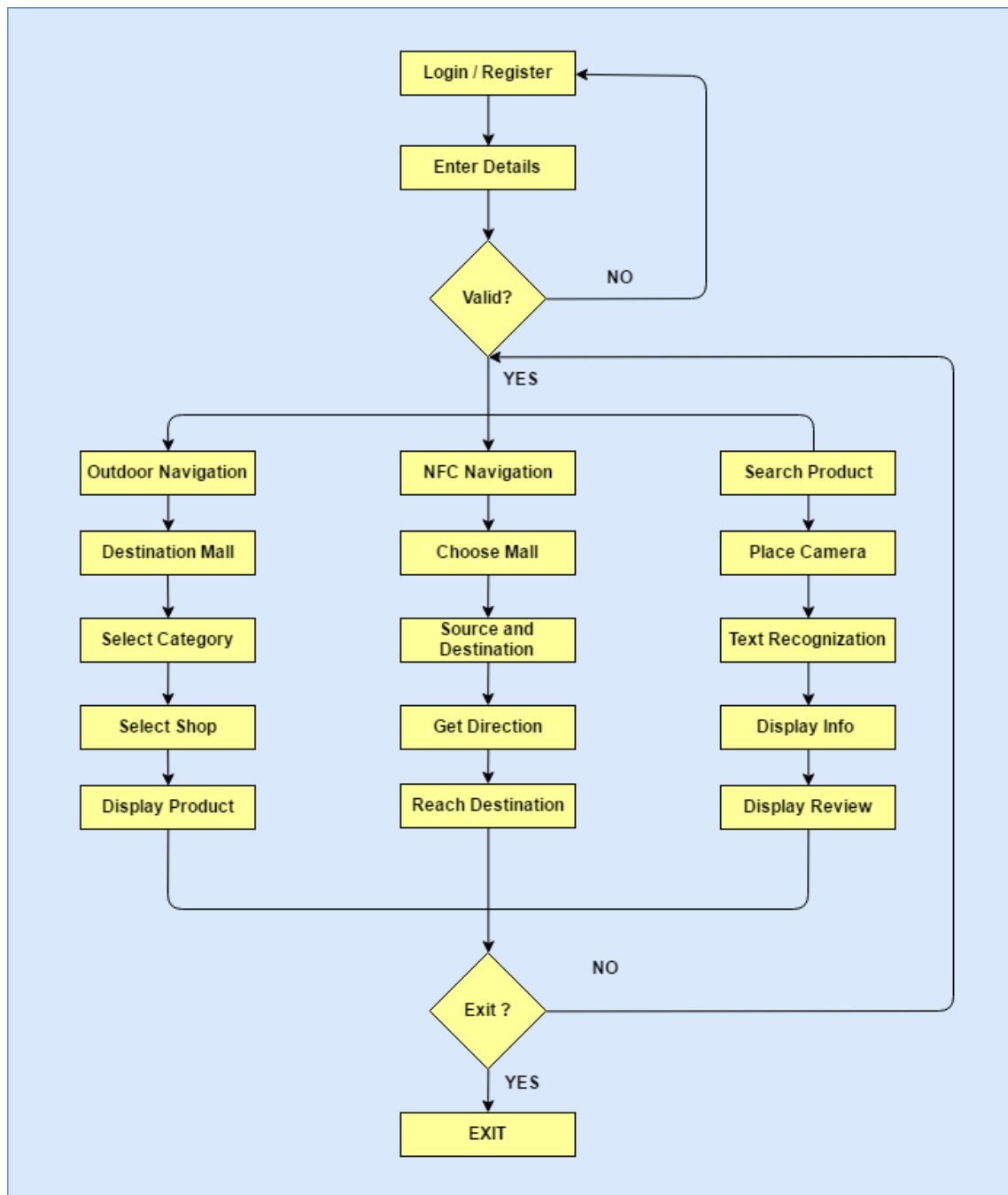
5.2 Flow-Chart

Figure 5.1: Flow Chart

Chapter 6

Implementation Details

6.1   Assumptions And Dependencies

6.1.1   Assumptions

Following are the assumptions which were taken into consideration:

1. When admin is allowing permission to vendor earlier contract regarding that is done on paper.

2. The local database is assumed to be scalable and robust so that it can store multiple data and maintain consistency.

3. The user interface should be simple and clean that allows soothing effect to user.

6.1.2   Dependencies

The dependencies are as follows:

For Backend processing, MySQL and PHP is being used. The backbone structure of the system is developed by making MySQl and PHP. MySQL is one of the best RDBMS being used for developing web-based software applications. MySQL is very friendly to PHP, the most appreciated language for web development. PHP is a server side scripting language.

6.2 Implementation Methodologies

6.2.1 Implementation Code

6.2.1.1 Code For Sending Email

```php
<?php
if(isset($-['action'])  POST['action']=='signup')
userid = $['user'];
fname=$-['fname'];
pass = $-['pass'];
email=$-['email'];
phone = $-['phone'];
code=rand(10,100);
salttext = "IndiaIsMyCountry";
userid=salttext.userid.salttext;
pass=salttext.pass.salttext;
code=salttext.code.userid;
userid=hash("sha256",userid);
pass=hash("sha256",pass);
code=hash("sha256",code);
include('DbConnect.php');
if(conn)
res = mysqli_query(conn,"insert into user values ('vendor','fname',
'userid','pass','phone','email','passive','code');");
if(res)to = email;
subject = 'Email Verification From IntelligentShopping';
link =' www.intelligentshopping.esy.es/emailVerified.php?p1 =' .usr
id.'p2='.code;
message = "<p><strong>Click on the below link to verify your
IntelligentShopping Account</strong></p>
<a href='link' > ClickHere < /a >";
headers = 'MIME-Version: 1.0' . "°";
headers. =' Content − type : text/html; charset = UTF − 8'."Σ";mail(to, subject,message, headers);
echo0;


else
echo 1;
else
echo 2;
else
header('location:index.php');
?>
```

6.2.1.2   file for verifying email

```php
<?php
include('DbConnect.php');
session_start();
userid=SESSION['vid'];
code = SESSION['vc'];
if(conn)
res = mysqli_query(conn,"select * from user where userID = 'userid'ANDcode ='code'");
if(mysqli_num_rows(res)>0)
while(row = mysqli_fetch_assoc(res))
status =row['accStatus'];
if(status ==' active')
echo0;
elseif(status=='passive')
res1 = mysqli_query(conn,"update user set accStatus =
'active' where userId = 'userid'ANDcode ='code'");
if(res1)echo1;elseheader('location : 404.html');?>
```

6.2.1.3   Code For Augmrnted Reality

```java
@Override
public void draw(Canvas canvas)
TextBlock text = mText;
if (text == null)
return;

// Draws the bounding box around the TextBlock.
RectF rect = new RectF(text.getBoundingBox());
rect.left = translateX(rect.left);
rect.top = translateY(rect.top);
rect.right = translateX(rect.right);
rect.bottom = translateY(rect.bottom);
canvas.drawRect(rect, sRectPaint);
// Break the text into multiple lines and draw
each one according to its own bounding box.
List<? extends Text> textComponents = text.getComponents();
for(Text currentText : textComponents)
float left = translateX(currentText.getBoundingBox().left);
float bottom = translateY(currentText.getBoundingBox().bottom);
canvas.drawText(currentText.getValue(), left, bottom, sTextPaint);


/**
* funtion for handling event on text click/tap
*/ private boolean onTap(float rawX, float rawY)
OcrGraphic graphic = mGraphicOverlay.getGraphicAtLocation(rawX, rawY);
TextBlock text = null;
if (graphic != null)
text = graphic.getTextBlock();
```

```
if (text != null  text.getValue() != null)
final LinearLayout detector= (LinearLayout)
findViewById(R.id.detector_layout);
final LinearLayout details = (LinearLayout)
findViewById(R.id.detail_layout);
detector.setVisibility(View.INVISIBLE);
details.setVisibility(View.VISIBLE);
details.startAnimation(animShow);
prdname.setText(text.getValue());
Log.d("TextDetectedis", text.getValue().toString());
detectedText = text.getValue().toString().replace("", "");
OcrCaptureActivity.loader.setVisibility(View.VISIBLE);
prdimg.setImageDrawable(null);
prddes.setText("");
available.setText("");
review.setAdapter(null);
findViewById(R.id.descbase).setVisibility(View.INVISIBLE);
findViewById(R.id.availablebase).setVisibility(View.INVISIBLE);
newHandler().postDelayed(newRunnable()@OverridepublicvoidrunloadDetails();, 1000);

elseLog.d(TAG, "textdataisnull");

elseLog.d(TAG, "notextdetected");
returntext! = null;
/ * * * navigationfunction * /
```

Chapter 7

Results and Analysis

7.1 Test cases and Result

7.1.1 Type Of testing

7.1.1.1 Black Box Testing

Black Box Testing, also known as Behavioral Testing, is a software testing method in which the internal structure/ design/ implementation of the item being tested is not known to the tester. These tests can be functional or non-functional, though usually functional. This method is named so because the software program, in the eyes of the tester, is like a black box; inside which one cannot see. This method attempts to find errors in the following categories:

1. Incorrect or missing functions
2. Interface errors
3. Errors in data structures or external database access
4. Behavior or performance errors
5. Initialization and termination errors

Black Box Testing method is applicable to the following levels of

1. Integration Testing
2. System Testing
3. Acceptance Testing

The higher the level, and hence the bigger and more complex the box, the more black box testing method comes into use.

7.1.1.2   Black Box Testing Techniques

Following are some techniques that can be used for designing black box tests.

1. Equivalence partitioning: It is a software test design technique that involves dividing input values into valid and invalid partitions and selecting representative values from each partition as test data.

2. Boundary Value Analysis: It is a software test design technique that involves determination of boundaries for input values and selecting values that are at the boundaries and just inside/ outside of the boundaries as test data.

7.1.2   Test Cases

A test case is a document, which has a set of test data, preconditions, expected results and post conditions, developed for a particular test scenario in order to verify compliance against a specific requirement. Test Case acts as the starting point for the test execution, and after applying a set of input values, the application has a definitive outcome and leaves the system at some end point or also known as execution post condition.

Typical Test Case Parameters:

1. Test Case ID
2. Test Scenario
3. Test Case Description
4. Test Steps
5. Test Data
6. Expected Result
7. Test Parameters

Table 7.1: Unit Testing

TestID	Test Objective	Precondition	Steps	Test Data	Expected Result
TC_101	Placing a marker on desired location	Google Map Activity	1.Finding LOcation where Marker is to place. 2.Finding Lat and Long 3.Place the marker	Info about the mall Location	Marker is Place Succesfully.
TC_102	Sending OTP Message	User Register phone no	1.Create account on SMS gatewayHub 2.Get 50 promo SMS 3.Save in Database 4.Validate Database	User Phone Number.	Validate the user while registering.
TC_103	Display Product	Based on Category	1.Match the selected mall With database 2.Display Avaible Category. 3.Display shops	Server Data	Product Display in Shops
TC_104	Display Review using AR	Place Camera	1.Reconize Text 2.Fetch Review 3.Dispaly info	web Data	Review Display Using AR

7.2 Result

7.2.1 Website

Step 1: New Vendor Registration

Figure 7.1: Vendor Registration

Step 2: Registration Link Send to Vendor to verify
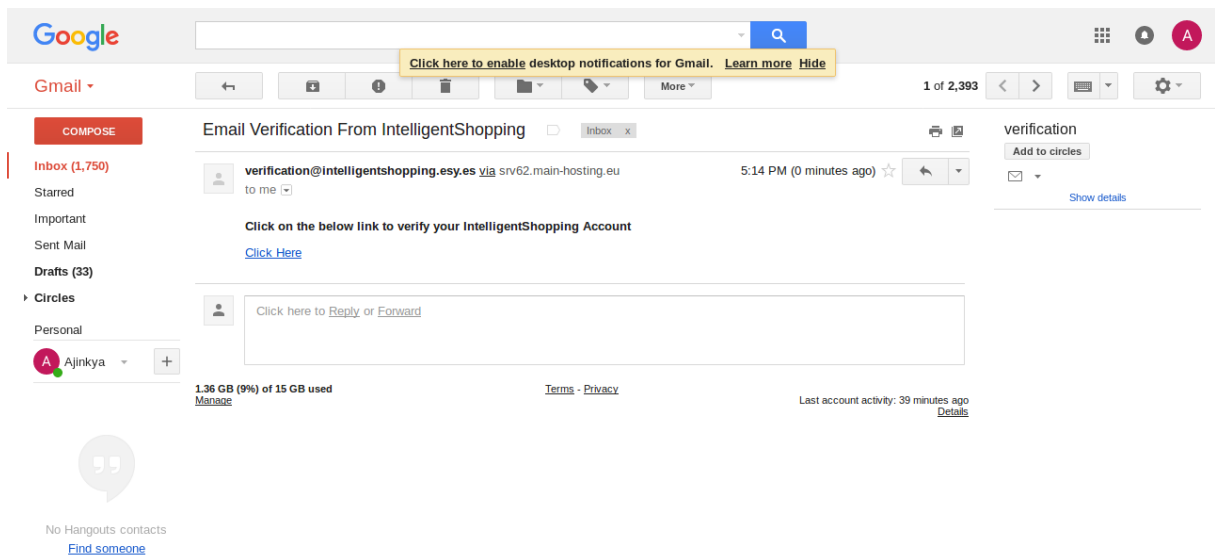

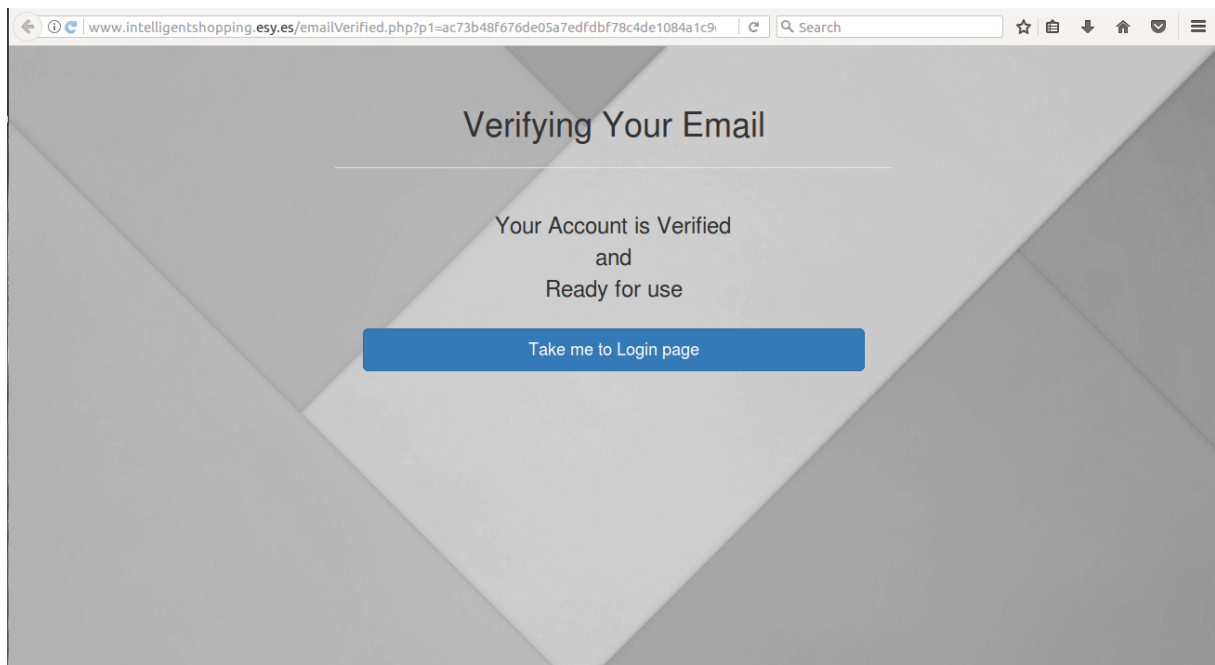Figure 7.2: Registration Link

Step 3: Verifying the Vendor

Figure 7.3: Verification
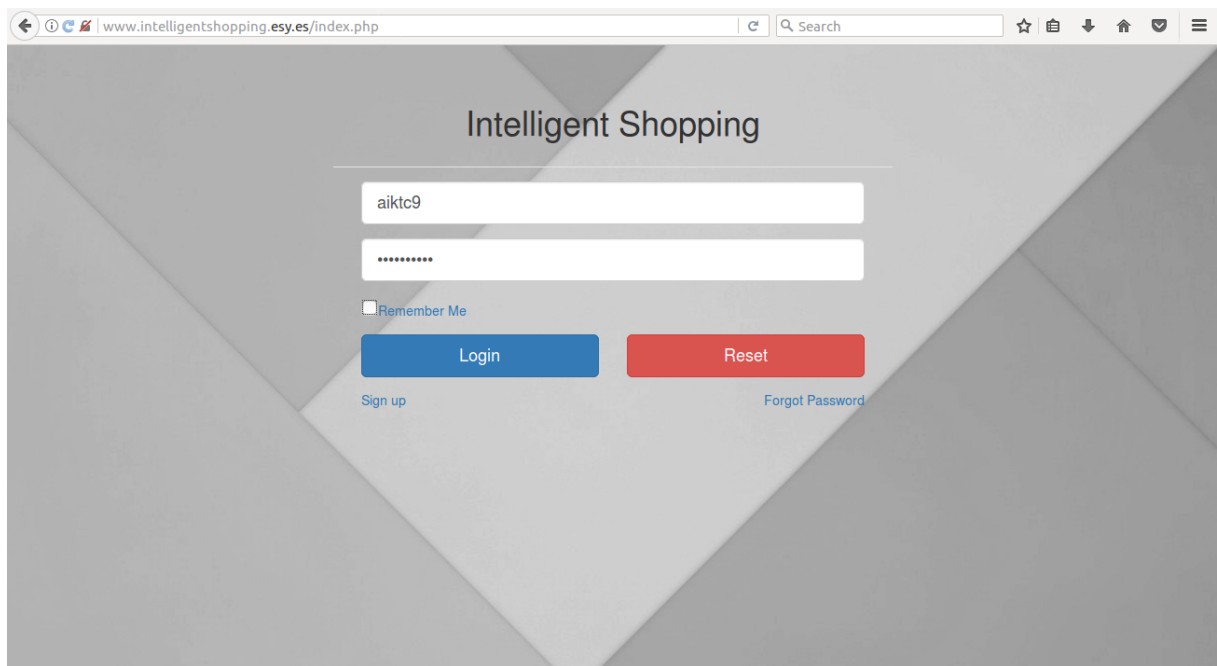
Step 4: Vendor Login

Figure 7.4: Vendor Login

Step 5: Admin Adding Vendor into his Desired Mall Database
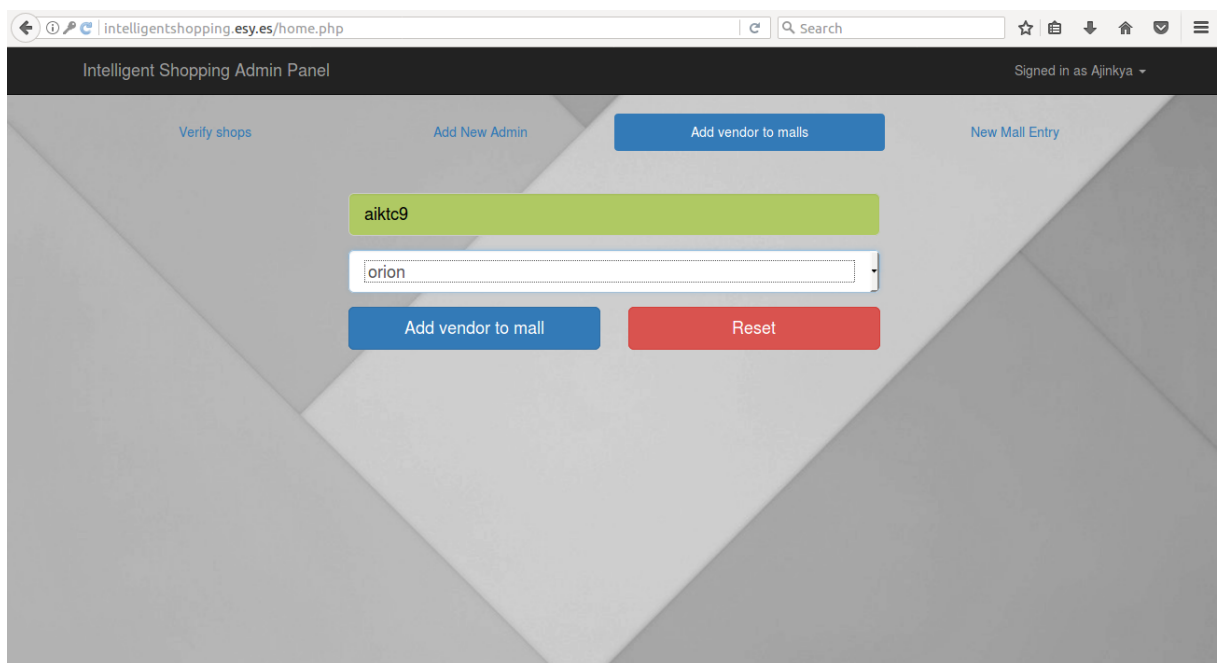

Figure 7.5: Admin Permission
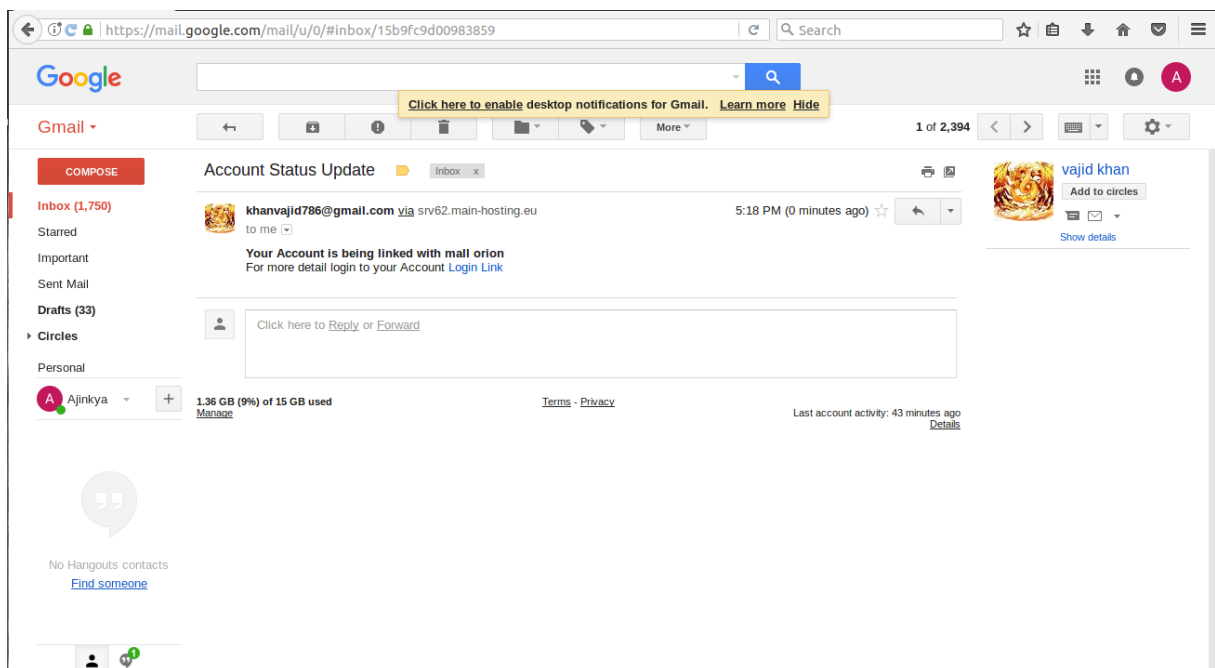
Step 6: Email Notification about Account Update

Figure 7.6: Mail For Permission
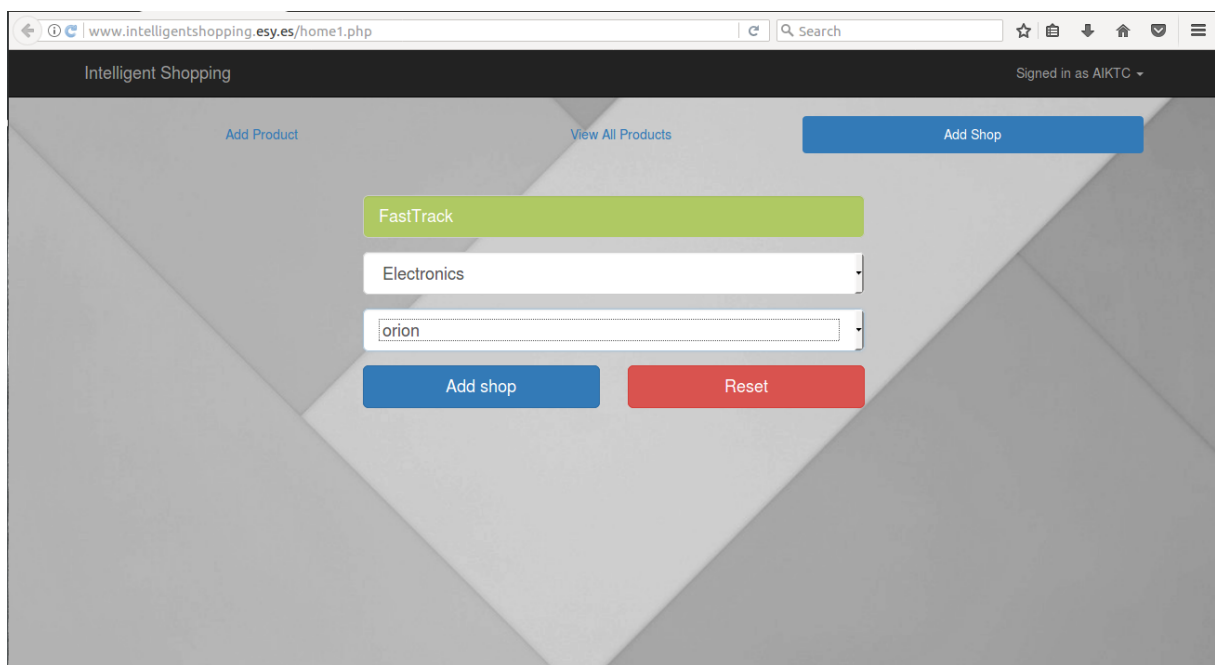
Step 7: Vendor adding shop

Figure 7.7: Add Shop
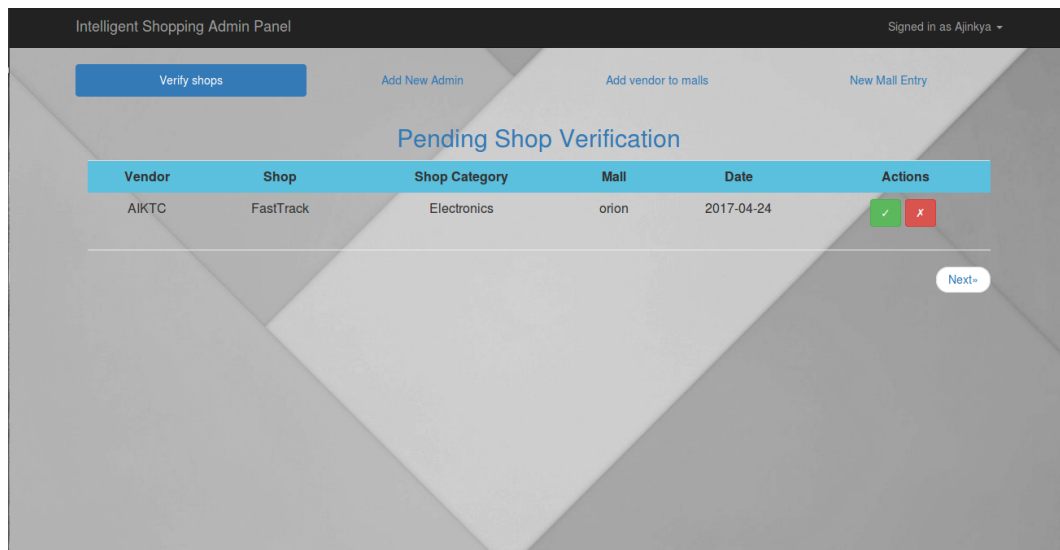
Step 8: Admin Verifying Shop

Figure 7.8: Admin giving permission to add shop in mall

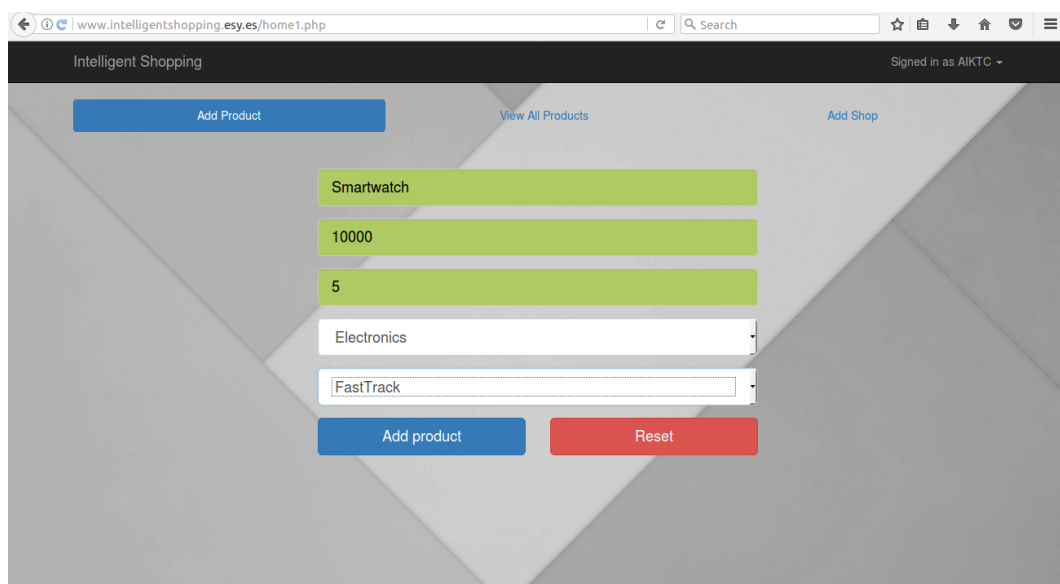**Step 9: Vendor adding product with Price and Discount Want to Offer**

Figure 7.9: Vendor adding product
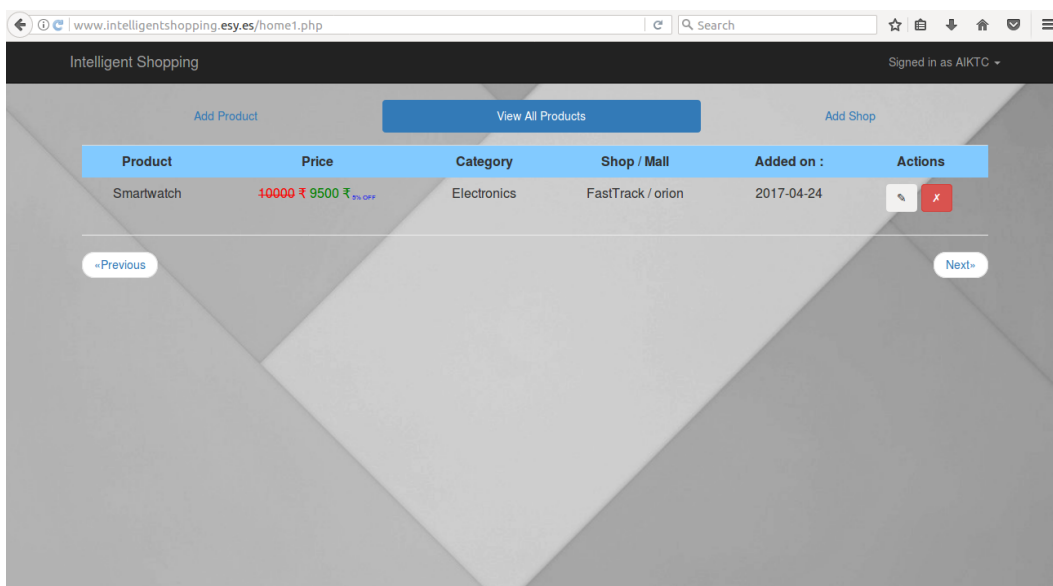
Step 8: Product List added by Vendor

Figure 7.10: Product List

7.2.2 Android App

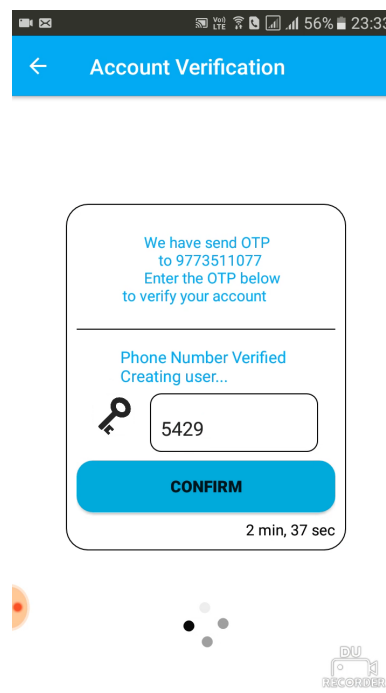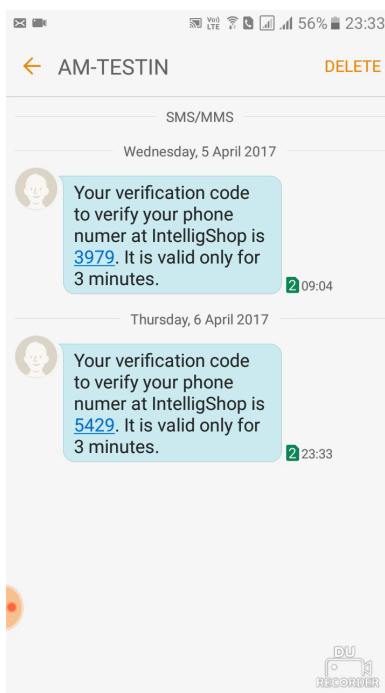**Step 1: Register with OTP Verification**
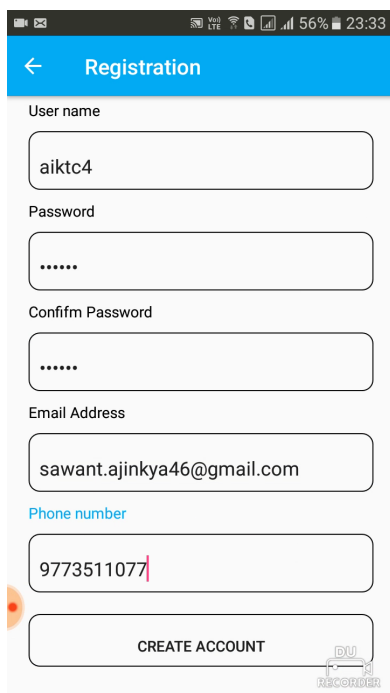
Figure 7.11: Register Details   Figure 7.12: Message Receive   Figure 7.13: OTP Verification

Step 2: Outdoor Navigation

Figure 7.14: Current Location

Figure 7.15: Search For Location

Figure 7.16: Search Product

Step 3: Indoor Navigation

Figure 7.17: Select Mall

Figure 7.18: Direction Pointing

Figure 7.19: Direction Pointing

Step 4: Augmented Reality

Figure 7.20: Text Reconization
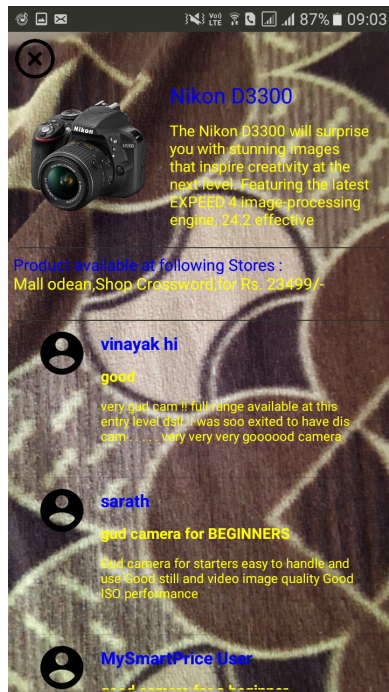
Figure 7.21: Review Display

Figure 7.22: Image Display

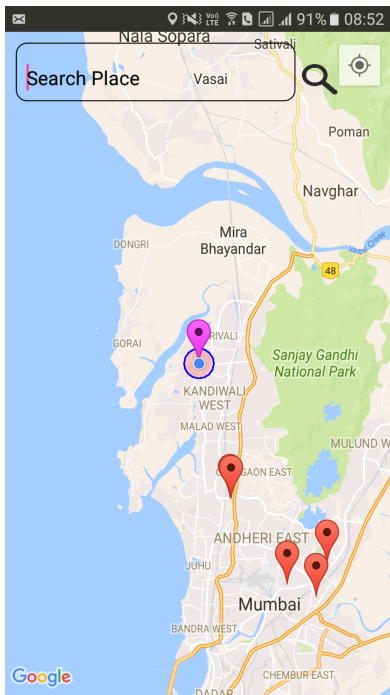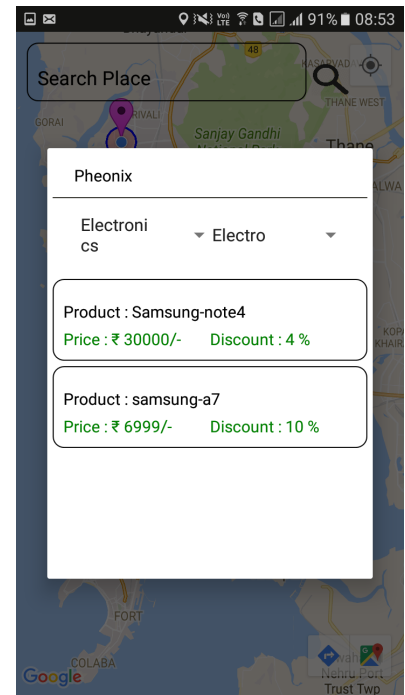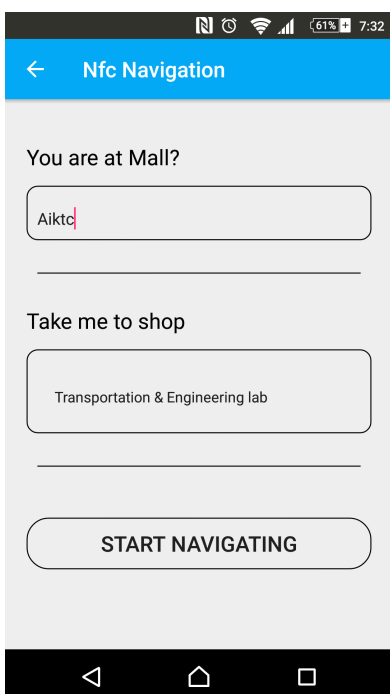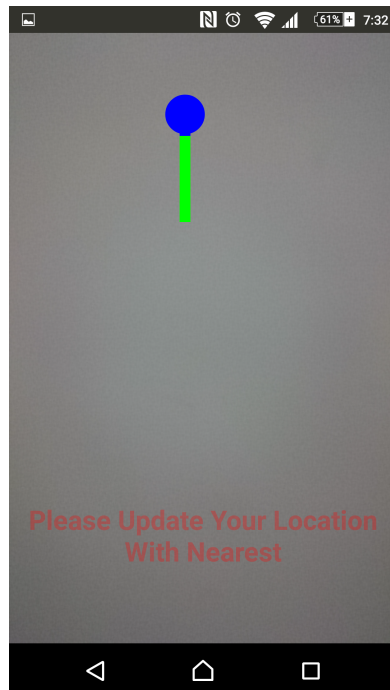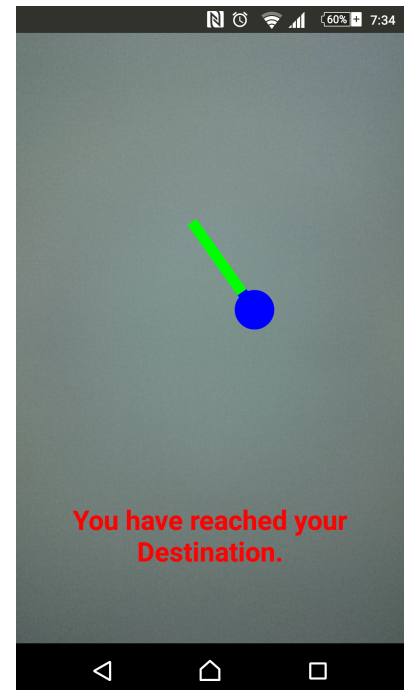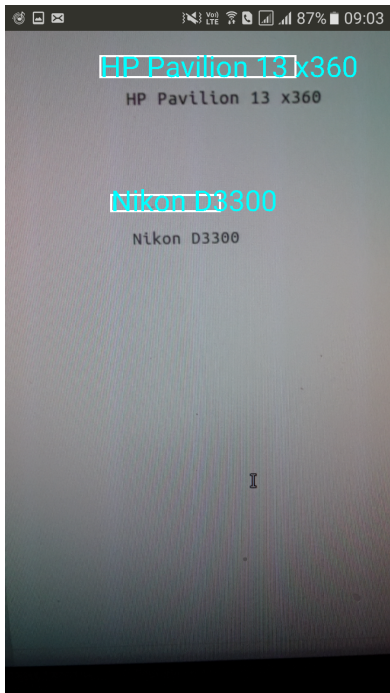# Chapter 8

Conclusion and Future Scope

8.1 Conclusion

1. Augmented Reality is the integration of digital information or objects with user world in real time.The time and responsibilities today demand high accuracy in everything we do, which is perfectly blended with Augmented Reality in applications.

2. Shopping is not an easy task, but Augmented Reality aims at making this process easy, by providing facilities such as interaction with digital objects.

3. With this work, user will get benefits like navigation inside the malls, thus it will make finding the desired shop easy, user can also see reviews from other users about the product he/she is willing to buy, this in turn makes the buying process easy.

4. It is expected that this application could be a very helpful and good one for retail shopping in near future.

8.2 Limitations

1. For enjoying the indoor navigation in mall the user's android device should support NFC navigation.

2. Due to magnetic interface the direction pointer flactuate.

8.3 Future Enhancement

1. Product price comparison can be implemented in future, which will compare the price of product and notify the user about lowest price available on that product

2. Reviews fetching can be improved with the help of data mining

3. Currently this work only supports Android platform, in future supports can be extended for platform like Windows and Ios.

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Chapter 9

Appendix A

9.1   Near field communication (NFC)

Near-field communication (NFC) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within 4 cm (1.6 in) of each other.

NFC devices are used in contactless payment systems, similar to those used in credit cards and electronic ticket smartcards and allow mobile payment to replace/supplement these systems. NFC is used for social networking, for sharing contacts, photos, videos or files. NFC-enabled devices can act as electronic identity documents and keycards. NFC offers a low-speed connection with simple setup that can be used to bootstrap more capable wireless connections.

 Each full NFC device can work in two modes:

Figure 9.1: NFC Guidence

1. NFC card emulationâ"enables NFC-enabled devices such as smartphones to act like smart cards, allowing users to perform transactions such as payment or ticketing.

2. NFC reader/writerâ"enables NFC-enabled devices to read information stored on inexpensive NFC tags embedded in labels or smart posters.

9.2 Google Map

Google Maps is a web mapping service developed by Google. It offers satellite imagery, street maps, 360Â° panoramic views of streets (Street View), real-time traffic conditions (Google Traffic), and route planning for traveling by foot, car, bicycle (in beta), or public transportation. Google Maps provides

Figure 9.2: Google Map

a route planner under "Get Directions". Up to four modes of transportation are available depending on the area: driving, public transit (see the Google Transit section below), walking, and bicycling. In combination with Google Street View, issues such as parking, turning lanes, and one-way streets can be viewed before traveling. Driving directions are covered as follows:

1. Most countries of mainland Eurasia and Africa are covered contiguously, including the United Kingdom, Ireland, the Canary Islands, Cyprus, Malta, Sri Lanka, most of Indonesia and Timor-Leste. China mainland, Hong Kong, Macau, Jordan, Lebanon and North Korea have directions available without connection to other states. Only public transit directions are provided for South Korea.

2. All countries of mainland North and Central America are covered contiguously.

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University of Mumbai.

FUERZA Project Competition (1st Position)

TANTRAVIHAR (2nd Position)

VIT | Vidyalankar Institute of Technology

Vidyalankar Institute of Technology

Proudly awards this

Certificate of Appreciation

to

Ajinkya Sawant
Vajid Khan
Pravin Chavan

of

ANJUMAN - I-ISLAM'S KALSEKAR TECHNICAL CAMPUS

for securing *Second prize* for the project

"Enhancing Retail Shopping Experience Through Augmente Reality"

Under the guidance of

Prof. Sameer Panwala

at the Tantravihar 2017, Annual Intercollegiate BE Project Competition, organised on 10th April, 2017.

Dr. Sangeeta Joshi
Organizing Secretary

Prof. Shrikant Velankar
Convener

Vidyalankar Institute of Technology

Proudly awards this

Certificate of Appreciation

to

Ajinkya Sawant

Vajid Khan

Pravin Chavan

of

ANJUMAN – I-ISLAM'S KALSEKAR TECHNICAL CAMPUS

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Dr. Sangeeta Joshi
Organizing Secretary

Prof. Sharikant Velankar
Convener