

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY**

**“Jnana Sangama”, Belgaum – 590 018**



**A project report on**

**“Android Application for Visually Impaired”**

submitted in partial fulfillment for the award of the degree of

**BACHELOR OF ENGINEERING**

**in**

**INFORMATION SCIENCE & ENGINEERING**

**by**

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**2019-20**

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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## DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

### Certificate

This is to certify that the project entitled, “**Android Application for Visually Impaired**”, is a bonafide work carried out by **Shrikesh S (1CR16IS104)**, **Tilak Hegde (1CR16IS117)**, **Abhishek Vijay (1CR16IS119)**, and **Samruddhi S (1CR16IS092)** in partial fulfillment of the award of the degree of Bachelor of Engineering in Information Science & Engineering of Visvesvaraya Technological University, Belgaum, during the year 2018-19. It is certified that all corrections/suggestions indicated during reviews have been incorporated in the report. The project report has been approved as it satisfies the academic requirements in respect of the project work prescribed for the said Degree.

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Name of the Examiners

Signature with date

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- 2.

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“Jnana Sangama”, Belgaum – 590 018



## DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

### *Certificate*

We, **Shrikesh S (1CR16IS104)**, **Tilak Hegde (1CR16IS117)**, **Abhishek Vijay (1CR16IS119)**, and **Samruddhi S (1CR16IS092)**, bonafide students of CMR Institute of Technology, Bangalore, hereby declare that the report entitled “**Android Application for Visually Impaired**” has been carried out by us under the guidance of **Mrs. Akhilaa, Assistant Professor**, CMRIT Bangalore, in partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering in **Information Science Engineering**, of the Visvesvaraya Technological University, Belgaum during the academic year 2018-2019. The work done in this dissertation report is original and it has not been submitted for any other degree in any university.

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# ABSTRACT

As far as outdoor activities are concerned the blind face difficulties in safe and independent mobility depriving them of normal professional and social life. Also, there are issues of communication and access to information. This project is for the visually impaired people and is based on the android platform. The major module of the project scans and detects the object in the image captured by the camera of an in-built camera of a smartphone for the visually impaired. It is a dedicated image recognition application running on an Android system smartphone.

Now-a-days, the mobile phone is one of the most powerful entities in the world, it helps for communication and to ease our day-to-day tasks. This android application integrates accessibility with navigation and features for safety of the user. The main aim is to guide visually impaired people to travel from source to destination. The user gives input vocally and he is guided through audio commands. We have included features like image recognition, making it easier for the visually impaired to identify the object around them. The app also includes news readers, therefore eliminating the issue of access to information. The user can get to know the day to day news which the app will read out for them. Adding to this, the app also helps the user to set alarms as well as reminders.

**Keywords:** Image Recognition (TensorFlow), Navigation, News Reader and Alarm and remainder keeper.

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## Chapter 1

### PREAMBLE

#### 1.1 Introduction

Android software development is the process by which new applications are created for devices running the Android operating system. Google states that "Android apps can be written using Kotlin, Java, and C++ languages" using the Android software development kit (SDK), while using other languages is also possible. All non-JVM languages, such as Go, JavaScript, C, C++ or assembly, need the help of JVM language code, that may be supplied by tools, likely with restricted API support. Some programming languages and tools allow cross-platform app support (i.e. for both Android and iOS). Third party tools, development environments, and language support have also continued to evolve and expand since the initial SDK was released in 2008. In addition, with major business entities like Walmart, Amazon, and Bank of America eyeing to engage and sell through mobiles, mobile application development is witnessing a transformation.

The android application is to help the partially blind carry out their day-to-day duties in an easier fashion. The Smartphone technologies and mobile applications make it easier, helping us carry out our day to day activities. As far as these activities are concerned the blind face difficulties in safe and independent mobility depriving them of normal professional and social life. They also face issues such as communication and access to information. The ability to navigate from one place to another is an integral part of daily life for this vision plays a critical role but it would be difficult for visually impaired people. Although it would be easier to go to a familiar environment without vision, navigating to unfamiliar places without vision is very difficult. In spite of this, the visually challenged people travel to different places independently on a daily basis. But to facilitate safe and efficient navigation, visually challenged individuals must be guided properly. Also, the blind face difficulties in recognising the objects around them. Image recognition, also known as computer vision, allows

applications using specific algorithms to understand images or videos. Image recognition helps to identify objects through a mobile device's camera.

Now-a-days, the mobile phone is one of the most powerful entities in the world, it helps for communication and to ease our day-to-day tasks. This android application integrates accessibility with navigation and features for safety of the user. The main aim is to guide visually impaired people to travel from source to destination. The user gives input vocally and he is guided through audio commands. We have included features like image recognition, making it easier for the visually impaired to identify the object around them. The app also includes news readers, therefore eliminating the issue of access to information. The user can get to know the day to day news which the app will read out for them. Adding to this, the app also helps the user to set alarms as well as reminders.

### **1.2 Existing System:**

The World Health Organization and the International Agency for the Prevention of Blindness's Vision 2020 initiative states a goal of "eliminating avoidable blindness by 2020." We are looking to do part in completing the aforementioned goal. Blind-Not is a powerfly tool looking to eliminate, on the contrary, initiate a process which helps the blind to carry out their everyday duties in a more efficient manner. The Initial software will be built on the Android platform. We are looking to include numerous modules such as Google API's, Firebase to store user data, Python Libraries, Machine Learning etc.

TapTapSee is an app designed to help the blind and visually impaired identify objects they encounter in their daily lives. The user has to simply double tap the screen to take the photo of anything around them at any angle and hear the app speak the identification back. However, this app had little trouble identifying currency. Therefore, in our project we have implemented image recognition using TensorFlow, such that it identifies various objects including currency.

Another application which is part of Google's android accessibility service, is designed to help the visually impaired users with just using their mobile devices. The app monitors and speaks out every movement the user makes on his or her phone. It can also read out the texts for them.

iSee is an android based application that benefits from commercially available technology to help the visually impaired people to improve their day-to-day activities. In this app, the user has to just hold the point and point anywhere he/she desires and tap on the screen. The application's algorithm runs in the background, and then communicates audibly, via a voice message, the object type, name and description.

Therefore, our aim was to combine all these features together and implement in a single android application. Thereby making it easier for the visually impaired.

### **1.2.1 Drawbacks**

1. Although the coder designs an optimised code, the code readability is very inadequate and cannot be modified by the user even if required. Any change to the code requires change in the model itself.
2. The amount of complexity and requirement requested by the code has led to the reduced usage of this application and manual code conversion is preferred

### **1.3 Proposed System**

1. Our aim is to develop an application that will help the blind carry day-to-day duties in easier fashion.
2. The main motive of this app is to make it easier for the user to learn the objects around them using image recognition.
3. Help them navigate to the required place.
4. Read the news for them, making it easier for them to update with the day to day news.
5. Help them set the alarm and reminders.

## **1.4 Problem Statement:**

Android Application to help the partially blind carry out their day-to-day duties in an easier fashion. The Image Recognition and navigation features of application enable users to identify items proficiently and navigates them to the items which are of prime importance.

## **1.5 Objective of the Project:**

This android application is to help the blind carry out their day to-day activities in an easier fashion. The main objective of this app is to help the blind carry out their activities in an easier way. All the user needs to do is take the snapshots and the app will handle the rest. The special navigation support helps users walk down the road with ease. The android application includes the following features, image recognition, navigation, news reader and time and remainder setter. All these features are implemented keeping the blind in mind.

## Chapter 2

# LITERATURE SURVEY

Early work in the field of helping the blind derived its importance on developing scientific methods to cure partial blindness. In response to this popular discourse, technology seeped in the cracks of science to not only improve the standard of living but also to engage in curing blindness.

According to the WHO, the estimated number of people visually impaired in the world is 285 million, 39 million blind and 246 million have low vision; 65 % of people visually impaired and 82% of all blind are 50 years and older. We are looking to build an Android Application to close the gap between what is and what could be.

The World Health Organization and the International Agency for the Prevention of Blindness's Vision 2020 initiative states a goal of "eliminating avoidable blindness by 2020." We are looking to do part in completing the aforementioned goal.

Blind-Not is a powerfly tool looking to eliminate, on the contrary, initiate a process which helps the blind to carry out their everyday duties in a more efficient manner. The Initial software will be built on the Android platform. We are looking to include numerous modules such as Google API's, Firebase to store user data, Python Libraries, Machine Learning etc.

According to our findings, there are few applications that work towards the same cause.

Few applications are mentioned below:

- **LookTel: The Money Identifier Mobile App:**

LookTel Money Reader instantly recognizes currency and speaks the denomination, enabling people experiencing visual impairments or blindness to quickly and easily identify and count bills.

- **TapTapSee: Identify Objects Through Photos:**

TapTapSee is designed to help the blind and visually impaired identify objects they encounter in their daily lives. Simply double tap the screen and take a photo of anything, at any angle. You'll hear the app speak the identification back to you.

- **iSee:**

iSee is an android based application that benefits from commercially available technology to help the visually impaired people to improve their day-to-day activities. In this app, the user has to just hold the point and point anywhere he/she desires and tap on the screen. The application's algorithm runs in the background, and then communicates audibly, via a voice message, the object type, name and description.

Further research indicate that Blind-Not will be not only deriving a part of these applications but also adding on the following functionalities:

- **Navigation:** Aim is to guide the visually impaired to travel from source to destination.
- **Image Recognition:** Helps the user recognize the objects that he/she scans.
- **News Reader:** Helps the user to update to day to day news.

According to an excerpt by Mr. Paul Adam on Quora, one of the primary difficulties for the blind using an application are the numerous buttons and forms which are not labelled. These issues tend to be on the rise in most applications dedicated to the blind.

Blind-Not will normalize these issues and turn to a user-friendly environment. In conclusion, Blind-Not, although, might not be the end goal but is definitely a step towards that goal.

## Chapter 3

### THEORITICAL BACKGROUND

Background theory in this thesis work serves as prophase for developing an application. That allows us to understand more compatibly the principals and technologies of Android development and can give us idea about further structure of prototype project.

#### **3.1 Android framework:**

Android is one of an Open source platform. It is created by Google and owned by Open Handset Alliance. It is designed with goal “accelerate innovation in mobile” As such android has taken over a field of mobile innovation. It is definitely free and open platform that differs hardware from software that runs on it. It results for much more devices be running the same application. Also, it gives possibility of friendlier environment for developers and consumers. Android it is complete software package for a mobile device. Since the beginning android team offers the developing kit (tool and frameworks) for creating mobile applications quick and easy as possible. In some cases, you do not specially need an android phone but you are very welcome to have one. It can work right out of the box, but of course users can customize it for their particular needs. For manufactures it is ready and free solution for their devices. Except specific driver’s android community provides everything else to create their devices.

#### **3.2 Android history:**

The actual history of Android starts when Google has had purchased and Android Inc. in 2005. But the development did not start immediately. The actual progress on android platform starts when 2007 Open Handsets Alliance has announced the Android as Open Source platform and year later the Android SDK 1.0. In the same 2008 the G1 phone was produced by HTC and was retailed within the T-Mobile carrier. In the next two years came out 4 versions of Android. In 2010 there

were at least 60 devices running android and it becomes second after Blackberry the best spread mobile platform.

### **3.3 Development methods used:**

There are several methods which can support developing process of any project such as:

- Waterfall
- Prototyping
- Incremental development
- Spiral development
- Rapid application development
- Agile software development
- Object oriented
- Top-down programming
- Unified process
- System testing.

But for our needs, due to limited time of this project, only two are the most suitable: rapid application developing and like part of it prototyping and also system testing.

### **3.4 Rapid application development method:**

This method is directed by producing high quality system in most efficient time costs. Also, it allows to divide project into smaller parts and develop them separately. It's basic idea to produce high quality system quickly by use of interactive Prototyping. It emphasizes on satisfaction the business requirements. It sets strict deadlines and if project slips the schedule, the emphasis is set to reducing requirements and not on changing deadlines. The prototypes are giving to the user for evaluation.



### 3.5 System testing:

System testing in this thesis work will be represented by Specification-based testing. Testing efforts to reach certain level of perfection by detecting all the faults which are in implementation. The best way to perform any testing is to select test case that satisfy certain criteria. These criteria are depending on the nature of application and the scope.

### 3.6 TensorFlow Object Detection API:

The TensorFlow object detection API is the framework for creating a deep learning network that solves object detection problems.

There are already pretrained models in their framework which they refer to as Model Zoo. This includes a collection of pretrained models trained on the COCO dataset, the KITTI dataset, and the Open Images Dataset. These models can be used for inference if we are interested in categories only in this dataset.

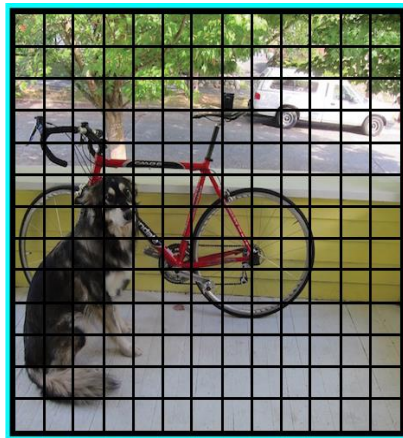
They are also useful for initializing your models when training on the novel dataset. The various architectures used in the pretrained model are described in this table:

Model name	Speed	COCO mAP	Outputs
<a href="#">ssd_mobilenet_v1_coco</a>	fast	21	Boxes
<a href="#">ssd_inception_v2_coco</a>	fast	24	Boxes
<a href="#">rfcn_resnet101_coco</a>	medium	30	Boxes
<a href="#">faster_rcnn_resnet101_coco</a>	medium	32	Boxes
<a href="#">faster_rcnn_inception_resnet_v2_atrous_coco</a>	slow	37	Boxes

### 3.7 A General Framework for Object Detection:

Typically, we follow three steps when building an object detection framework:

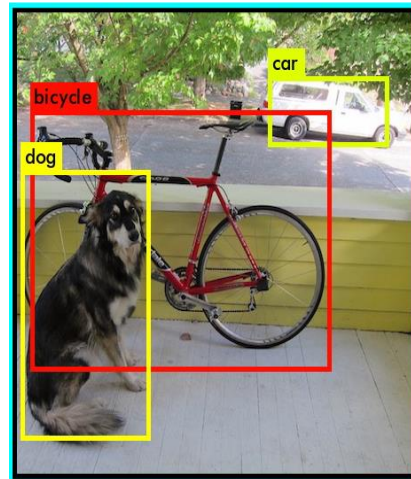
1. First, a deep learning model or algorithm is used to generate a large set of bounding boxes spanning the full image (that is, an object localization component)



2. Next, visual features are extracted for each of the bounding boxes. They are evaluated and it is determined whether and which objects are present in the boxes based on visual features (i.e. an object classification component)



3. In the final post-processing step, overlapping boxes are combined into a single bounding box (that is, non-maximum suppression)



## Chapter 4

# SYSTEM REQUIREMENT SPECIFICATION

A System Requirement Specification (SRS) is basically an organization's understanding of a customer or potential client's system requirements and dependencies at a particular point prior to any actual design or development work. The information gathered during the analysis is translated into a document that defines a set of requirements. It gives the brief description of the services that the system should provide and also the constraints under which, the system should operate. Generally, SRS is a document that completely describes what the proposed software should do without describing how the software will do it. It's a two-way insurance policy that assures that both the client and the organization understand the other's requirements from that perspective at a given point in time.

SRS document itself states in precise and explicit language those functions and capabilities a software system (i.e., a software application, an ecommerce website and so on) must provide, as well as states any required constraints by which the system must abide. SRS also functions as a blueprint for completing a project with as little cost growth as possible. SRS is often referred to as the "parent" document because all subsequent project management documents, such as design specifications, statements of work, software architecture specifications, testing and validation plans, and documentation plans, are related to it.

Requirement is a condition or capability to which the system must conform. Requirement Management is a systematic approach towards eliciting, organizing and documenting the requirements of the system clearly along with the applicable attributes. The elusive difficulties of requirements are not always obvious and can come from any number of sources.

## **4.1 INTRODUCTION**

Early work in the field of helping the blind derived its importance on developing scientific methods to cure partial blindness. In response to this popular discourse, technology seeped in the cracks of science to not only improve the standard of living but also to engage in curing blindness. According to the WHO, the estimated number of people visually impaired in the world is 285 million, 39 million blind and 246 million have low vision; 65 % of people visually impaired and 82% of all blind are 50 years and older.

### **4.1.1 Purpose**

The project “Vision” is an automated system for visually impaired individuals. We are focusing on providing ease of use and multiple functionalities consolidated within an android application to help We are looking to build an Android Application to close the gap between what is and what could be. The main objective of the project is to involve facilities like Image recognition and Image labelling.

### **4.1.2 Need/Motivation**

The motivation for this particular topic is derived from the lack of cheaply available options for visually impaired individuals. According to the study in Lancet, 8.8 million blinds in India in 2015. But these numbers are expected to decrease according to a recent excerpt in the Hindustan Times which states that, “The government is set to change a four-decade-old definition of blindness to bring it in line with the WHO criteria and ensure the Indian data on blindness meets the global estimates. The change in definition will bring down the number of blind persons by 4 million in India.”

## 4.2 Requirements

### 4.2.1 Functional Requirements

- It should provide good UI for an individual to work upon.
- It should be able to geo-tag objects which are of primary use to the user.
- Secure registration and profile management facilities for different users.
- It should provide details like navigation, image labelling, etc.
- It should generate alerts via notifications to the user's mobile device.

### 4.2.2 Non-Functional Requirement

#### 4.2.2.1 Safety Requirements:

If there is extensive damage to a wide portion of the database due to catastrophic failure, such as a disk crash, the recovery method restores a past copy of the database that was backed up to archival storage (typically tape) and reconstructs a more current state by reapplying or redoing the operations of committed transactions from the backed-up log, up to the time of failure. We are implementing database features with Firebase by Google, hence all the user data stored will be safely handled and in case of an application crash, the data can be reloaded and replicated without assistance.

#### 4.2.2.2 Security Requirements:

Firebase Authentication provides backend services, easy-to-use SDKs, and ready-made UI libraries to authenticate users to your app. It supports authentication using passwords, phone numbers, popular federated identity providers like Google, Facebook and Twitter, and more

Firebase Auth will provide the authentication and validation that is required to protect the user data and details provided during the time of registration.

#### **4.2.2.3 Software Quality Attributes:**

- **AVAILABILITY:** Since we are using facilities like
- **CORRECTNESS:** The system should generate an appropriate report about different activities of the lab and should keep track of all records.
- **MAINTAINABILITY:** The system should maintain correct schedules of labs and the documentation of all the lab equipment.
- **USABILITY:** The system should satisfy the maximum number of users' needs.

#### **4.3 Hardware Requirements**

- Pentium IV or higher, (PIV-300GHz recommended)
- 256 MB RAM
- 1 Gb hard free drive space

#### **4.4 Software Requirements**

- Android
- Adobe XD
- Java
- Android Device: Icecream Sandwich version or later
- Firebase
- Operating System: Windows 10 / Windows XP

## Chapter 5

# SYSTEM ANALYSIS

Analysis is the process of finding the best solution to the problem. System analysis is the process by which we learn about the existing problems, define objects and requirements and evaluates the solutions. It is the way of thinking about the organization and the problem it involves, a set of technologies that helps in solving these problems. Feasibility study plays an important role in system analysis which gives the target for design and development.

### 5.1 Feasibility Study

All systems are feasible when provided with unlimited resource and infinite time. But unfortunately, this condition does not prevail in practical world. So, it is both necessary and prudent to evaluate the feasibility of the system at the earliest possible time. Months or years of effort, thousands of rupees and untold professional embarrassment can be averted if an ill-conceived system is recognized early in the definition phase. The prime focus of the feasibility is evaluating the practicality of the proposed system keeping in mind a number of factors. The following factors are taken into account before deciding in favour of the new system.

### 5.2 Economical Feasibility

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Vision application will be economically viable to all the users as it will be an open-source application and reduces the need for manual aid.



### **5.3 Technical Feasibility**

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system. Keeping in view the above fact, nowadays all organizations are automating the repetitive and monotonous works done by humans. The key process areas of the current system are nicely amenable to automation and hence the technical feasibility is proved beyond doubt.

## Chapter 6

# SYSTEM DESIGN

Design is a meaningful engineering representation of something that is to be built. It is the most crucial phase in the developments of a system. Software design is a process through which the requirements are translated into a representation of software. Design is a place where design is fostered in software Engineering. Based on the user requirements and the detailed analysis of the existing system, the new system must be designed. This is the phase of system designing.

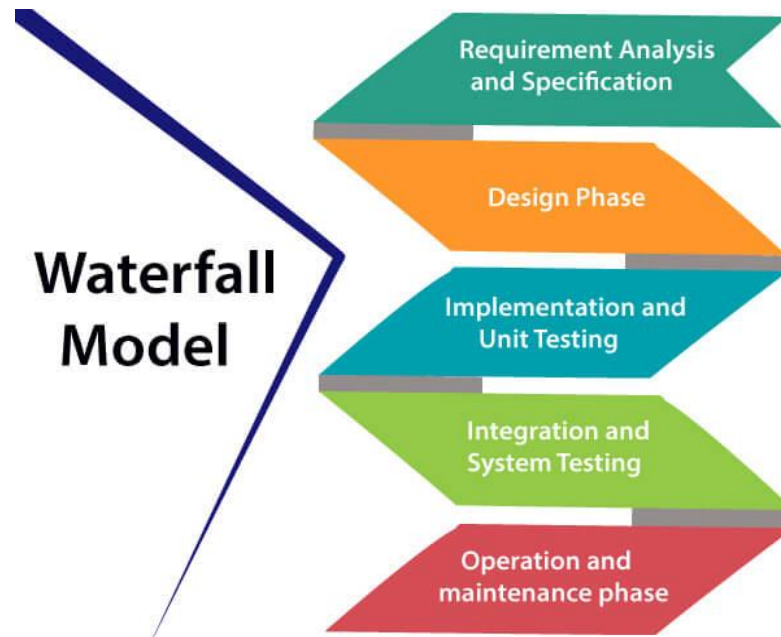
Design is the perfect way to accurately translate a customer's requirement in the finished software product. Design creates a representation or model, provides details about software data structure, architecture, interfaces and components that are necessary to implement a system. The logical system design arrived at as a result of systems analysis is converted into physical system design.

### 6.1 Product Features

The major features of Vision Application are listed below.

- Unauthorized access is prevented. Because only authorized user can address the complaints and access the resources.
- The user will be able to use Image Recognition and Image Labelling features for object detection.
- Users can Geo-tag objects of primary use to them and will be navigated to that object.

## 6.2 Waterfall Model



### Advantages of the Waterfall Model

- Clear project objectives.
- Stable project requirements.
- Progress of system is measurable.
- Strict sign-off requirements.
- Helps you to be perfect.
- Logic of software development is clearly understood.
- Production of a formal specification.
- Better resource allocation.
- Improves quality. The emphasis on requirements and design before writing a single line of code ensures minimal wastage of time and effort and reduces the risk of schedule slippage.

- Less human resources required as once one phase is finished those people can start working on to the next phase.

### **6.3 Use case Diagram:**

A use case defines a goal-oriented set of interactions between external entities and the system under consideration. The external entities which interact with the system are its actors. A set of use cases describe the complete functionality of the system at a particular level of detail and it can be graphically denoted by the 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.

In software and systems engineering, a use case is a list of steps, typically defining interactions between a role (known in Unified Modelling Language (UML) as an "actor") and a system, to achieve a goal. The actor can be a human, an external system, or time.

In systems engineering, use cases are used at a higher level than within software engineering, often representing missions or stakeholder goals. The detailed requirements may then be captured in Systems Modelling Language (SysML) or as contractual statements.

The Sequence of activities that are carried out are the same as the other diagrams .Use case for this module indicates the users interaction with the system as a whole rather than individual modules .All the encryption mechanisms are carried out via the login page that redirects the user to the particular functionality that he or she wishes to implement .

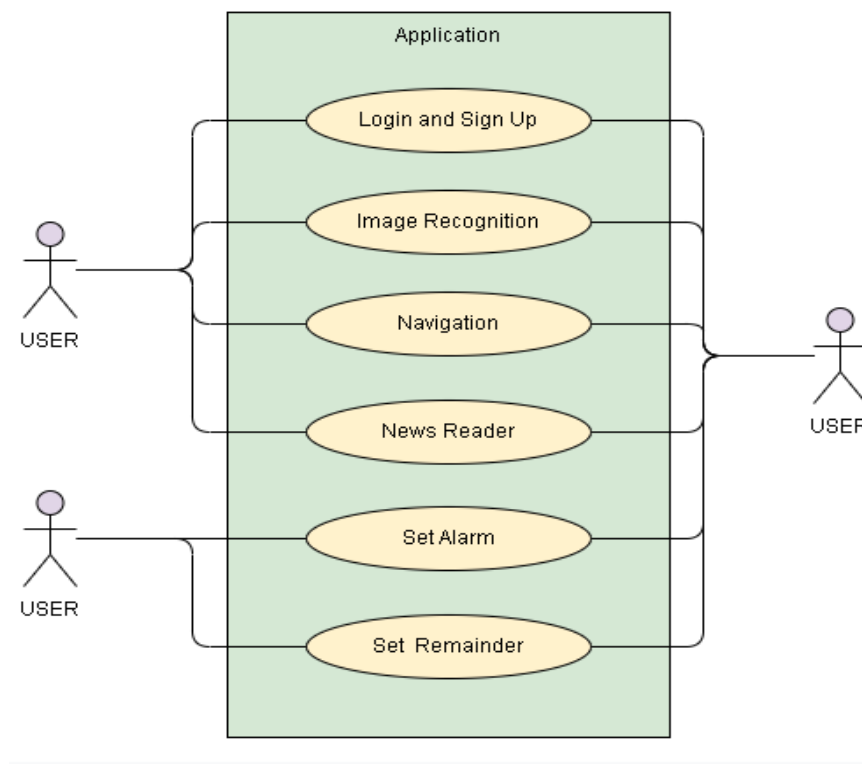


Fig: Use case Diagram

### 6.4 Sequence Diagram:

Sequence diagram are an easy and intuitive way of describing the behaviour of a system by viewing the interaction between the system and the environment. A sequence diagram shows an interaction arranged in a time sequence. A sequence diagram has two dimensions: vertical dimension represents time; the horizontal dimension represents the objects existence during the interaction.

A Sequence diagram is an interaction diagram that shows how processes operate with one another and what is their order. It is a construct of a Message Sequence Chart. A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations

in the Logical View of the system under development. Sequence diagrams are sometimes called event diagrams or event scenarios.

A sequence diagram shows, as parallel vertical lines (*lifelines*), different processes or objects that live simultaneously, and, as horizontal arrows, the messages exchanged between them, in the order in which they occur. This allows the specification of simple runtime scenarios in a graphical manner.

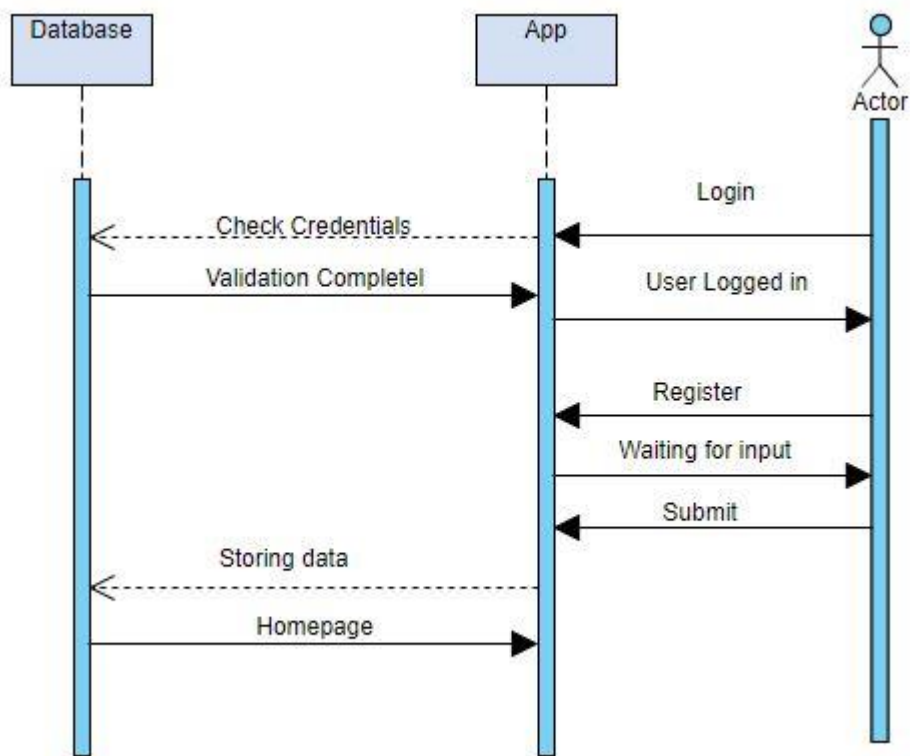


Fig: Sequence Diagram

## 6.5 Class Diagram:

In software engineering, a class diagram in the Unified Modelling 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 modelling. The classes in a class diagram represent both the main objects, interactions in the application and the classes to be programmed.

In the diagram, classes are represented with boxes which contain three parts:

- The top part contains the name of the class. It is printed in bold and centered, and the first letter is capitalized.
- The middle part contains the attributes of the class. They are left-aligned and the first letter is lowercase.
- The bottom part contains the methods the class can execute. They are also left-aligned and the first letter is lowercase.

In the design of a system, a number of classes are identified and grouped together in a class diagram which helps to determine the static relations between those objects. With detailed modelling, the classes of the conceptual design are often split into a number of subclasses.

In order to further describe the behaviour of systems, these class diagrams can be complemented by a state diagram or UML state machine.

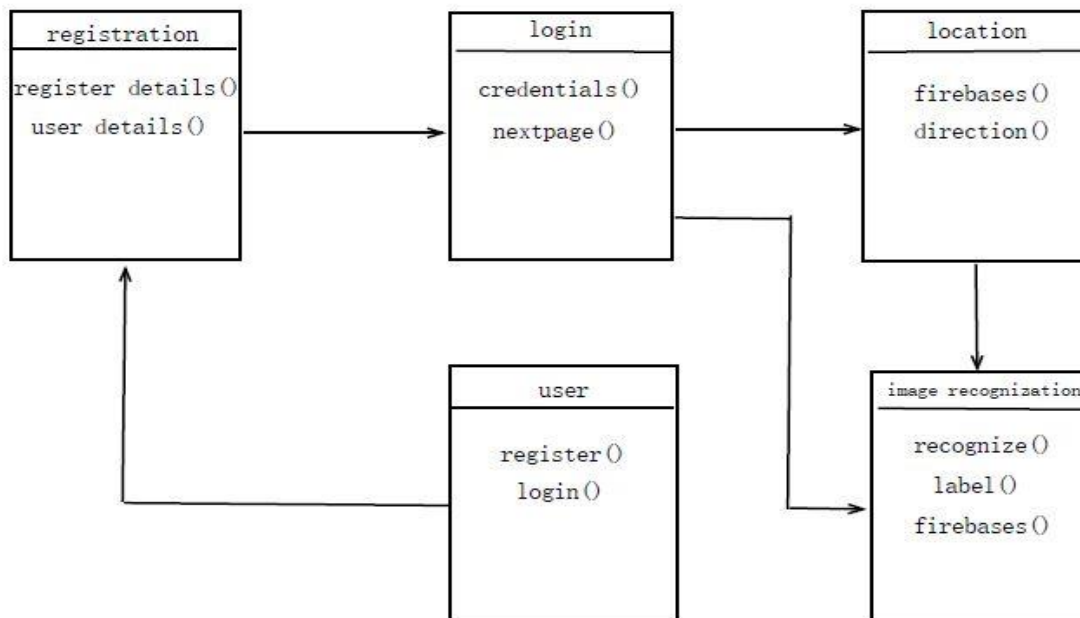


Fig: Class Diagram

Modules:

1. Role of the user:  
The user is initially asked to register if he/she is a new user or user can log in.
2. Registration and Login:  
It includes user registration, including the name, number, etc of the user.
3. Image Recognition  
This module generates recognition services.
4. Location/Navigation.



## Chapter 7

# IMPLEMENTATION

This android application involves four modules. Image recognition, navigation, news reader and time and remainder keeper. Image recognition for the visually impaired to identify the objects in their surroundings. Navigation for the blind to navigate from source to destination without any problem. New reader, reads out the day to day news headlines to the blind users, keeping them updated. time and remainder keeper to help the blind set time and remainders.

### **7.1 Image Recognition Module:**

This module is implemented using TensorFlow. Image recognition helps identify the objects by taking the picture using the phone's camera. The user is supposed to just take the snapshot and the app would label the objects identified in the picture.

### **7.2 Navigation Module:**

Aim is to guide the visually impaired to travel from source to destination. The user can pin a location on the map. And then he or she is guided through the audio commands. This module is implemented using Google API.

### **7.3 News Reader Module:**

This module is voice activated. Reads every day's headlines, so that they can get updated to day to day news. Built from RSS news feed and fed into the application. It is real time based and updates fast.

### 7.4 Time and Remainder keeper:

This module is to help the user or the visually impaired to set time as well as remainder. Making it easier for them as well as the other normal people.

```
package com.example.reminderapp;
import android.arch.persistence.room.Room;
import android.content.Intent;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
public class MainActivity extends AppCompatActivity {
    private EditText user,pass;
    private Button login;
    private TextView register;
    private AppDatabase appDatabase;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        user = findViewById(R.id.editText);
        pass = findViewById(R.id.editText2);
        login = findViewById(R.id.button);
        register = findViewById(R.id.register);
        appDatabase = AppDatabase.getAppDatabase(MainActivity.this);
```

```
RoomDAO roomDAO = appDatabase.getRoomDAO();
UsernamePassword temp = roomDAO.getLoggedInUser();
if(temp!=null){
Intent intent = new Intent(MainActivity.this,MainPage.class);
startActivity(intent);
finish();
}
login.setOnClickListener(new View.OnClickListener() {
@Override
public void onClick(View v) {
loginUser(user.getText().toString().trim(),pass.getText().toString().trim());
}
});
register.setOnClickListener(new View.OnClickListener() {
@Override
public void onClick(View v) {
Intent intent = new Intent(MainActivity.this,Register.class);
startActivity(intent);
finish();
}
});
public void loginUser(String user,String pass){
RoomDAO roomDAO = appDatabase.getRoomDAO();
UsernamePassword temp = roomDAO.getUserwithUsername(user);
//Toast.makeText(this, temp.getPassword(), Toast.LENGTH_SHORT).show();
if(temp==null){
Toast.makeText(MainActivity.this,"Invalid username",Toast.LENGTH_SHORT).show();
```

```
}
else{
if(temp.getPassword().equals(pass)){
temp.setIsloggedIn(1);
roomDAO.Update(temp);
AppDatabase.destroyInstance();
Intent intent = new Intent(MainActivity.this,MainPage.class);
startActivity(intent);
finish();
}
else{
Toast.makeText(MainActivity.this,"Invalid Password",Toast.LENGTH_SHORT).show();
}
}}
}
```

### **7.5 Firebase Authentication:**

Firebase Authentication is implemented which provides backend services, easy-to-use SDKs, and ready-made UI libraries to authenticate users to your app. It supports authentication using passwords, phone numbers, popular federated identity providers like Google, Facebook and Twitter, and more

Firebase Auth will provide the authentication and validation that is required to protect the user data and details provided during the time of registration.

```
package com.example.phoneauth;
import android.content.Intent;
import android.os.Bundle;
```

```
import android.support.v7.app.AppCompatActivity;
import android.util.Log;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import com.google.firebase.auth.FirebaseAuth;
import com.google.firebase.auth.FirebaseUser;
public class MainActivity extends AppCompatActivity {
    private FirebaseAuth firebaseAuth;
    FirebaseAuth.AuthStateListener mAuthListener;
    private String uid;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        TextView text = findViewById(R.id.txtView);
        Button button = findViewById(R.id.signOut);
        firebaseAuth = FirebaseAuth.getInstance();
        FirebaseUser user = firebaseAuth.getCurrentUser();
        if (user != null) {
            text.setText("You are logged in you Uid is: "+firebaseAuth.getCurrentUser().getUid());
        } else {
            Intent intent = new Intent(MainActivity.this, LoginActivity.class);
            intent.addFlags(Intent.FLAG_ACTIVITY_CLEAR_TOP
                | Intent.FLAG_ACTIVITY_NEW_TASK| Intent.FLAG_ACTIVITY_CLEAR_TASK);
            startActivity(intent);
        }
    }
}
```

```
// Log.e("uid",this.uid);
button.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        signout();
        Intent intent = new Intent(MainActivity.this,LoginActivity.class);
        intent.addFlags(Intent.FLAG_ACTIVITY_CLEAR_TOP|Intent.FLAG_ACTIVITY_NEW_TASK|
        Intent.FLAG_ACTIVITY_CLEAR_TASK);
        startActivity(intent);    }
    });
// String phone = firebaseAuth.getCurrentUser().getPhoneNumber();
}
private void signout() {
    firebaseAuth.signOut();
    Log.e("OUT","OUT");
}
```

## Chapter 8

# TESTING

System testing is actually a series of different tests whose primary purpose is to fully exercise the computer-based system. Although each test has a different purpose, all work to verify that all the system elements have been properly integrated and perform allocated functions. The testing process is actually carried out to make sure that the product exactly does the same thing what is supposed to do. In the testing stage following goals are tried to achieve: -

- To affirm the quality of the project.
- To find and eliminate any residual errors from previous stages.
- To validate the software as a solution to the original problem.
- To provide operational reliability of the system.

### 8.1 Testing Methodologies

There are many different types of testing methods or techniques used as part of the software testing methodologies on mobile applications. Some of these testing methodologies are:

#### 8.1.1 Structural Testing:

Mobile application languages add some specific constructs for managing mobility, sensing, and energy consumption. The peculiarities of those new programming languages have to be taken into account when producing control or data flow graphs (and their respective coverage criteria) out of the mobile programming language. (Potentials and Automation): New coverage criteria (and if needed, new control and data flow graphs) shall be thought as a way to consider at best the new

mobility, sensing, and energy constructs. In case the source code is not available, new bytecode analysis tools can be realized.

### **8.1.2 Functional Testing:**

Mobile applications functional testing requires to specify both the application and the environment it may operate in (especially in MobileApps). (Potentials and Automation): state-based approaches can be particularly useful to specify the different states a mobile application may reach when different sensed data are received. We can expect to model the ranges of value an environmental variable can get, and model the impact of various environmental inputs into the application under test. We can also use state-based approaches to model different execution modes (e.g., low battery, meeting, and flying mode) the system can be.

### **8.2 Performance and reliability testing:**

Performance and reliability of mobile applications strongly depends on the mobile device sources, on the device operational mode, on the connectivity quality and variability, and other contextual information. (Potentials and Automation): new techniques for performance and reliability analysis have to explicitly consider characteristics related to (changing) contexts and different devices. Runtime analysis techniques can also be adopted to monitor the resources and connectivity state and prevent performance degradation.

### **8.3 System Testing:**

System testing in this thesis work will be represented by Specification-based testing. Testing efforts to reach certain level of perfection by detecting all the faults which are in implementation. The best way to perform any testing is to select test case that satisfy certain criteria. These criteria are depending on the nature of application and the scope.



## 8.4 Usability Testing

Validating a mobile native app generally involves testing mobile device-based gestures, content, interfaces, and the general user experience—for example, how the user interacts with the camera, GPS, or a fingerprint sensor. In contrast, usability testing for mobile Web apps typically focuses on Web-based GUI content, interfaces, and user operation flows. For example, a mobile travel app such as Dwellable ([www.dwellable.com](http://www.dwellable.com)) supports travel information and related content on mobile browsers in different languages based on user location. Validating such mobile application needs mobile usability testing to assure the quality of mobile Web content as well as its presentation formats, styles, and languages.

## 8.5 Mobility Testing

Mobility testing on a native device usually involves testing the device's location-based functions, features, data, profiles, and API. For example, a mobile travel app's content should be delivered and presented to users based on their current location; this would include airport information, rental service offices, maps, and attraction points and related data. If the device cannot accept that data, the testing engineer needs to know that. In contrast, testing mobility for mobile Web apps focuses on testing the quality of location-based system functions, data, and behaviours.

## 8.6 GUI Testing:

Two are the main challenges we foresee in GUI testing of mobile applications:

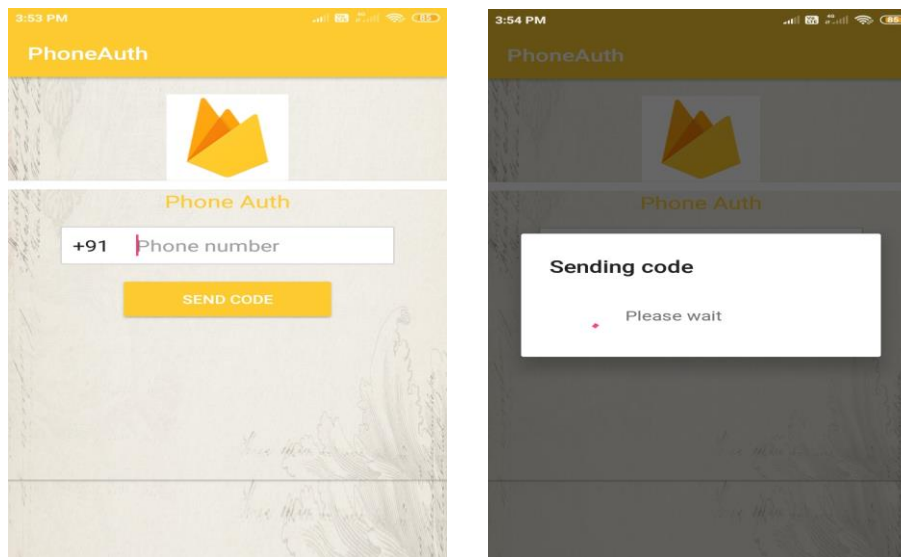
- i) To test whether different devices provide an adequate rendering of data, and
- ii) To test whether native applications are correctly displayed on different devices.

## Chapter 9

### SCREENSHOTS WITH DESCRIPTION

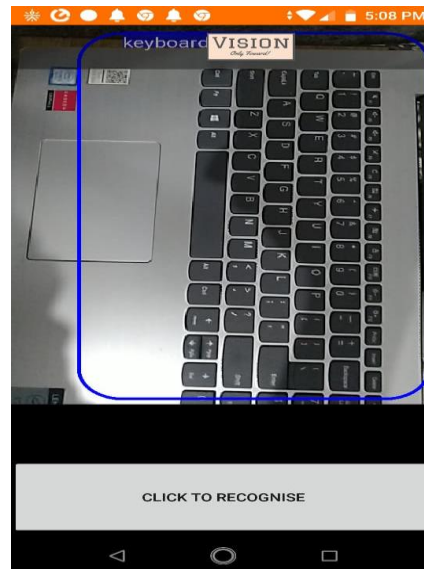
#### 9.1 Login Page:

We use Firebase Authentication to sign in a user by sending an SMS message to the user's phone. The user signs in using a one-time code contained in the SMS message.



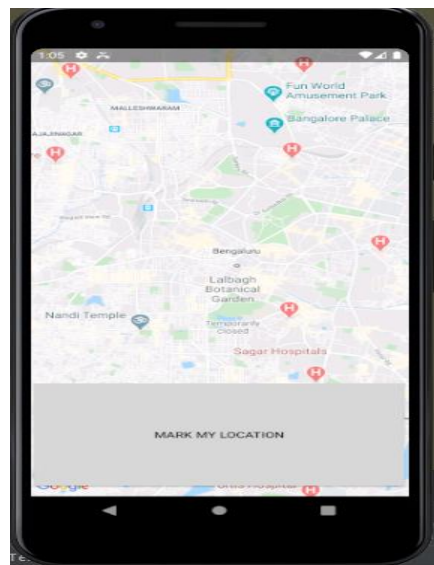
#### 9.2 Image Recognition:

Image Recognition refers to the task of inputting an image into a neural network and having it output some kind of label for that image.



### 9.3 Navigation:

- Aim is to guide the visually impaired to travel from source to destination.
- The user can pin a location on the map.
- And then is guided through audio commands.



## 9.4 News Reader:

It is voice activated. Reads every day's headlines. Built from RSS news feed and fed into application. It is real time and updates fast



## Chapter 10

# CONCLUSION AND FUTURE SCOPE

We have presented an Android application for the assistance of the visually challenged user that will guide the user in navigating from his source to destination as well as it will help him in acknowledging his contacts about his location. The app was developed and Google Maps were integrated to search different locations on map. SMS sending module is integrated to the app, on triggering SMS button SMS to registered users is sent with the user's current location. The application requires internet connectivity and GPS enabled smart-phone and thus can be easily accessed by the user. Thus, the developed application is more accurate than the existing systems. The use of the application will surely ease some of the difficulties faced by visually challenged users and can help them in achieving an independent livelihood.

The government is set to change a four-decade-old definition of blindness to bring it in line with the WHO criteria and ensure the Indian data on blindness meets the global estimates. The change in definition will bring down the number of blind persons by 4 million in India by 2020.

We are looking to be part of that goal and do our part for the society.

## Chapter 11

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