

ANDROID APP “ONDHER JOSTHI / BLIND’S EYE”

For BLIND

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

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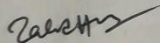
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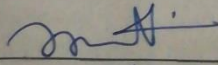
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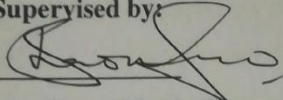
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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Mr. Shaon Bhatta Shuvo, Lecturer, Department of Computer Science & Engineering** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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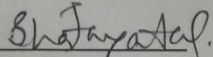


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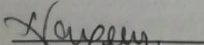
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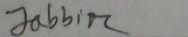
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Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

This report and application aim to develop a mobile application which will work as a third hand of a blind, will help and facilitate to operate a mobile phone. There are very few other applications on this sector but have lot of lacks alongside. Plenty of additional features have been added with it and made it as complete as possible and further up-gradation will in loop. A massive level usage is targeted on blind and disable faction. So it is very important aspect to design the user interfaces so that it becomes easily understandable by the targeted one. Also the platform needs to be dynamic so that information are synched. As this application has social impact, it is believed that, it will earn success by blind to reduce one's complexity & make their lifestyle at ease. We usually have the sights that a blind man is supposed to restrain to freely involve with his mobile phone as he has not his visual sight. We also concede that the mobile phone companies don't produce products which are blind-friendly. But we are living in a digital age and our country is thriving as a digital country. So, here is no less importance to involve the blind in digital era. We as a team, realize that here is social responsibility to be friend with the blind and disable one. On that particular point we have a kick to develop this app. This app has some unique features such as weather update, knowing present location, make a call, search a number in phonebook, know date and time, read and write a mail, read and write a text message, play music, search in google etc. by just using the voice command. As the blinds are not able to visualize, the voice aide in the app helps them what they need and directs them on their inquiry.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

According to a WHO^[1] report of 2014, the rate of visually impaired child under 5 years in Bangladesh is 46 per 1000, in 1993 which was 133. But this number of child might be an asset for us if they would get an access to digitalization. And new target to achieve Sustainable Development Goal^[2] of United Nations by 2030, where we are committed to ladder up our digital phenomena up to the mark. At the same time, we have to ponder and assure the fair-front of the lagged faction. To achieve these targets we have to overcome a number of challenges. The very first challenge is toppled up the obstacle to the path of digitalization^[3]. To achieve this we have to ensure the access of digital sector of all sphere of society. A large part of common people are still out of privileged and they are blind. Instead of going to privileged them, they are predominantly under-privileged. Besides, there are some other problems, including not taking proper care of this faction, avoiding responsibility. To reduce the irk of visually impaired people, we develop this “**Ondher Josthi / BLIND’S EYE**” to add value in social welfare.

1.2 Motivation

The best motivation after this application is social responsibility. Till now in our country, most of the people are not aware of this part which is very important to know very well. Besides city people, village people are totally ignorant of it.

Rate of impaired people is also not avoidable. There is not sufficient awareness program or activity to make their life out of complexity. As internet usage is growing like beyond anything, they need to be succinct to all form of digitalization.

Moreover, we want to convert this faction into a workforce. Here is so many digitalized job^[4] has been sprouting out. Whether they are capable to adapt with this digital platform, they may have a huge opportunity to chase a job and comfy the hurdles in their life.

1.3 Objective

The main objective of our project is to reduce the complexity of the visually impaired people. We provide all types of tutorial and tips about the app, how to operate it which is featured by voice command. The blind one can easily familiar with the features as they need not learn it via other through. The main challenge of our project is that, how can we reached our project at the highest level approach and how much it will be more user friendly .We also want to make a communication chain between the blind and the admin.

As this application will be on mobile and internet based, target is to be used by mass people. It will be easily accessible and very easy to understand. By this, objective is inclusion of mass people into this. Thus the main goal which is reducing the hurdles and despair of the mass and blind.

1.4 Expected Outcome

Expected outcome is one mobile application which will work as guideline or advisor for a blind-one. It will create popularity among the mass people too. It will be used as massive level among all people of Bangladesh. The more it gets matured, more blinds and despair one will use this application which will be a gateway of digital Bangladesh. Ultimately it will become helpful under-privileged one.

1.5 Report Layout

Chapter 1 contains objective, moral and motivation and ultimate assessment of the current scenario of the targeted faction.

Chapter 2 is all about background of this application. In this chapter relevant works, comparative analysis and scope of the problem is described.

Chapter 3 is about requirements of the application. It includes requirement collection, analysis, data modeling, logical data modeling and design requirements.

Chapter 4 will talk about design of the project. It includes screen design, backend design and interaction design.

Chapter 5 contains the information regarding implementation & testing of the project.

And finally chapter 6 is having conclusion and further scope of the developments.

CHAPTER 2

BACKGROUND

2.1 Introduction

This chapter is having details of related works and apps which are existing now, comparative analysis and sorting out the pros and cons. In this chapter, detail scopes of the application is also explained. Challenges would be faced are also outlined here.

2.2 Related Works

There are lot of apps exist ^[6] not-meticulously on ease the blind's lifestyle, mostly are in famous, unlike this will determine the complexities and make it easier to live. There are other type of application which works as path-finder calculator or command them on their walkway. There is another section of application who deals with send and read mail, location, message read out, play music and hit a call and receive a call. It gives update weather. None of the other can provide these particular features. There are so many apps named as-Ideal Accessibility Installer, Scan Life Barcode, QR Reader, Talk Back, Font Installer Root etc. Here, Ideal Accessibility Installer just work in three features- KickBack, TalkBack, and Sound Back. Scan Life Barcode can just read barcode and QR code for the blind. TalkBack works as a part of Google's Android Accessibility Service and just in online. Font Installer Root works a dealing tool. But we come up with a combo package and providing kind of all necessary assistance in this particular app.

2.3 Comparative studies

With this app, blind no need to depend on their but this app only. It provides day to day necessary features like make a phone call and texting and send a Gmail by just only their voice command, is revolutionary.

It also has setting reminder facility for any important task to do like meeting with doctor, taking medicine etc.

It also directs them the location with voice command, which is a ground breaking feature. The comparative analysis is given below-

Table 2.1: Comparative studies among different apps

Features	Existing Apps	Ondher Josthi
Email	No app in familiar	Read and Write
Reminder	Yes, but just in shallow form	As whole as To-Do list
Phone-call	Online	Online and Off-line both.
Location	Online	Online and Offline location tracker
Play music	Yes, but only in google now	Resume or pause the music in a compact app
Google search	No	Search in google by voice command
Time	No, not in any apps	Yes

2.4 Scope of the problem

This app particularly hinged up to focus on blind and disable people who are not visually able or otherwise can't operate the app by their hand. If someone would come up with no disabilities can also get the developed features according to the app.

Hereby, people who will be registered in the log-in get the features. The casualty "Laziness" is not should be considered as it depends on user who will utilize it positively and negatively. Authorized gesture prescribed by the developers and gesture based on the social norm is recommended and appreciated.

2.5 Modules:

In this section, details of each functionality are explained-

1. User Module.

2.5.1 User Module

User module is for the patient. They can perform the below operation in the application-

i. Registration

User must have to do the registration first. This will give Him/her a user id and password.

ii. Get Mail

To get the incoming Gmail and read it out by voice aide.

iii. Compose Mail

To send a mail a blind can compose the mail by voice Command.

iv. Search Subject

To search a particular subject or topic in google, a blind just Utter the topic or subject name.

v. Call Logs

This feature will update incoming and outgoing call and duration of the call. It will work in offline mode.

vi. Messages

This particular feature will help a blind to read out a text and send a text. It will work in offline mode.

vii. **Call Number/Search Number**

To call a number and search a contact name or number included in that feature. It will work in offline mode.

viii. **Location**

A blind can check his/her present location by voice command and know the exact location by voice aide and with the help of Google Map.

ix. **Play Music**

A blind can listen a music and may pause it by voice command. It will work in offline mode.

x. **Weather**

A blind can also know th weather update and the voice aide will help to know it. It will work in offline mode.

xi. **Database**

Here database will in Registration, Call-log, Search Contact, Reminder etc. features.

2.6 Challenge

Most challenging part of this project is interactive screen design which will be understandable by all and offline voice command. This is the sole app in Bangladesh which solely has the offline voice command system. As it will be used by mass people, in particularly blind, interaction between user and application needs to be smooth and easy.

Adding library for offline speech recognition was another big deal. We used Pocket Sphinx android library for offline speech recognition. Another big challenge of this

application is data synchronization and to synchronize this server programming was a challenge, and google maps API and Yahoo weather API adding was also a challenge. Synch with Google Map, Connecting server, weather updates server are really tiresome and commendable.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

Business process modeling is the process of identifying processes and representing it with models like flowchart, use case activity diagram. For this application, flow chart has been build which is given below-

3.1.1 Flow chart of the proposed system

Sometime it is more effective to visualize something graphically than it is to describe with words, which is why we use Flow chart. Again, Flowchart explain a process clearly through logical overview, hierarchy and text. A flowchart is a diagram that depicts a process, system or computer algorithm. They are widely used in multiple fields to document, study, plan, improve and communicate often complex processes in clear, easy-to-understand diagrams. Flowcharts, sometimes spelled as flow charts, use rectangles, ovals, diamonds and potentially numerous other shapes to define the type of step, along with connecting arrows to define flow and sequence. After analysis, our flow of process we create our flowchart for our system.

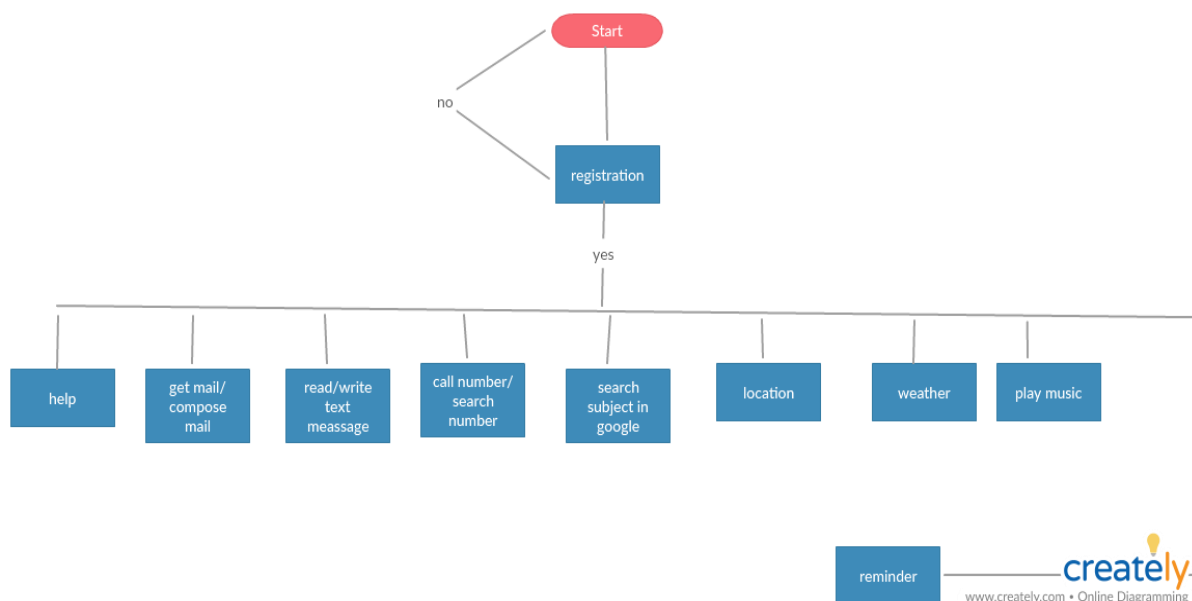


Figure 3.1: Flow Chart of the application (Figure is drawn by using creately)

According to the process flow of our app, after start of our project a user have to be registered first. As in our app there is one type of user-blind/single-hand-user, he/she can get the assistance by voice aide and train up the module for their individual purpose by just only uttered.

3.1.2 Iterative Model

Iterative development is a way of breaking down the software development of a large application into smaller chunks. In iterative development, feature code is designed, developed and tested in repeated cycles. With each iteration, additional features can be designed, developed and tested until there is a fully functional software application ready to be deployed to customers.

Typically iterative development is used in conjunction with incremental development in which a longer software development cycle is split into smaller segments that build upon each other. Which is shown in Figure 3.2. By working iteratively, the project team goes through a cycle where they evaluate with each iteration, and determine what changes are needed to produce a satisfactory end product.

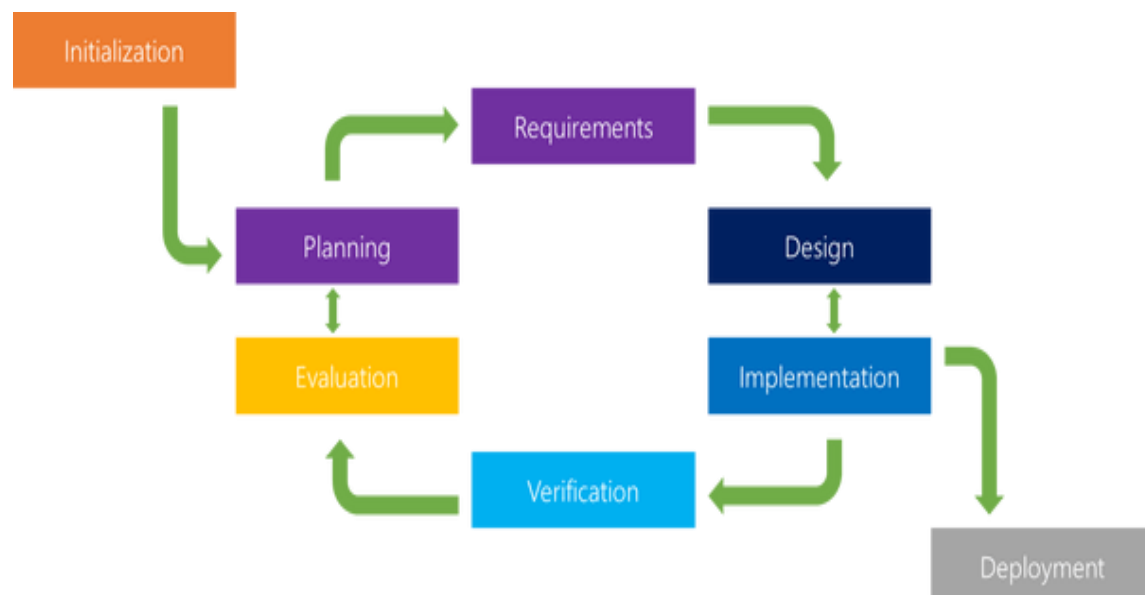


Figure 3.2: Iterative Model

3.2 Requirement Collection and Analysis

We gathered many kinds of business process from many different places and items and analysis them and also saw some documents.

There are many ways to collect requirements. But in our case, we used the below methodologies:

- **Online Survey:** Checked different existing application on this sector. Noted requirements from there. Took best features of it.
- **Interview:** Interview was taken of different blind people for their requirement. What kind of features they want to have, which information will help them if got etc. were collected from interviews. Most of the cases, we also observe that along with the blind people, someone who is driving the car or who has discarded his limbs somehow also desperately need this particular app to ease their life.

3.3 Use Case Modeling and Description

In the Unified Modeling Language (UML), a use case diagram can summarize the details of your system's users (also known as actors) and their interactions with the system. To build one, you'll use a set of specialized symbols and connectors. An effective use case diagram can help your team discuss and represent:

- Scenarios in which your system or application interacts with people, organizations, or external systems
- Goals that your system or application helps those entities (known as actors) achieve.

To identify, clarify, and organize system requirements, Use Case model is mostly needed. It is made up of a set of possible sequence of interaction between actors and systems in a particular environment for a particular goal.

A use case diagram contains four components.

The boundary, which defines the system of interest in relation to the world around it .The actor, usually individuals involved with the system defined according to their roles. The use case in which the specific role is played by the actor within and around the system.

The relationships between and among the actor and the use case. In our report we keep use case model because-

1. We want to organize functional requirements.
2. We want to models the goal of system and actor interactions.
3. We want to record paths from trigger event to goal we also describe main flow using it.

For our app have just one actor (user) who will interact with the app’s features and below the interactions would be shown in a use case-

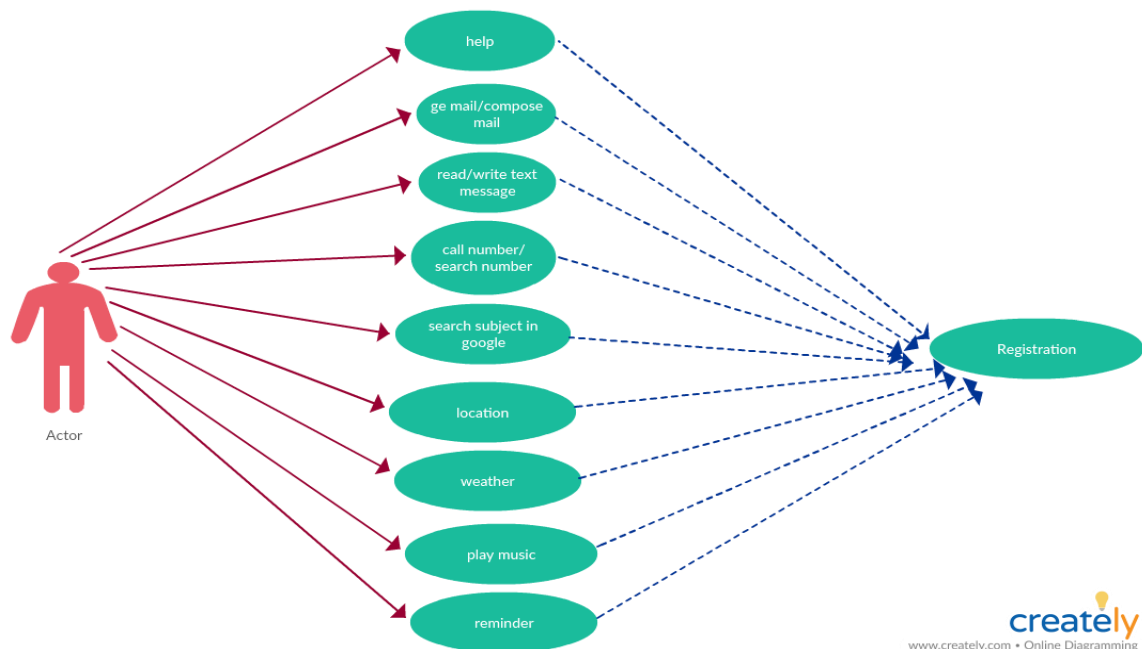


Figure 3.3: Use Case Diagram for user (figure is drawn by using “creately”)

A use case (or set of use cases) has these characteristics:

- > Organizes functional requirements
- > Models the goals of system/actor (user) interactions.
- > Records paths (called *scenarios*) from trigger events to goals.

3.4 Logical Data Model

After performing analysis on the business rules and data to discover attributes and relationships between data elements. We developed a logical representation schema of our system which is given below-

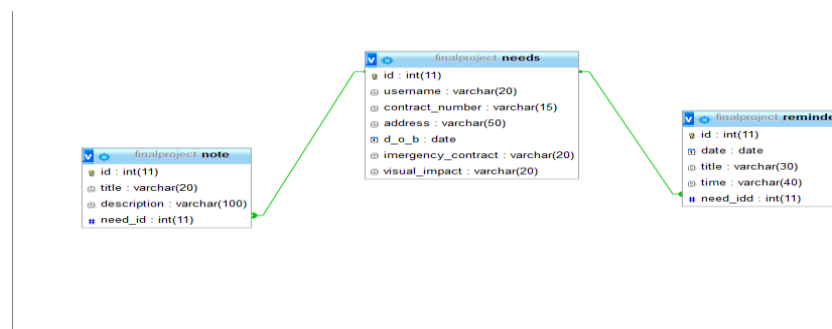


Figure 3.4: Logical Data Model (Schema).

Needs- This schema basically handle user registration informations.

Note- It seems like a notebook or diary which preserves user's important note.

Reminder- It will be reminding the user about his/her important task which is impending.

3.5 Design Requirements

Product development and process optimization, a requirement is a singular documented physical or functional need that a particular **design**, product or process aims to

satisfy. Requirements show what elements and functions are necessary for the particular project.

Effective design requirements are:

- Needed to solve your design problem. If it is not needed, leave it out. You'll have enough other things to work on!
- Feasible. A good design requirement is not just a wish. Ask if you have the time, money, materials, tools, and knowledge to make it happen.
- Subject to change as you do more research and design. Always ask yourself, is this requirement needed and feasible? If your answers to those questions change, it is OK to change the requirement.

Design Requirements for admin:

- Take actions (edit/delete/view)
- Add features

Design Requirements for user:

- View
- Search
- Comment
- Rating

3.6 DFD (Data Flow Diagram)

A data flow diagram (DFD) is a graphical representation of the "flow" of data through a 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. Here we use DFD to visualize how our data is structured.

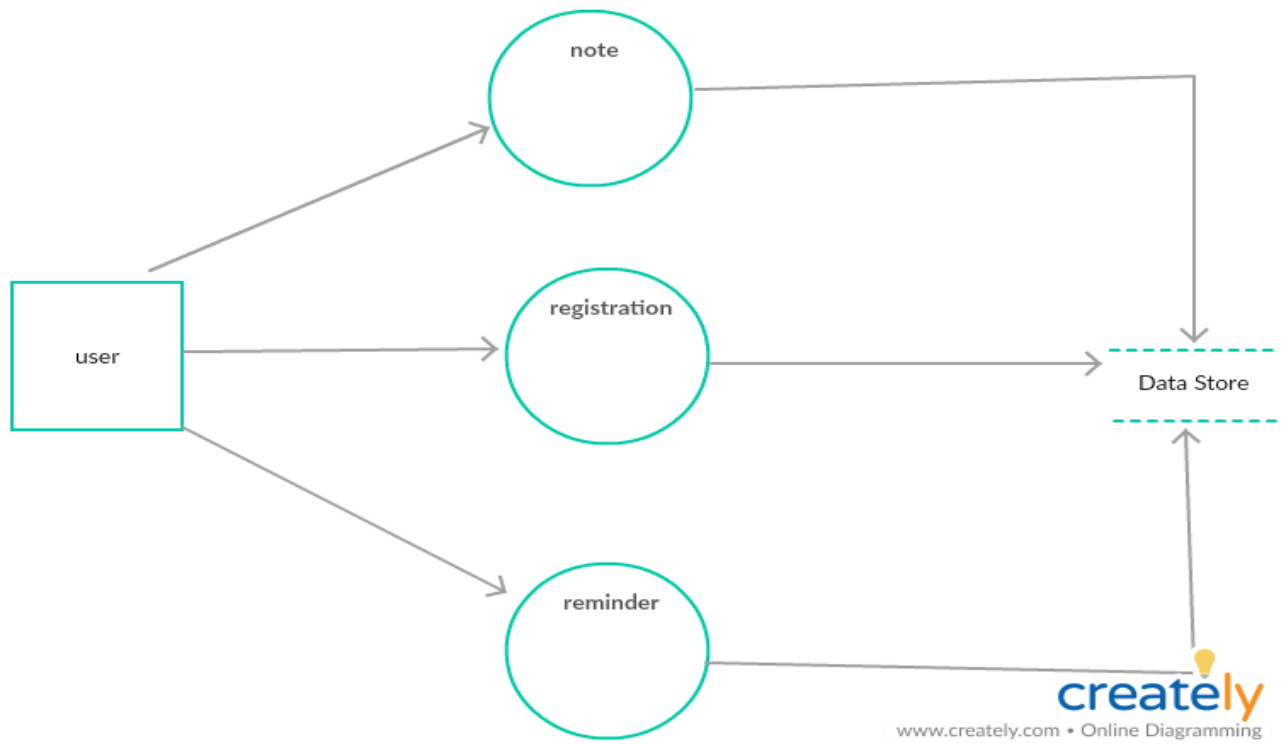


Figure 3.5: Data Flow Diagram (DFD) (figure is drawn by using “creately”)

CHAPTER 4

Design Specification

A design specification provides explicit information about the requirements for a product and how the product is to be put together. Its use is called for where a product has to be specially made to meet a unique need. For example, a design specification must include all necessary information that I've listed above i.e. data, architectural, interface and component-level design for the software not excluding the documentation.

4.1 Front-end Design

Front-end design involves creating the XML code that makes up a user interface.

Here is the list of front-end design-

Table 4.1: Screen List

1) Splash Screen
2) Entering choice Screen
3) User registration
3.1) User home screen
3.2) User Date status screen
3.3) User set reminder screen
3.4) Search Topics/Subject Screen
3.5) Seek Location screen
3.6) Weather update screen
3.7) Call Number/ Search Number screen
3.8) Play music screen
3.9) User help screen

4.1.1 XML

- XML stands for eXtensible Markup Language.
- XML was designed to store and transport data.

-XML was designed to be both human and machine-readable.

4.2 Back-end Design

As our app is a dynamic application that is a sum of design, structure and functionality, so back-end design plays a very monumental role in our system. The technology and programming that “power” a system, that user does not see but makes the system run is the back end.

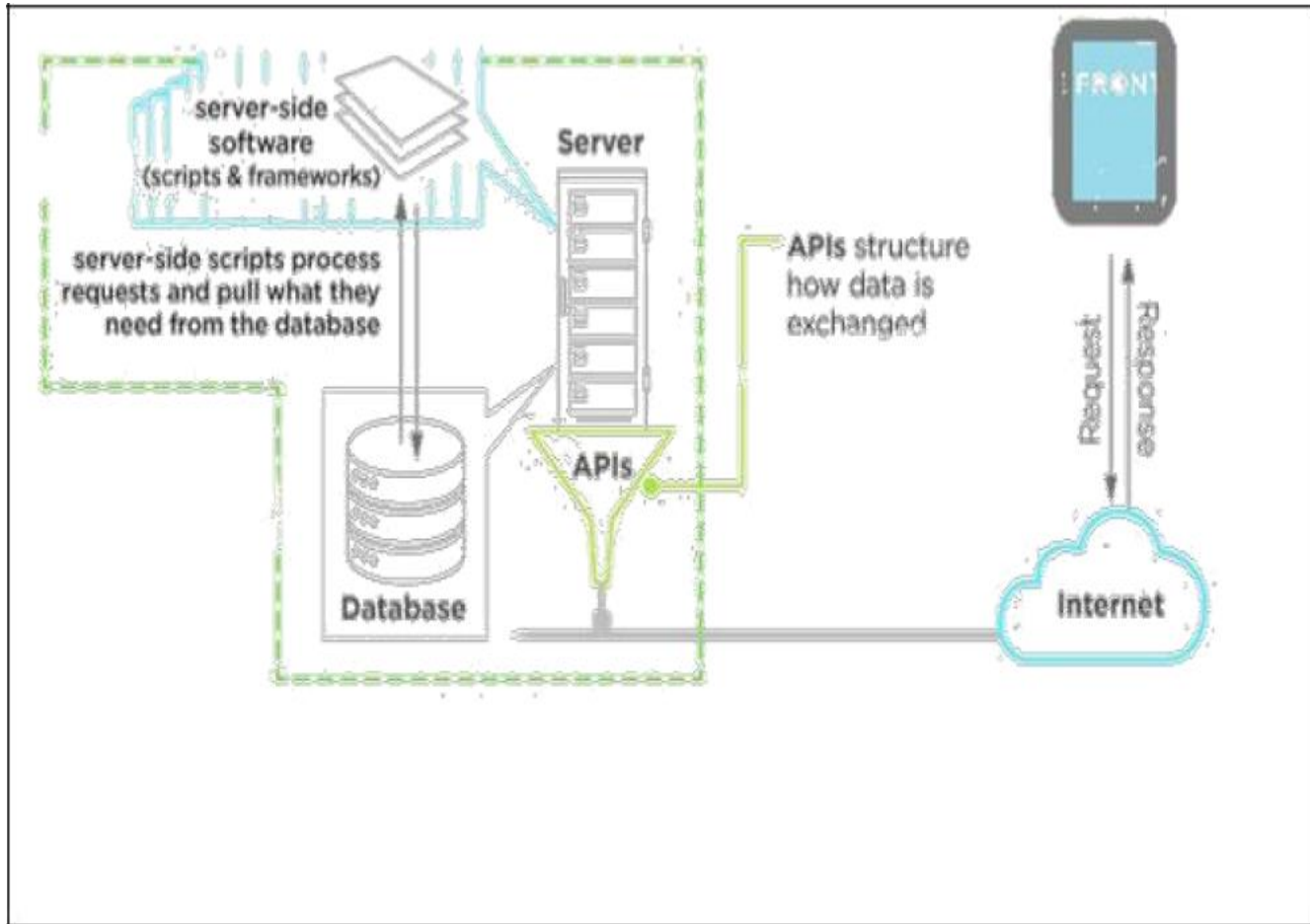


Figure 4.1: Overall system architecture (with infra)

As we can see in the overall system architecture, client will communicate with application over the internet for application data. It will send request to API server. API is hosted to some hosting server like AWS. Database is also hosted at amazon end. For our case we used RDS which is amazon database service. API will communicate with database for its data.

4.2.1 JAVA

Java allows you to play online games, chat with people around the world, calculate your mortgage interest, and view images in 3D, just to name a few. It's also integral to the intranet applications and other e-business solutions that are the foundation of corporate computing.

4.2.2 SQLite

SQLite is a standard language for storing, manipulating and retrieving data in databases.

--SQL can retrieve data from a database.

--SQL can insert, update and delete records in a database.

--SQL can create new databases.

--SQL can create views in a database.

--Save user name to welcome the user

-- Store users information (date of birth, contact number, address, emergency contact)

--Store reminder modules reminder.

4.2.3 API

1. Gmail
2. Google maps API for users' current location service
3. Yahoo weather API for weather updates
4. Text to speech engine
5. Speech to text engine

6. Pocket sphinx library for offline speech recognition, machine learning is used in this library that learn the spelling from its user so that it can recognize users' spelling easily.

4.3 Implementation Requirements

Hardware Requirements:

- CPU 1.2 GHz Dual Core

- 512MB of RAM or higher.

- 15.46 MB of Storage space

Software Requirements

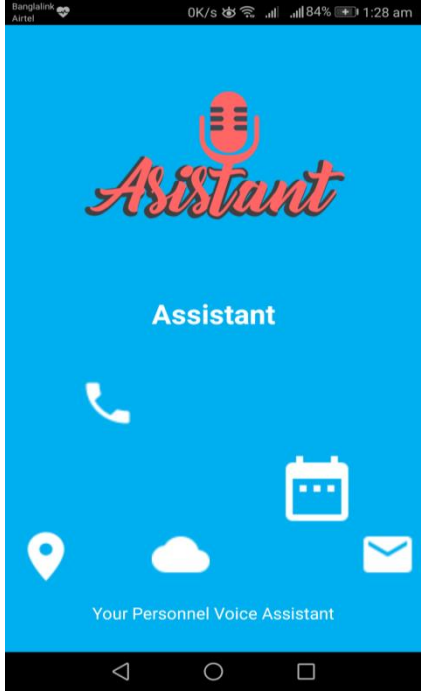
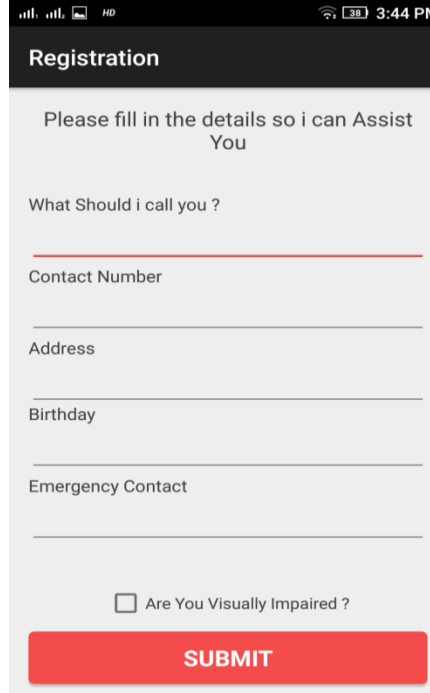
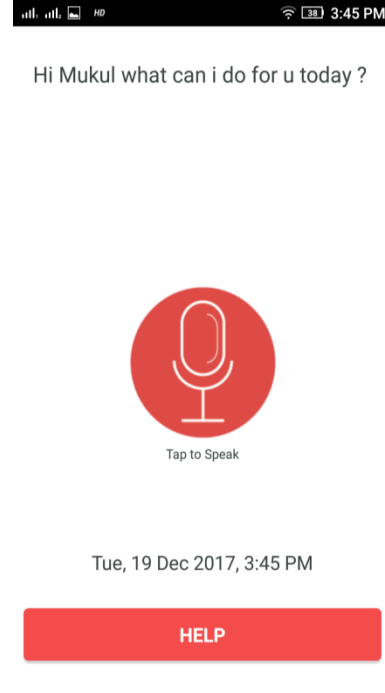
-- Ice cream Sandwich (4.0.2) or higher

4.4 Interaction Design and UX

Interaction design is the process of designing screen which is view and will be used by user.

User experience matters here. Below are the screen shot of screens.

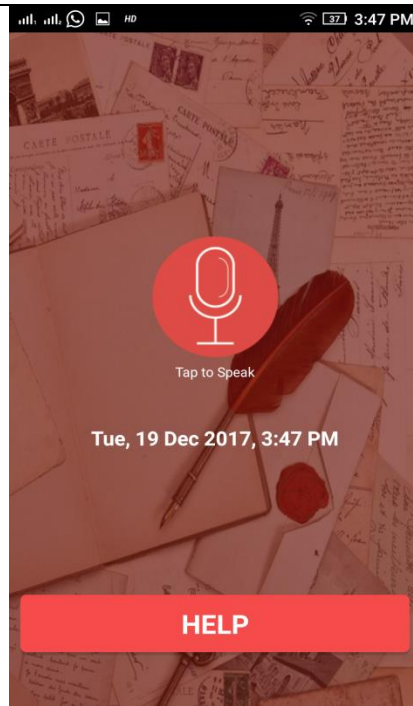
Splash Screen	Registration	Greeting Screen
---------------	--------------	-----------------

		
<p>Splash screen is initial screen which will be shown at the time of Loading application. Once application is loaded, it will disappear.</p>	<p>Screen to initiate registration process</p>	<p>The voice aide asking the user for what to help.</p>

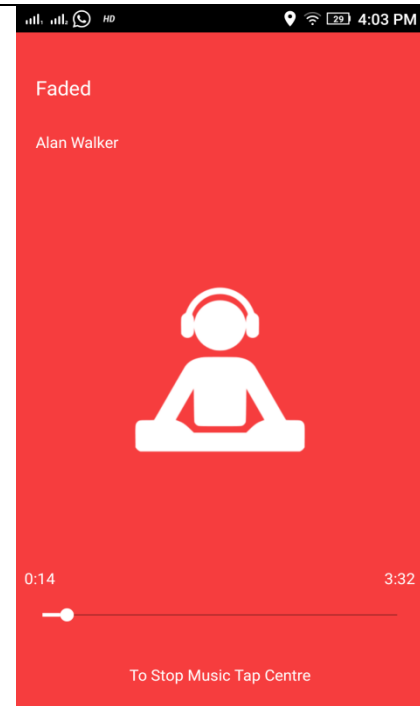
Voice Aide to aid	Help for helps	Play Music
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This command directs the user about the feature



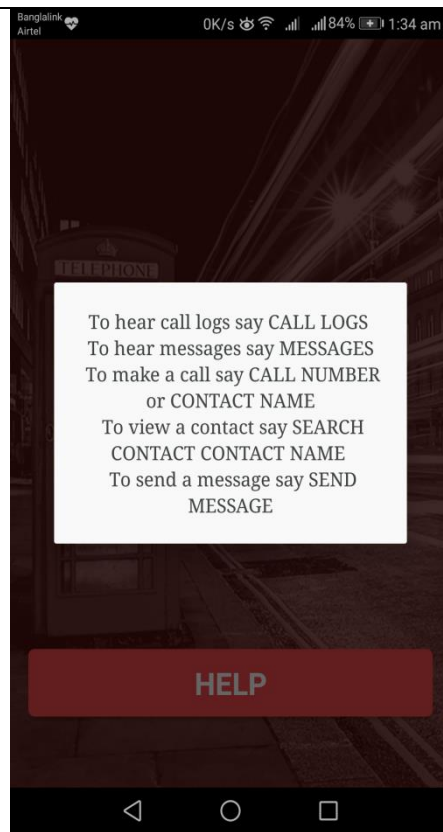
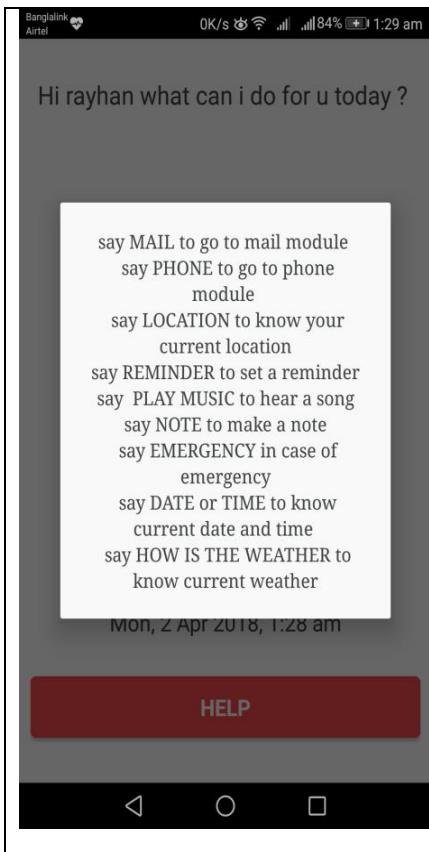
User get help for unfamiliar service



User play a music by his voice command

Reminder	Time	Weather Update
----------	------	----------------

<p>User can save his/her important notes to remind later</p>	<p>User can make a call by his command</p>	<p>User can get weather update by just asking</p>

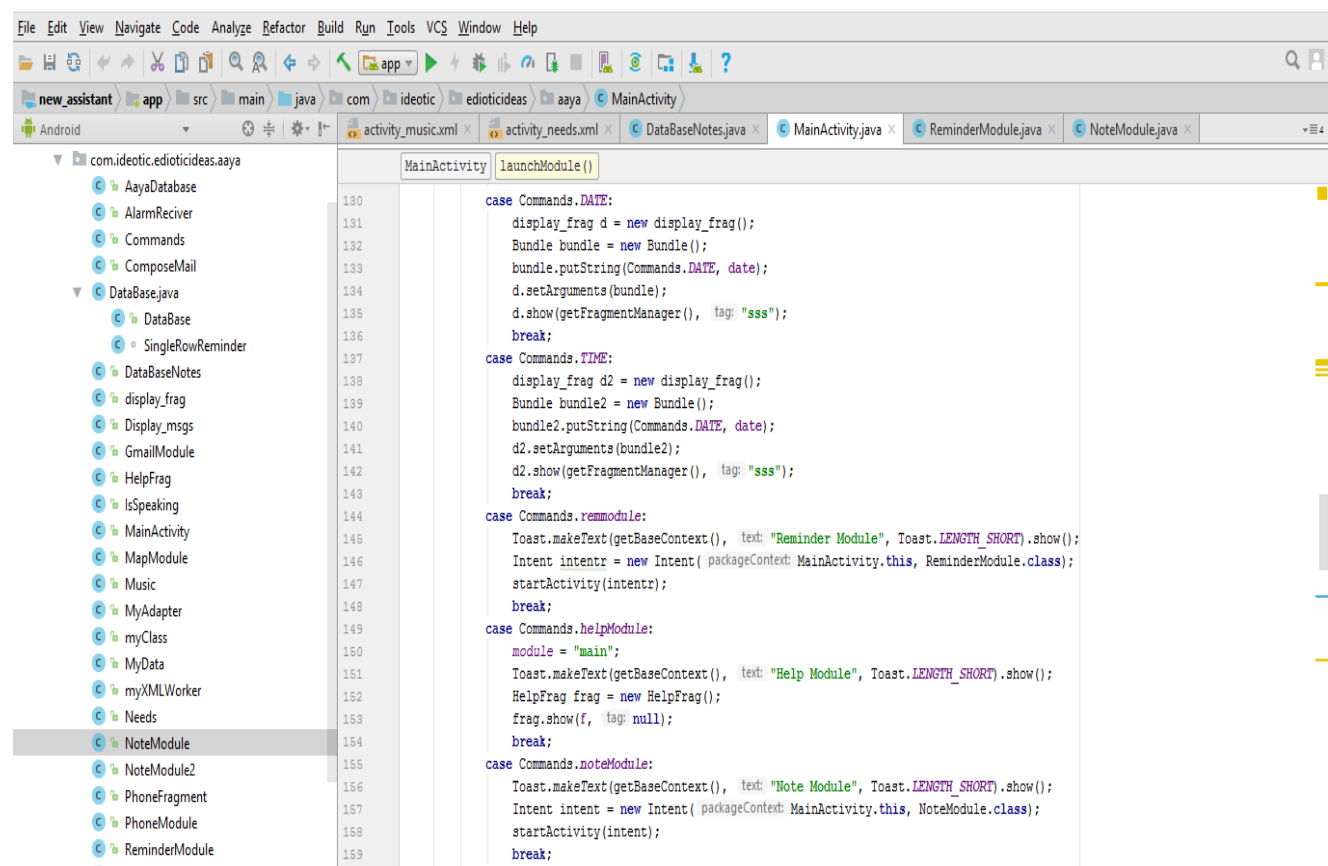


5.3 Implementation of Interactions

This project has 3 layers-

- ❖ View layer which is user screen.
- ❖ Application layer: where business logic is there. API implantation is done at this level.
- ❖ Database Layer: where data is stored.

Every event in the user interaction is having code behind it.



```
File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help
new_assistant app src main java com ideotic edioticideas aaya MainActivity
Android activity_music.xml activity_needs.xml DataBaseNotes.java MainActivity.java ReminderModule.java NoteModule.java
com.ideotic.edioticideas.aaya
  AayaDatabase
  AlarmReciver
  Commands
  ComposeMail
  DataBase.java
    DataBase
    SingleRowReminder
  DataBaseNotes
  display_frag
  Display_msgs
  GmailModule
  HelpFrag
  IsSpeaking
  MainActivity
  MapModule
  Music
  MyAdapter
  myClass
  MyData
  myXMLWorker
  Needs
  NoteModule
  NoteModule2
  PhoneFragment
  PhoneModule
  ReminderModule
MainActivity launchModule()
130 case Commands.DATE:
131     display_frag d = new display_frag();
132     Bundle bundle = new Bundle();
133     bundle.putString(Commands.DATE, date);
134     d.setArguments(bundle);
135     d.show(getFragmentManager(), tag: "sss");
136     break;
137 case Commands.TIME:
138     display_frag d2 = new display_frag();
139     Bundle bundle2 = new Bundle();
140     bundle2.putString(Commands.DATE, date);
141     d2.setArguments(bundle2);
142     d2.show(getFragmentManager(), tag: "sss");
143     break;
144 case Commands.remmodule:
145     Toast.makeText(getBaseContext(), text: "Reminder Module", Toast.LENGTH_SHORT).show();
146     Intent intentr = new Intent( packageContext: MainActivity.this, ReminderModule.class);
147     startActivity(intentr);
148     break;
149 case Commands.helpModule:
150     module = "main";
151     Toast.makeText(getBaseContext(), text: "Help Module", Toast.LENGTH_SHORT).show();
152     HelpFrag frag = new HelpFrag();
153     frag.show(f, tag: null);
154     break;
155 case Commands.noteModule:
156     Toast.makeText(getBaseContext(), text: "Note Module", Toast.LENGTH_SHORT).show();
157     Intent intent = new Intent( packageContext: MainActivity.this, NoteModule.class);
158     startActivity(intent);
159     break;
```

Figure: 5.3 Implementation of Interaction

5.4 Testing Implementation

Quality assurance is concerned with the product quality. It's to gain insight and confidence that product quality is meeting its goal. So, to meet the quality of a product, its need to test the product again and again using different testing techniques and identify problems to solve them.

5.4.1 Testing

Here in our project we used different methods to test our software to identify bugs. Those are discussed below.

5.4.2 Unit test

Unit testing makes heavy use of white-box testing techniques. We followed unit test technique at code level. Unit testing is the most efficient method to find errors. In our project we used unit testing to find errors in a particular module. Each module code is written and checked with different inputs and error removed.

The following checklist was used for unit test:

- a. Number of input parameters equal to number of arguments or not.

- b. Parameter and argument attributes match or not.

- c. Parameter and argument units systems match or not.

- d. Number of arguments transmitted to called modules equal to number of parameters or not.

- e. Database connection checking before performing any operation on database.

- f. Database field which doesn't allow null value, for those checking of form values was done in code and default values was used to remove database error.

- g. Global variables which were used in one module were checked whether those are consistent for that module or not.

- h. Initializations of variables were checked for erroneous initialization.
- i. Some database error like integrity constraint are taken under exception and handled properly by warning users with proper error messages.
- j. Any textual errors in output were removed by checking output values for different inputs. All these techniques were used on individual module of code and errors were removed. Those errors which couldn't remove were handled under exception.

5.4.3 Integration Test

Integration testing addresses the issues associated with the dual problems of verification and program construction. Black box test case design is used over here. All the unit tested code are then combined together and compiled for errors. Suppose in a form there are several different buttons to insert or update or delete. First each button's procedure added and tested and then all the buttons functionality were checked altogether. As well as after finishing one form, all the forms integrated together and checked.

5.4.4 Validation test

Validation test provides final assurance that software meets all functional requirements. Validation test was done by checking final software in different environment using various inputs.

5.4.5 System test

System testing verifies that all elements mesh properly and that overall system function/performance is achieved. System testing was done by installing our apps in different mobile devices. We used different versions of android OS for this too.

Using the above testing techniques we removed errors from code. Those errors which could not be removed were handled by the android exception handler by generation

meaning full message for the users. After this we can assure the quality of the product. It is efficiently workable in different environments and able to fulfill the user's requirements for which software is built.

5.5 Test Results and Reports

Bugs mean faults or errors of software. In the development process of software or after implementation of software, developer faces so many errors which may be code error, user input error, network failure error. Bugs are removed by debugging and fixing the code error. If there are some errors except code error which can't be removed are usually handled by exception handler.

In our project we faced so many bugs. Some of them are given below-

- a. "Connect failed because target host or object does not exist". This error occurs when database server is not available for use. If the intermediate network line doesn't work properly this error occurs at connection time. This only removed by establishing proper network connection between server and client.

- b. "End of communication channel or line". This error occurs while database become disconnected at the time of performing a query. Because of network failure this happens. To overcome this problem user needs to connect database from again.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion

By doing this project, we have learned so many things. While working with blind one or disable one, it came to our realization that we have so many things to do as social responsibility. It helps to understand android application development. We have learned about project management. Infrastructure for hosting an application also got cleared by this process while we were hosting API for the application. It was a great scope of learning.

“Ondher Josthi / Blinds Eye” provides lots of opportunity to use and also lots of things can be done further on it.

6.2 Scope for Further Developments

There is huge scope of further developments on it. This is just starting of a huge buzz. Potentiality of this application is mentioned below:

1. **Adding Bangla content:** We can add contents in Bangla so that villagers/mass people can also understand it. It will increase huge customer base.
2. **Add Chat:** Talking with another user directly will be a great addition. Anytime any urgency may arise. Application will have an option to talk to each-other at any time so that he can convey his good/bad feelings.
3. **Add Audio tutorial:** Currently we have added test based tutorial only. But audio tutorial can be added with this.
4. **Add Obstacle Finder:** Currently we have no obstacle finder as it is available

in another apps. So further we may add this feature.

Appendix

Appendix A: Project Reflection

Regarding Goal:

- Global context of this project was to create awareness which we believe is somewhat achieved and it will be more.

- Our target was to publish this application in Google play store so that it can be easily downloadable and usable which is achieved.

Selection of Resources:

- For project resources mostly we have searched over internet. We downloaded so many related apps, used those, and took idea from them.

- Main target of this investigation was finding what is not there in the existing application which we can provide. It was not though that much easy but we managed to find the differences between our product and products available for downloading.

Achieving goal:

- There is a slight deviation from our dream to practical. It was in our mind that, this application will be solely capable to store patient history, it will provide analysis of patient's record, will be good for spontaneous communication. But due to insufficient time, we couldn't manage all features it can have. It can be done in production environment.

Learning:

- By doing this project, we have learned android application development, API design and how to absorb it in the application. We also learned about documentation,

requirement collection and analysis. We have covered every section of project phases which is major learning.

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