

Implementation of Handling Android Application using SMS (Short Message Service)

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Abstract - In today's world where the Security of the Mobile Devices play an important role, so keeping it in mind it is also important to keep track of it at the same time. With this topic it will help the user to keep track of the device. With this being an android application there is no requirement for an active Internet Connection, it will be an extra added benefit for the user to use it. With the current options available in the market getting the current location of the device requires an active internet connection.

Thieves can always erase the data and use the cellphone/device. So if the data storage is encrypted the thieves won't get your personal storage data. One of the more crucial elements of owning a Smartphone is security. Of course, security doesn't just lie in the hands of platform developer —it's also the responsibility of the device owner.

The User will be able to perform actions such as changing the profile status of the phone for ex. Silent to Ringer, Vibrate to Ringer and other actions like wiping the data of the data just by sending a SMS (Short Message Service).

Key Words: OTP Wipe,

1. INTRODUCTION

Today the people are ready to pay ton of money to retrieve their data or to destroy the data of the stolen phone. According to Lookout, which worked with IDG Research to conduct the study, between 50% of phone theft victims would pay \$500 to get their devices back. It's not that the device is that important to them but the data on the device is very important. According to the same survey one-third of the people are ready to pay \$1000 retrieve their stolen phone and 68% of the polled victims would put themselves in danger to regain the control of their device.

Losing the hardware is bad, but what data can the thief get from the storage? This question is very important. Thieves can always erase the data and use the cell phone/device. So if the data storage is encrypted the thieves won't get your personal storage data. In modern Android phones since Nougat 7.0 are encrypted by default. Encryption is only on those on phones that came with Nougat but not on devices which are updated to Nougat. Encryption only helps if the device is protected with a secure PIN. If the PIN is 1234 the thief can easily guess and access all the data. The data shown on the notification tray can also be helpful for the thief to get around the data. So the solution for this is to hide the notification contents.

1.1 Problem statement and objective

Problem Statement

Creating an Android Application that will be used to change the current state of the phone, get the current location of the device using Short Message Service (SMS).

1.2 Proposed work

The proposed work consists of a system that takes the initial registration details from the user that includes phone number. This is then saved in the database. After Logging in successfully the user will have to set the PIN for the Operation manually of his choice. And this is the first part of the application. Then to make use of the application the user will have to send the message that includes the PIN code and the name of the action defined in the application. So if the PIN in the message is verified with the Database successfully the action mentioned in the message will take place.

Three modules are having been designed for the purpose of the complete process that is defined above. These modules make the project easier to understand and proper work distribution. The modules are as follows:

- 1) **Design Module**
- 2) **Reading Message Module**
- 3) **Performing Action Module**

2. SYSTEM ANALYSIS

2.1 Literature Survey

[1] By Adrienne Porter Felt, Serge Egelman, Erika Chin, David Wagner “Android Permissions: User Attention, Comprehension, and Behavior” This paper was published in 1-6 2016(IEEE) February 17, 2012.

One of the major issues while accepting the permission is that, are the users paying attention to permissions which they asked of. A survey which was conducted gave a result that only 17% of the people paid attention to the permissions while installing and only 3% of the user could correctly the three comprehension questions. An application must obtain permission in order to use sensitive resource like camera, microphone, etc. For example an application must have READ_CONTACTS permission in order to read the entries in users Contacts.

[2] By Salman Khan, Waheed Ahmad and Riaz Ali

“A Research on mobile applications for location tracking through web server and SMS”

This paper was published in July-August 2015.

The aim of develop an android application which will be used to send the current location of the device to the server database and the phone numbers stored by the user via a Short Message Service. In case of emergency the user can just press the emergency button and the location will be send to the stored numbers. One other way to track the device location is by the web server database which keeps updating the current address continuously of the device.

The purpose of permission is to protect the privacy of an Android user. Android apps must request permission to access sensitive user data (such as contacts and SMS), as well as certain system features (such as camera and internet). Depending on the feature, the system might grant the permission automatically or might prompt the user to approve the request. If your app lists dangerous permissions in its manifest (that is, permissions that could potentially affect the user's privacy or the device's normal operation), such as the SEND_SMS permission above, the user must explicitly agree to grant those permissions.

Table 2.1: Permission Groups

| Permission Group | Permissions |
|------------------|---|
| Calendar | <ul style="list-style-type: none"> • Read_Calendar • Write_Calendar |
| Sms | <ul style="list-style-type: none"> • Send_Sms • Receive_Sms • Read_Sms • Receive_Wap_Push • Receive_Mms |
| Storage | <ul style="list-style-type: none"> • Read_External_Storage • Write_External_Storage |
| Location | <ul style="list-style-type: none"> • Access_Fine_Location • Access_Coarse_Location |
| Phone | <ul style="list-style-type: none"> • Read_Phone_State • Read_Phone_Numbers • Call_Phone • Answer_Phone_Calls • Add_Voicemail |

Table 2 contains the permission group name in one column and the permissions under that group. Android makes the decision as to whether an app might need the permission based on the value provided for the target Sdk Version attributes.

2.2 System Requirement

This includes the hardware and software specification which is required to run an application on a device.

2.2.1 Software Requirement

This part includes the software tools that we used to make an application and the services which will be used by an application.

- **Android Studio** –Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such as: A flexible Gradle-based build system.
- A fast and feature-rich emulator.
- A unified environment where you can develop for all Android devices.
- Instant Run to push changes to your running app without building a new APK.
- Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud Messaging and App Engine.

Android Studio is Android's official IDE. It is purpose-built for Android to accelerate your development and help you build the highest-quality apps for every Android device.

Front End

- **XML**

The Android platform uses XML files in projects for many purposes, from providing basic configuration of the application in the Manifest File, to using XML Layout Files to define the user interface.

Elements uses these standard files in the same way they are used when working with the Java language, so Elements developers have access to the same controls and UI capabilities as all other Android developers, fully natively.

There are two ways for working with XML Layout files in your Android projects:

- You can edit the files in XML format using the regular code editor in Fire and Visual Studio. This option is favored by many Android developers, and gives you full control about your UI design down to the most minute detail.
- You can ask Fire or Visual Studio to launch Android Studio to design these files using Google's official visual designer, by right-clicking the project node in the Solution tree and choosing "Edit User Interface Files in Android Studio" (Fire) or "Open in Android Studio" (Visual Studio).

Any changes you make to your XML Layouts in Android Studio will automatically sync back into your project, and elements defined in your layouts and the other XML files will be available via the static R class in your project's default namespace.

Advantages of XML

- It can represent common computer science data structures: records, lists, and trees.
- Its self-documenting format describes structure and field names as well as specific values.
- The strict syntax and parsing requirements make the necessary parsing algorithms extremely simple, efficient, and consistent.
- XML is heavily used as a format for document storage and processing, both online and offline.

Back End

1) JAVA

Java is one of the most popular and widely used programming language and platform. A platform is an environment that helps to develop and run programs written in any programming language.

Java is fast, reliable and secure. From desktop to web applications, scientific supercomputers to gaming consoles, cell phones to the Internet.

Advantages of Java

- **Java is easy to learn:** Java was designed to be easy to use and is therefore easy to write, compile, debug, and learn than other programming languages.
- **Java is object-oriented:** This allows you to create modular programs and reusable code.
- **Java is platform-independent:** One of the most significant advantages of Java is its ability to move easily from one computer system to another. The ability to run the same program on many different systems is crucial to World Wide Web software, and Java succeeds at this by being platform-independent at both the source and binary levels.

Firestore

Firestore is a mobile and web application development platform developed by Firebase, Inc. in 2011, then acquired by Google in 2014. As of October 2018, the Firestore platform has 18 products, which are used by 1.5 million apps.

Services Provided

- Firestore Analytics
- Firestore Authentication
- Real-time Database
- Firestore Hosting
- Firestore Storage
- **Google Play Services** – These are the services which are provided by the Google. The application will use the services like Google Firestore.

2.2.2 Hardware Requirement

This section includes the hardware required by an application and which type of hardware the application will use.

- **Smart android mobile phone**– The application is android application which will require a device to run an application.

3. SYSTEM DESIGN

Systems design is used to define the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There are various diagrams that can be used to represent the process and flow of the system or project.

3.1 Use Case Diagram

A use case diagram 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. There are 3 users involve in this system –

- Actor
- Database

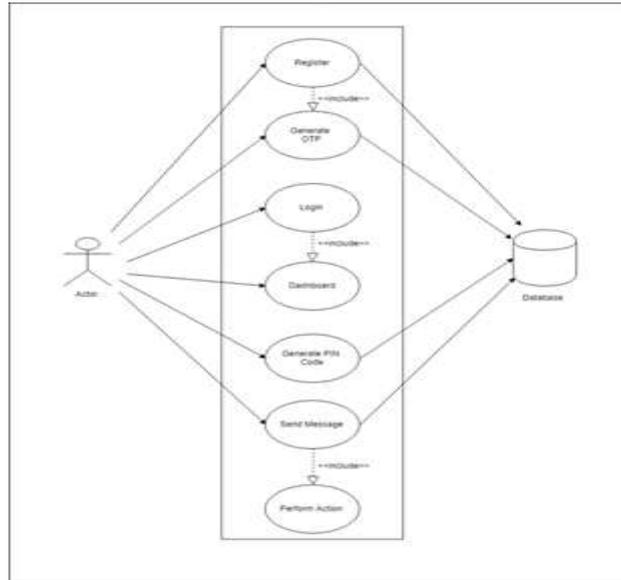


Figure 3.1: Use Case Diagram of the system

This will show how every module interacts with the system and how modules are interconnected. This diagram shows user interaction with the system. The diagram shows the cases involved. Initially the user registers and the OTP are generated by the firebase. After registering a PIN must be set. After this whenever the message is read and the PIN is verified the action will be performed.

3.2 Flow Chart

The flow chart is defined as to visually present the flow of data through an information processing system, the operations performed within the system and the sequence in which they are performed.

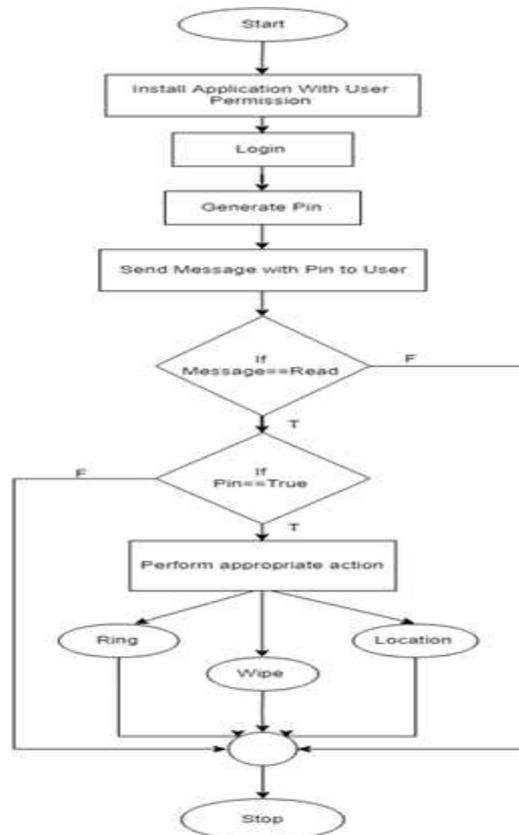


Figure 3.2 Flow chart

The flow of the system is as follows according to the flow chart below i.e. Fig 3.1. Initially the user will have to install the application in the device itself. At the first start of the application the user will have to accept all the permission required for the actions to take place. The general permissions that would be required for the actions are the 'READ SMS', 'SEND SMS', 'ACCESS_FINE_LOCATION', etc. After accepting the permission, the user will login or Register. Then after registering the user will have to set the PIN.

4. IMPLIMENTATION OF THE SYSTEM

4.1 Design Modules

There are 3 modules present in the project –

1. Design the User Interface and Requirement Gathering
2. Reading and Sending SMS
3. Performing Actions based on User Requirements

1. Design the User Interface

This is the first module which includes the requirement gathering and the Design User Interface for the android application. The requirement gathering process involved gathering all the required information.

2. Reading and Sending SMS

This is the second module, in this the message that is received will be read and the counter message will be send. This module involves the java logic of Reading and Sending of Messages. As the message has two strings the PIN will also be checked in this module. And will be verified to the PIN set by the user in the application.

3. Performing Actions based on User Requirements

The third module is used to perform the actions that are requested by the user. In this the second string in the message i.e. the action name will be executed. Actions included such as change the phone profile to Ringer, Wipe Data, etc.

5. TESTING

Testing - Software testing is the process of evaluation a software item to detect differences between given input and expected output. Testing assesses the quality of the project. Software testing is a verification and validation process.

5.1 Types of Testing

Manual Testing

Manual testing includes testing a software manually, i.e., without using any automated tool or any script. In this type, the tester takes over the role of an end-user and tests the software to identify any unexpected behavior or bug. There are different stages for manual testing such as unit testing, integration testing, system testing, and user acceptance testing.

Testers use test plans, test cases, or test scenarios to test a software to ensure the completeness of testing. Manual testing also includes exploratory testing, as testers explore the software to identify errors in it.

Following are the testing techniques that are performed manually during the test life cycle:

- Acceptance Testing
- White Box Testing
- Black Box Testing
- Unit Testing
- System Testing
- Integration Testing

5.2 Levels of testing -

There are four level of testing -

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

1. Unit Testing -

This type of testing is performed at the earliest stages of the development process and it is also known as component testing. Various components in the project are tested.

After developing each component in project, as application progresses each component are need to be tested. Projects usually are built in the components and each component must need to be tested so that overall objective of the project must need to be achieved.

2. Integration Testing -

Integration testing is testing in which a group of components are combined to produce output. Also, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing.

This type of testing is performed when clicking on the scan in application, the camera should be open and also scan the marker of department, after scanning the detected marker must retrieve the notices and then shown to the user. After viewing the notices, it can be saved or downloaded.

3. System Testing -

System testing is the testing to ensure that by putting the software in different environments it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

We deployed our application in different vendor's android mobile phone and also on various android operating system or platform with different versions.

4. Acceptance Testing -

Acceptance testing is often done by the customer to ensure that the delivered product meets the requirements and works as the customer expected. It falls under the class of black box testing.

We have checked that our objective of making this project satisfies or not.

6. RESULT AND DISCUSSION

This is the first page of the application where the user has to enter his/ her mobile number which is currently present in the cell phone. After entering the mobile number user has to click on GET OTP. The firebase will generate and send the OTP to the given phone number. The OTP received will be automatically read by the application

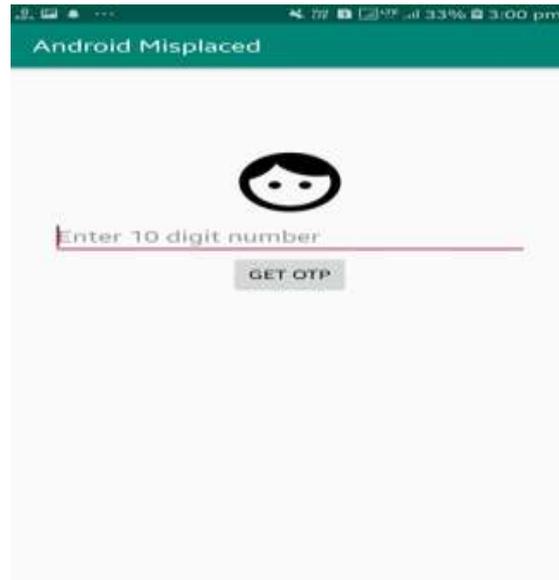


Fig 6.2.2: Login Screen

After the OTP is automatically read by the application, the application will ask user to enter the PIN which will be used in future for performing the actions. The set up PIN will appear only when the OTP is read by the application. If the OTP is not read by the application, the application won't ask you to set the PIN. The entered pin will be saved in the firebase database.

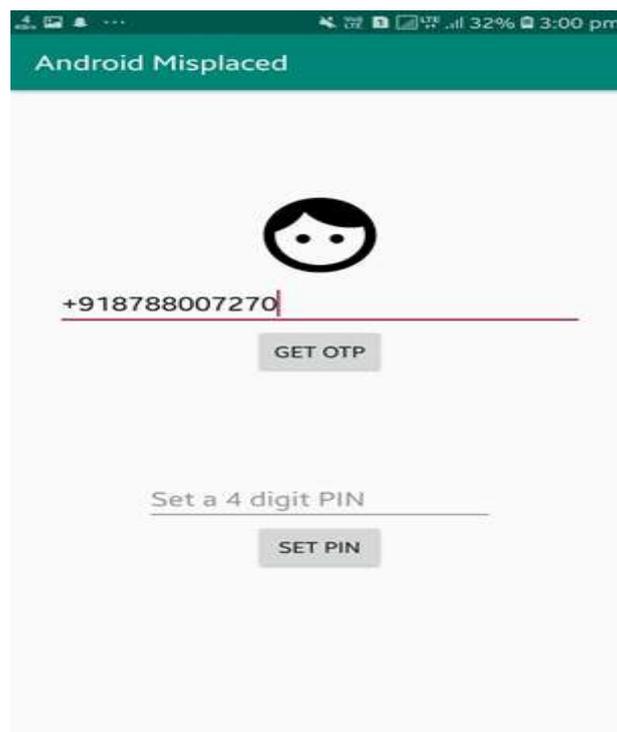


Fig 6.2.3: OTP Verified Login Screen

After login the user will be ready for using the application. The application will display the registered mobile number. This page of the application will only show those messages which are in the proper syntax format. The three dots on the top right corner consist of options such as

- i) Refresh
- ii) Clean commands
- iii) Logout
- iv) Exit

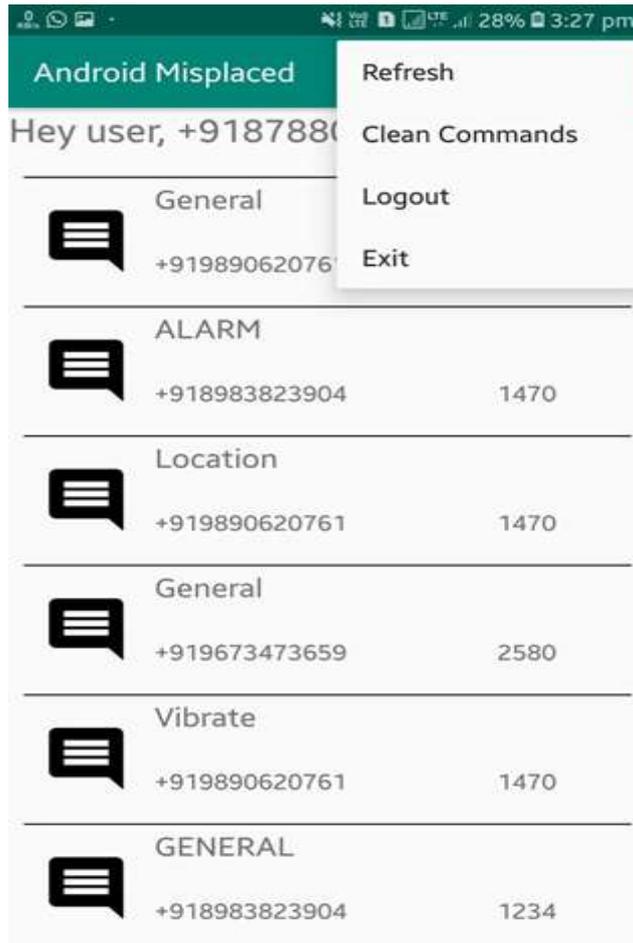


Fig 6.2.4: Dashboard Screen

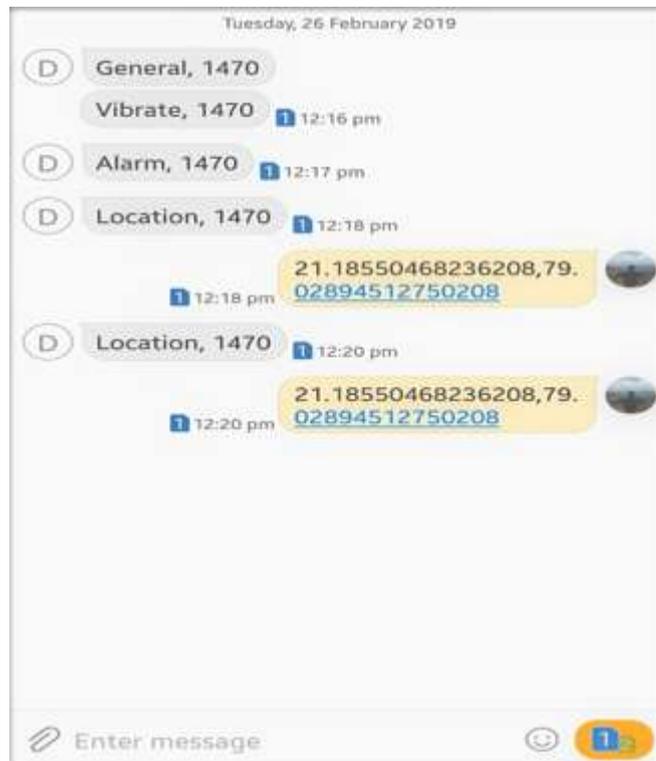


Fig 6.2.5: Message Output Screen

It is the sample where the user is demanding for the current location of the mobile phone. For that the user has entered the command as COMMAND, <PIN> for example "LOCATION, 1402" after couple of second the location in the form of latitude and longitude will be send by the application to the requested mobile number through the firebase database. After this the action will get terminated.

7. ADVANTAGES AND APPLICATION

ADVANTAGES AND APPLICATIONS

Advantages

- No use of Internet
- Actions can be performed by Messages.
- The Application can be used to secure data and locate the device at the same time at the idlest condition.

Application

- In remote areas where Internet Connection is an issue.
- Locating mobile devices which are lost.

Secure the data of the Phone by wiping it

8. CONCLUSIONS and future scope

8.1 Conclusion

In this paper we have analyzed a new way to perform the actions of Android using SMS (Short Message Service). The range of Android Application is vast and there are many developers who are ready to take advantage of the open source of android hence **(Engineering Knowledge)** is substantially mapped in it. We identified that the normal user always came across the problem of missing phone he/she was not able to able to save the data as he had to login first for further actions which would require an Internet Connection hence **(Problem Analysis)** is mapped in it. So to overcome this we came up with the idea of sending SMS with the action which wouldn't require an active internet connection hence **(Design/Development Solution)** is substantially in it. During this process we have researched different research papers and the different application which do similar kind of work hence **(Conduct Investigation of complex problem)** is substantially mapped in it.

8.2 Future Scope

Future scope of this project will include the deployment of this project on a larger scale, by making it compatible with all the applications which is listed in the applications section.

This project is first deployed on college level. Then for future scope, it can be deployed in various other work areas depending upon the application of that specific work area.

Various other features can also be provided to the users depending on the application and work area of the project.

Authentication of valid users is also a part of the future scope, when project will be used apart from colleges and schools, as a part of security.

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