

# Android Application for Visually Impaired People “Secure Navigation Tool”

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**Abstract:** This paper describes the technologies for blind peoples using Android. It is designed to provide dynamic interaction and the ability to change to fit changed circumstances guided with the use of Audio instructions, Face detection, Locationtracker, Red zone alert, Text to Speech conversion, Image reading. Eventually, the project focused on challenging task for these people is independent navigation new spaces, buildings, environments. The environment is usually signaled and labeled with visual marks and signs which are not appropriate for blind persons. With the purpose of balancing the access to services and spaces among all persons, this work proposes an innovative navigation and information system to help the navigation of blind people within new environments e.g. shopping center, public office building.

**Keyword:** Visually Impaired Persons, Navigation System, GPS, Android Location, OCR, TTS

## I. INTRODUCTION

In this project we designed a navigation system for blind people in order to provide precise location information. Suggested system, as an independent program, is fairly cheap and it is possible to install onto Smart phone held by blind people. This allows blind people to easy access the program.

The developed service utilized Smart Phone in order to search route between the current locations of user to the destination and provide a voice-navigation.

Our proposed system is an android mobile phone application consisting of Google Map, DisasterManagement Server (DMS) as third party server. If the user of application is in probable disaster affected area then user will get visual and audio disaster warning and evacuation help on the map of the activities affected by visual impairment, navigation play a fundamental role, since it enables the person to independently move in safety. The heterogeneous environment, easily perceived by visually enabled people, is hardly known by the application. This system helps out to both normal and blind people to reach to the nearest safe place prior to disaster.

The use of mobile applications does not necessarily need to be limited to sighted people. When object recognition is applied to faces, it can be used for identification. Face recognition is a suitable method for assisting visually impaired persons in identifying people compared to other biometric methods such as fingerprint, iris and voice recognition.

## II. RELATED TECHNOLOGY

Following are the related technology:

### 1. Android:

Android is a software stack and mobile operating system that includes the operating system for portable devices, middleware, user interface, and a standard application (Web Browser, Email Client, SMS), multimedia message service (MMS). Android developers were able to write applications in the Java language, a runtime library that can run the compiled byte code (Java Runtime Library).

In addition, it provides the required application through the Android Software Development Kit (SDK) to develop a variety of tools and APIs. Android works on the Linux kernel and the Android system uses C / C ++ libraries, etc. are included. Android, unlike existing Java virtual machines, uses a Java application made of Dalvik Virtual machine that runs on a separate process.

A construction of Android is shown in figure as followed. In these construction components, it is divided into a total of 5 classes of application, application framework, library, Android runtime, and Linux kernel. Handset layout platform is adaptive to expand 3D graphic library based on OpenGL ES1.0, VGA, and 2D graphic library, and it uses SQLite database software for a purpose of data storage. Android supports connection technologies including GSM/EDGE, CDMA, EV-DO, UMTS, Blue Tooth, and Wi-Fi.

It also supports a web browser based on an open source, Weskit application framework and it allows the usage of touch screen that is supported by additional hardware, GPS, acceleration sensor, compass sensor, and 3D graphic acceleration.



### Platform usage-

Charts in this section provide breakdowns of Android versions, based on devices accessing the Google Play Store in a seven-day period ending on April 3, 2017. Therefore, these statistics exclude devices running various Android forks that do not access the Google Play Store, such as Amazon's Fire tablets.

Version	Code name	Release date
2.3	Gingerbread	February 9, 2011
4.0	Ice Cream Sandwich	December 16, 2011
4.1	Jelly Bean	July 9, 2012
4.2	Jelly Bean	November 13, 2012
4.3	Jelly Bean	July 24, 2013
4.4	KitKat	October 31, 2013
5.0	Lollipop	November 3, 2014
5.1	Lollipop	March 9, 2015
6.0	Marshmallow	October 5, 2015
7.0	Nougat	August 22, 2016
7.1	Nougat	October 4, 2016

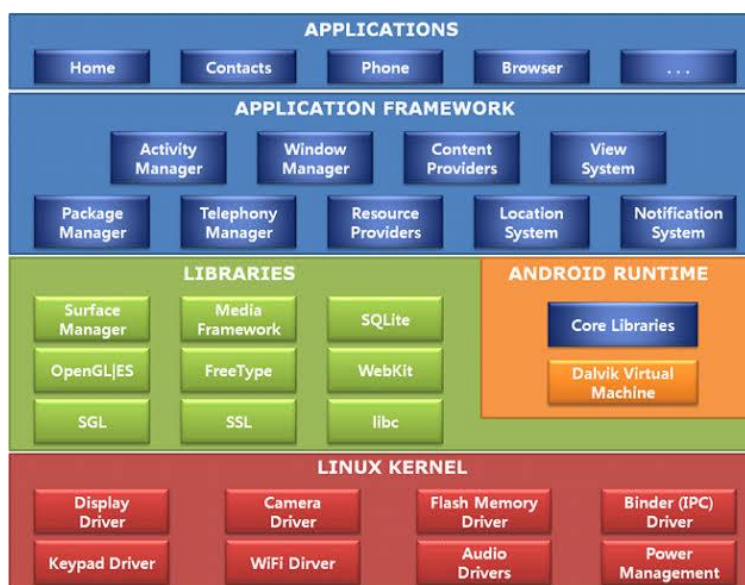


Fig. construction of Android components

## 2. LBS (Location-Based System)

LBS service indicates a wireless contents service that provides certain information based on the location change of the user. Developers of mobile handset have voluntarily tried to install LBS within their devices. However, LBS were originally developed by telecommunication companies' mobile contents providers. Main benefit of the system is the fact that the users don't have to directly insert location as they move.

GPS positioning technology is one of important technologies that allow easier excess of wireless internet service. However, in order to lateralize LBS, there are more related technologies other than GPS and satellite based technologies.

Within mobile communication network, there exists a management mechanism in order to manage a mobility of cell phone and there are many GPS LBS service based on the mechanism. Movements of LBS can be seen in three different parts; Positioning technology, lay-administered platform and location application.

**1) Positioning Technology:** Service provider can predict any location using GPS chip within wireless device. In this case, the positioning technology directly manages a calculation of location using received signal from satellite. Once



the calculation is done, a variety of information can be received through mobile communication network. Depending on Mobile communication network or location information service, the system sometimes uses a single base station based information, rather than multiple base stations. Since mobile communication network, characteristically, constantly manages the mobility of cell phones, this positioning technology method can be a method of providing LBS without any additional position technology and any calculation from requests of location. The accuracy of location estimation is at the maximum when the location was estimated using GPS and the matching satellite based location prediction method. On the other hand, a base station method has the lowest accuracy of predicting location since it only allows predicting a certain part of region rather than a coordinate. LBL service can be materialized using other methods other than what are currently shown. Within current mobile communication network, there exists a variety of end terminals that have different method of predicting location. Therefore, normal mobile communication companies combines GPS, A-GPS and a base station based method to provide LBS.

**2) Lay-administered Platform:** A lay-administered platform is a general word for LBs service components that achieves and process user location from position technology and provides information to application through an interface with network. Within network models based on GSM, CDMA, GMLC(Gateway Mobile Location Center) has been defined as a facility that request a base station based routing information by interlocking with management system in the inner part of mobile communication service and functions as a gateway of interlocking with LBS application within IP network. These GMLC can be sorted out to be one of LBS platforms within mobile communication network.

**3) Location application:** This application represents a service that provides already processed contents based on locations of individual user or an object through communicating with lay-administered platform or that can manage collected location information.

Within mobile communication network, this application can be separated into Location Application server and Location contents server. Location Application Server is nicknamed as 'LBs Platform' and it is a facility of mobile communication network that simultaneously provides extra service based on basic location and a gateway for the outer contents service. Typical contents service or areas of solution are telematics, WAP service based on location, emergent safety call service, map combined with GIS and a region service.

### III. GOALS AND OBJECTIVES

Following are the goals and objectives of our dissertation:

1. The blind person to independently move in safely
2. Face detection and Recognition system for security purpose
3. Location tracker
4. Alert for Red zone
5. Text to Speech conversion
6. Image reading

### IV. SOFTWARE REQUIREMENTS

**I. Performance Requirements:** It is stated that application should take less computation time fore.g. a module may have to execute within a spaced elapsed time, or a use less than the special amount of CPU time, or consumed less than specified amount memory, consumes less battery power and requires fewer satellites for GPS that the user position by calculating differences in the times the signals, from different satellites, take to reach the receiver. Compliance with these constraints should be tested as directly as possible. Performance requirement should calculate above constraints. They may be specified as:

1. Worst case (if any) i.e. acceptable
2. Best case value, to show when growth potential is essential. The project required internet connection for making connection between mobile user and GPS.

**II. Security Requirements** Debug app selects the application that will be debugged. You do not need to set this to attach a debugger, but setting this value has two effects:

1. It will prevent Android from throwing an error if you pause on a break point for a long time while debugging.
2. It will enable you to select the Wait for Debugger option to pause application start up until your debugger attaches.

### III. Safety Requirements

1. Android enables you to set a number of options that will make it far easier to test and debug applications.
2. It is very buggy with occasional crashes. This Android Application automatically debugs these crashes, as there is a default debugger in the application.



## V. SOFTWARE QUALITY ATTRIBUTES

**1. Maintainability:** All the modules must be clearly separate to allow different user interfaces to be developed in future. All development will be provided with good documentation.

**2. Practicality:** The design of the system meets the practical requirements as much as possible.

**3. Usability:** Usability is concerned with how easy it is for user to accomplish a desired task and the kind of user support our system performed. The user interface will be clear and easy to use.

**4. Availability:** Availability is concerned with system faults. System failures occur when the system no longer delivers a service consistent with its specifications. The availability of a system is the probability that it will be operational when it is needed.

**5. Modifiability:** The system should be modifiable. Modifiability is concerned with what can change and when and who do it.

**6. Performances:** The response time utilization and throughput behavior of the system. Care is taken so as to ensure a system with comparatively high performance.

**7. Understandability:** The interface element should be easy to understand. Ambiguous naming should be avoided.

## VI. SOFTWARE INTERFACES

The system can be on Windows, Linux.

Application User Requirement:

1. Smart-phones with Android OS
2. Internet support
3. GPS support
4. Android OS version 4.2.2 or higher

## VII. ACTIVITIES

1. Activity diagram describes the flow of control in a system. So it consists of activities and Links. The flow can be sequential, concurrent or branched.

2. Activities are nothing but the functions of a system. Numbers of activity diagrams are prepared to capture the entire flow in a system.

3. Activity diagrams are used to visualize the flow of controls in a system. This is prepared to have an idea of how the system will work when executed.

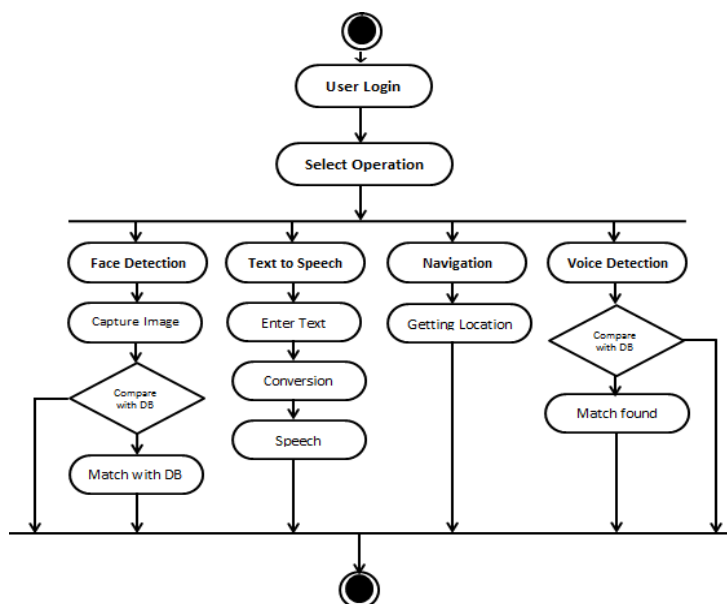


Fig. Activity Diagram



## VIII. SOFTWARE TESTING

Android provides an integrated framework that helps you test all aspects of your app. The Android platform and Testing Support Library include tools and APIs for setting up and running test apps within an emulator or physical device. This section provides an overview of the methodologies used for testing and debugging of some of the key features and components of the application, issues encountered and lessons learnt.

Key performance enhancements are then described, followed by a comparative evaluation of the Android platform across a set of standard micro-benchmarks. The focus of our test strategy was primarily functional and end-to-end testing due to the limited development time frame, novelty of the platform and the sheer variety and number of components involved. The Android SDK provides a set of integrated development and testing tools that include a built in emulator, debugger, logger, and device drivers that allow running applications on an Android phone. The emulator was used extensively in the initial development and testing of the application.

### Type of Testing:

**I. Unit Testing:** Unit tests try to detect if all application functions work correct individually.

**a. Local Unit Tests:** Unit tests that run on your local machine only. These tests are compiled to run locally on the Java Virtual Machine (JVM) to minimize execution time. Use this approach to run unit tests that have no dependencies on the Android framework or have dependencies that mock objects can satisfy.

**b. Instrumented unit tests:** Unit tests that run on an Android device or emulator. These tests have access to Instrumentation information, such as the Context of the app you are testing. Use this approach to run unit tests that have Android dependencies which mock objects cannot easily satisfy.

**II. Integration Testing:** Integration tests try to detect if all these functions are accessible in our application and they are properly integrated.

**a. Components:** within the app only this type of test verifies that the target app behaves as expected when a user performs a specific action or enters a specific input in its activities. For example, it allows you to check that the target app returns the correct UI output in response to user interactions in the app's activities. UI testing frameworks like Espresso allow you to programmatically simulate user actions and test complex intra-app user interactions.

**b. Cross-app Components :** This type of test verifies the correct behavior of interactions between different user apps or between user apps and system apps. For example, you might want to test that your app behaves correctly when the user performs an action in the Android Settings menu. UI testing Frameworks that support cross-app interactions, such as UI Automated, allow you to create tests for such scenarios.

**III. System Testing:** Location-based testing approaches are rather new and motivated by the strong increase in the use of mobile applications with location-aware capabilities. This section introduces our testing model and explains how this model can help in enhancing the testing procedure of location-based mobile apps

**IV. Black-box testing:** Although many existing mobile apps are open source, our work concerns testing of valid functioning of services associated to app nodes.

## IX. RESULTS

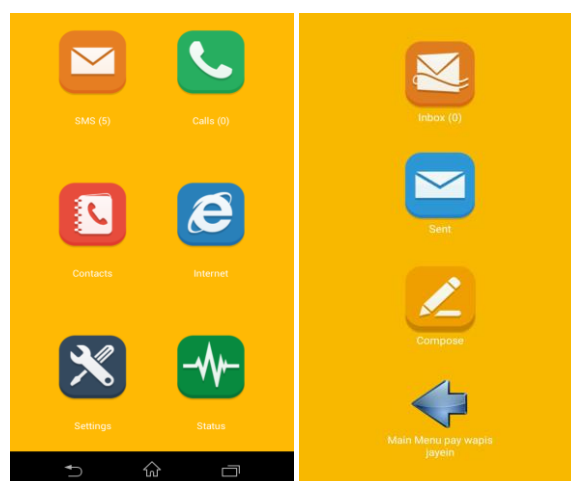


Fig.Home Screen Fig.Msg Screen

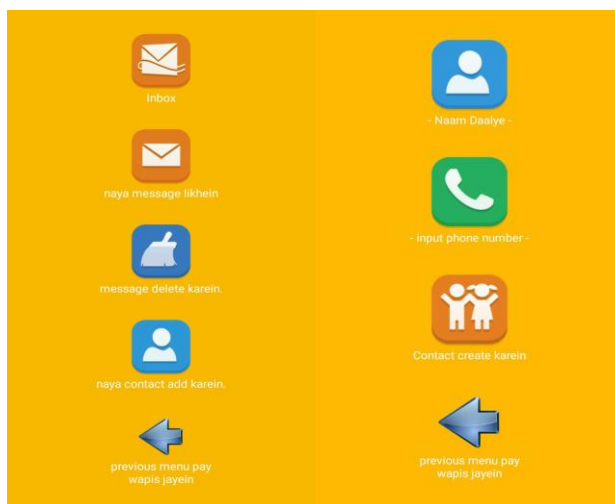


Fig.Inbox Screen Fig.Create new contact

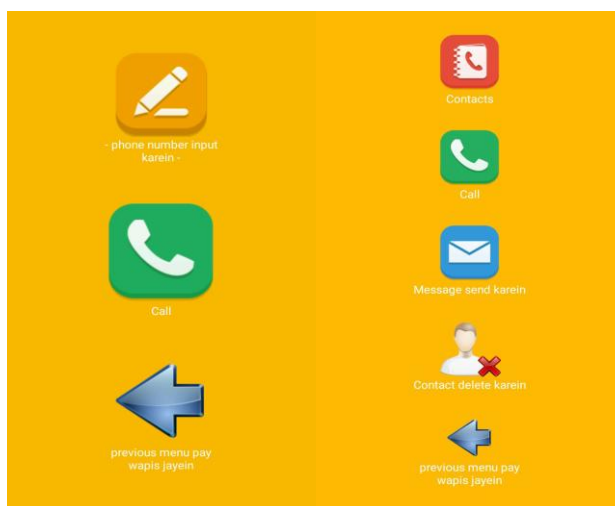


Fig.Call Dialing Screen Fig.Call Logs Screen

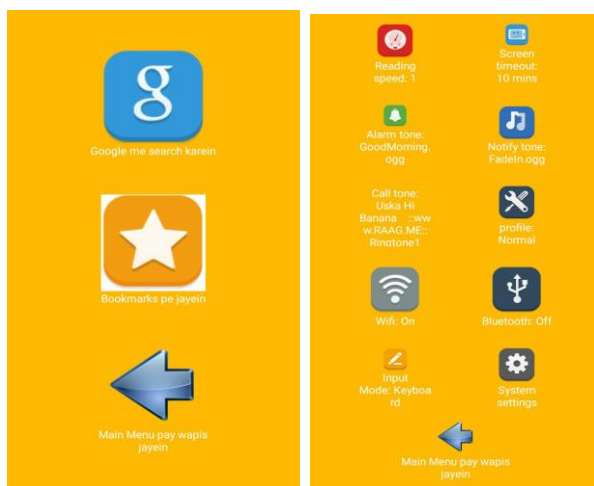


Fig.Browser Screen Fig.Setting Screen

**X. CONCLUSION AND FUTURE SCOPE**

Blind people are frequently faced with the lack of appropriate signaling when visiting new environments. Such Difficulties often lead blind people to avoid spaces ideally designed for everyone.Thus, with the intention to promote



the integration of blind people in society, we proposed a new approach based normal Smart phone and wireless sensors spread among the environment.

Our Product proposes a developing an Android Application which is based on Location alarm provides different location based services like profile changing of mobile for certain places that user registered, nearby places, location tracking, nearest locator, member location finder. Here for finding location the GPS technology with Google Map API caused. Emergency alarm is a new feature updated in our system for the security purpose of user.

As this application is open source, so can be runnable on other smart phones. Finding out desired destination, nearby places, location tracking, notification Alarm etc. are all in one is not implemented. We have an alternative way for locating user's current position is network provider. By Using Latest communication technology this application can be further implemented efficiently and faster.

Hence we conclude that our project will definitely minimize the complexity of manually remembering events, locations, appointments and time. This will lead to increase the transparency, security, privacy services to all the users.

#### Future scope:-

1. Add-on services
2. Finger Print Scanner
3. Connectivity through Facebook-Use Facebook Friend list for recognizes the people (Face Detection).

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