

# **TRACK YOUR CHILD**

(Locating an individual through tracking System)



**By**

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## **CERTIFICATE**

This is to certify that this project report entitled “**Track your child**” by **Sheeza Khalid, Saad Munawar, Maheen Sajid, Basirah Noor and Sania Nadeem**, submitted in partial fulfillment of the requirement for the degree of BE (Electrical Telecom) in Military College of Signals (NUST) during the academic year 2016-17, is a bona fide record of work carried out under my guidance and supervision.

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**Signature:**                      \_\_\_\_\_

**Date:**                                      \_\_\_\_\_

## **ABSTRACT**

Project is aimed at developing a module with an android application that will be designed to help in tracking lost people to know their location. Now a days a lot of cases of kidnapping was reported. Parents always worry about the possibility of kidnapping of their children. This paper proposes a solution to help parents to track their children in any scenario. Nowadays, most mobile phones are equipped with GPRS allowing us to get the device's geographic position in real time. The proposed solution takes the advantage of the android application on mobile phone and at tracked end we design small size tracking module. The motivation for the project is to help the person to track the people they care for in case of any disaster/calamity or because of any kind of accident.

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# **DEDICATION:**

**To Allah Almighty, our respected Teachers and our beloved parents**

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## TABLE OF CONTENTS

<b>1. Introduction.....</b>	<b>1</b>
1.1 Overview:.....	1
1.2 Problem Statement:.....	1
1.3 Approach:.....	2
1.4 Objective:.....	3
1.5 Organizing the Document.....	3
<b>2. Background Scope: .....</b>	<b>4</b>
2.1 Existing Literature: .....	4
2.1.1 What is GPS?.....	4
2.1.2 GPS Tracker.....	4
2.1.3 What is GSM?.....	5
2.2 What is Android?.....	6
2.2.1 Versions of Android.....	7
2.3 Problem Formulation: .....	8
<b>3. Design.....</b>	<b>9</b>
3.1 Technical Specifications .....	9
3.2 Design Requirements:.....	11
3.3 Design Specification:.....	12
3.4 Design structure:.....	12
3.4.1 description.....	12
3.4.2 About Hardware interface.....	14
3.5 Detailed design with Justification.....	15
3.5.1 Description.....	15
<b>4. Simulation.....</b>	<b>18</b>
4.1 Android Application:.....	18
4.2 Description of android app development:.....	18
4.3 Android Application Start up:.....	20
<b>5. Implementation.....</b>	<b>23</b>
5.1 Physical Interface: .....	23
5.2 Function of Push Button:.....	24
<b>6. Results.....</b>	<b>25</b>
6.1 Simulation Results: .....	25
6.2 Implementation Results: .....	27
6.3 Scope.....	28
6.4 Resources Utilized.....	28
<b>7. Bibliography: .....</b>	<b>29</b>
7.1 List of similar projects done at MCS: .....	30
7.2 List of similar projects elsewhere: .....	30
7.3 Online help: .....	30
7.4 Project Research Work:.....	32
<b>8. Improvements:.....</b>	<b>33</b>

## LIST OF TABLES

Table 1. Versions of Android.....	07
Table 2. Softwares Used.....	28
Table 3. Components Utilized.....	28



## LIST OF FIGURES:

Figure 1. Follow up scenario.....	2
Figure 2. GPS Tracking Mechanism.....	5
Figure 3. Structure of GSM Network.....	6
Figure 4. Arduino.....	10
Figure 5. SIM900.....	10
Figure 6. SKM53.....	10
Figure 7. 7805 Regulator.....	11
Figure 8. Push Button.....	11
Figure 9. Work Break down Chart.....	12
Figure 10. Block Diagram of Module.....	13
Figure 11. Block Diagram of Tracker.....	14
Figure 12. Complete Block diagram of Module and App Integration.....	15
Figure 13. Functioning of Tracker.....	15
Figure 14. Integrated circuit of hardware module.....	16
Figure 15. Flow Chart of Modules Integration.....	17
Figure 16. Flow chart of module working.....	18
Figure 17. Flow chart of App Working.....	20
Figure 18. App initial display.....	21
Figure 19. Network Setting.....	22
Figure 20. Location Display.....	22
Figure 21. Map display.....	23
Figure 22. App coding flow chart.....	23
Figure 23. Interface of modules.....	24
Figure 24. Arduino Embedment.....	25
Figure 25. Welcome Note.....	26
Figure 26. Start up screen with Menu.....	26
Figure 27. Number Setting.....	27
Figure 28. History List.....	27

Figure 29. Previous Location .....27  
Figure 30 Current Location.....28  
Figure. 31 Miss call Alert.....28

**KEY TO SYMBOL OR ABBREVIATION:**

- **GSM** Global System of Mobile Communication
- **GPS** Global Positioning System
- **GPRS** General Packet Radio System
- **BTS** Base Transceiver Station
- **SIM** Subscriber Identity Module
- **SMS** Short Message Service
- **XML** Extensible Markup Language
- **WIFI** Wireless Fidelity
- **NMEA** National Marine Electronics Association

## **CHAPTER 1:**

### **INTRODUCTION:**

This is age of information, majority of people owned smart phone [1]. Fearing the kidnapping of children, the fear of losing our children in the rush public places, fear of the children joining the wrong company [2], we aim to design a prototype for parents and for those individuals who wish to locate their children in situations such as kidnapping or cases where there is a fear of losing children. It is cost effective and easy to use and can be worn easily by children without even the involvement of any 3<sup>rd</sup> party.

#### **1.1 Overview:**

We want to design a cost effective prototype so that can cost as low as possible so that it can be easily bought by majority of people and also easy to use.

The size of the module at the trackers end must be small and compact. In this way it can be easily attached to the vehicle or child or person and can be placed in the child bag or lunch box without it being visible.

The android application must be easily available and also open and should be easy to operate. So people can use it without any hesitation and difficulties or hassle.

As the initial output will be the coordinates of latitude and longitude so proper and correct instructions regarding how to locate the exact and precise location using google maps should be provided or the application should be linked in such a way that the location is given automatically when Wi-Fi is available for easy and correct operation.

#### **1.2 Problem Statement:**

In recent years many developments are taking place. Life is getting busier and tougher. Security of personal belongings, family, is of major concern. Parents are consult about safety of their children. The stealing of vehicles is becoming very common.

Traditional methodology to overcome the challenge is

1. GPRS services for mobile to mobile tracking.
2. Different tracking modules whose output can only viewed on computer.

Problem reported

1. Kids are not allowed to take mobile in schools.
2. Carrying computer or laptop everywhere is not easy.

Keeping such problems in consideration our problem statement is designing of a sms based controlling GPS tracker through android application. It will have a hardware part which will be a module at the tracker end and the android application will be on the mobile phone at the user end. The hardware will be attached to the specific vehicle or the children we want to track. The android application will send a sms to locate the position of the module.

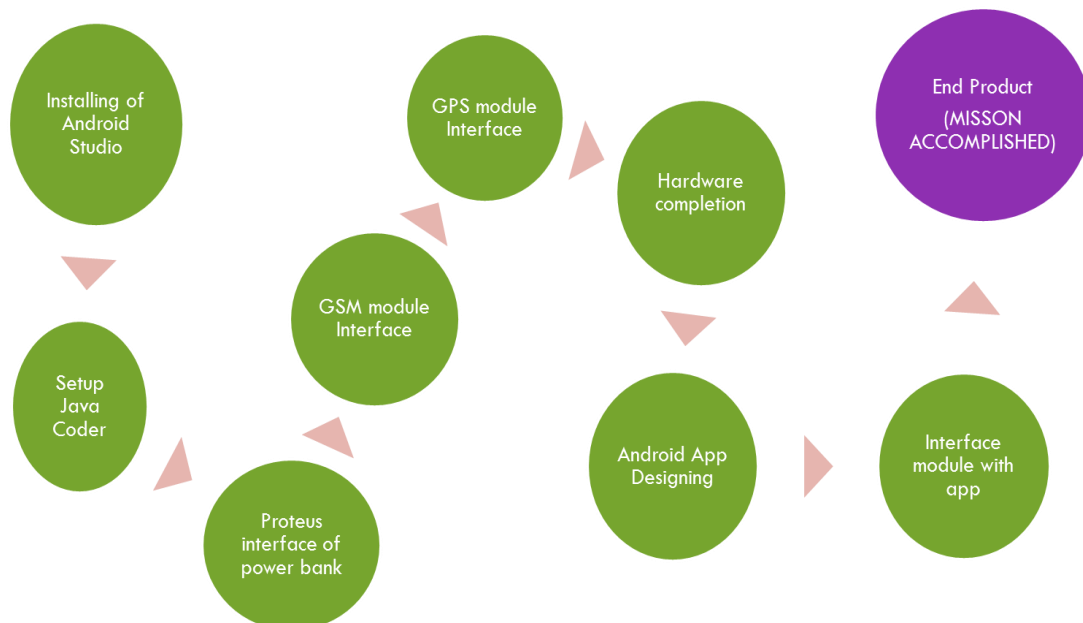
It will reply back with the location using GPS antenna in the form of latitude and longitude coordinates and the smart phone will identify the position using wifi on google maps.

Our proposed solution will

- Enhance security of individual and our personal belongings.
- Made tracking possible of non- mobile user.
- Two way tracking made possible.
- Also easily accessible on areas having weak signals.

### 1.3 Approach:

Our tracking device has a hardware which is a module and an android application which will be on the smart phone. A sms will be sent to the module via the android application. It will reply by sending the coordinates of longitude and latitudes using the GPS antenna. With the help of google map and the availability of wi-fi the coordinates will be used to indicate the exact location.



**Figure 1. Follow up scenario**

### 1.4 Objective:

This project is designed to utilize the concepts of Android programming, module building, circuit design, JAVA and XML coding, NMEA codes. Basically what we are trying to do is to integrate our practical and theoretical skills to gain a wider insight into the field of GSM and GRPS services.

This project aims to develop the hardware and software GPS tracker based on android based smart phone. This project provides an alternative solution or a benchmark to monitor and operate an SMS-based GPS tracker locating individuals in easy manner and an effective cost.

### **Advantages:**

- This project is about the design a prototype of GPS Tracker based on Android smart phone, GPS Antenna and microcontrollers.
- Small size and its cost effectiveness made it accessible for all.
- Can send alert in sense of danger.
- Easy to use.
- Reachable at anytime, anywhere and at any scenario.

### **1.5 Organization of Document:**

This document is divided into four main parts:

- First part introduces the project.
- Second part tells about background related to this field, and how our method of developing this project is efficient than the others.
- Third part is about design, specifications and algorithm.
- Final part is about references and bibliography

## **CHAPTER 2:**

### **BACKGROUND SCOPE:**

#### **2.1 Existing Literature:**

In location is [3] updated in the server and stored in a database. The clients that are registered in the server can request the location of another client. The basic purpose of the development of the application was to locate friends and family. J2ME was used to implement the mobile

#### **Use of Background Study:**

These documents are about tracking from mobile to mobile, but each document focuses on a special aspect. Positives and negatives are discussed and then the most suitable approach or algorithm is suggested [4]. These background studies not only highlight a lot of problems that occurred in the previous development but they suggest what improvements can be done in the future in terms of function and cost efficiency.

#### **2.1.1 What is GPS? :**

The Global Positioning System (GPS), originally Navstar GPS, is a space-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

#### **Fundamentals:**

The role of GPS is to locate the precise location with help of satellites.

#### **2.1.2 GPS Tracker:**

A GPS tracking unit is a device, that is carried by a moving vehicle or person, which uses the Global Positioning System to determine and track its precise location.

## The Basics of How GPS Tracking Devices Work



**Figure 2. GPS Tracking Mechanism**

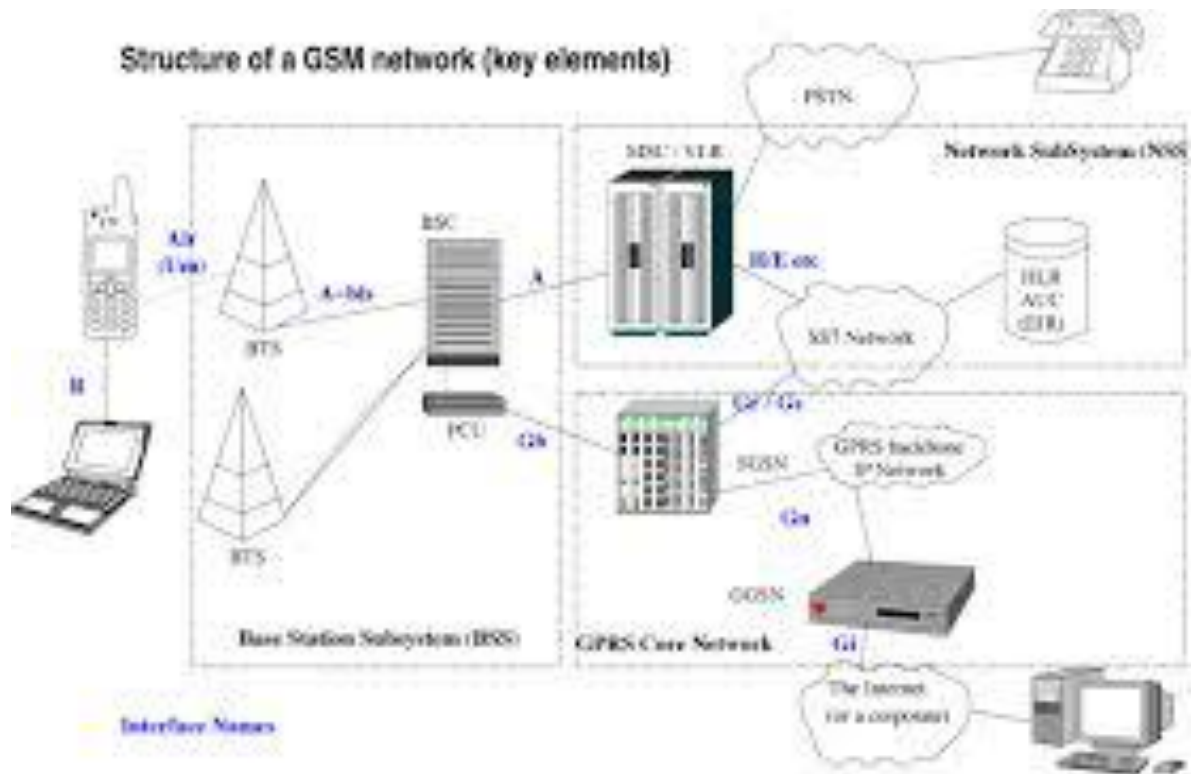
### **Types of GPS trackers:**

- Data loggers
- Data pushers
  - Asset tracking
  - Aircraft trackers
- Data pullers
- Covert GPS Trackers

### **2.1.3 What is GSM? :**

GSM (Global System for Mobile Communications, originally Groupie Special Mobile) is a 2G standard develop for proper message and data rate transiction.





**Figure 3. Structure of GSM Network**

## 2.2 What is Android? :

Android is a mobile operating system developed by Google, based on the Linux kernel. It is designed primarily for touchscreen mobile [5] devices such as smartphones and tablets. Android's user interface is user-friendly. It uses touch gestures and features such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. Google has further developed Android TV for televisions, Android Auto for cars, and Android Wear for wrist watches, each with a specialized user interface. Variants of Android are also used on notebooks, game consoles, digital cameras, and other electronics.

### 2.2.1 Versions of Android:

<i>Code name</i>	<i>Version number</i>	<i>Initial release date</i>	<i>API level</i>	<i>Support status</i>
<i>(No codename)</i>	<i>1.0</i>	<i>September 23, 2008</i>	<i>1</i>	<i>Unsupported</i>
<i>(Internally known as "Petit Four")</i>	<i>1.1</i>	<i>February 9, 2009</i>	<i>2</i>	<i>Unsupported</i>
<i>Cupcake</i>	<i>1.5</i>	<i>April 27, 2009</i>	<i>3</i>	<i>Unsupported</i>
<i>Donut</i>	<i>1.6</i>	<i>September 15, 2009</i>	<i>4</i>	<i>Unsupported</i>
<i>Eclair</i>	<i>2.0–2.1</i>	<i>October 26, 2009</i>	<i>5–7</i>	<i>Unsupported</i>
<i>Froyo</i>	<i>2.2–2.2.3</i>	<i>May 20, 2010</i>	<i>8</i>	<i>Unsupported</i>
<i>Gingerbread</i>	<i>2.3–2.3.7</i>	<i>December 6, 2010</i>	<i>9–10</i>	<i>Unsupported</i>
<i>Honeycomb</i>	<i>3.0–3.2.6</i>	<i>February 22, 2011</i>	<i>11–13</i>	<i>Unsupported</i>
<i>Ice Cream Sandwich</i>	<i>4.0–4.0.4</i>	<i>October 18, 2011</i>	<i>14–15</i>	<i>Unsupported</i>
<i>Jelly Bean</i>	<i>4.1–4.3.1</i>	<i>July 9, 2012</i>	<i>16–18</i>	<i>Unsupported</i>
<i>KitKat</i>	<i>4.4–4.4.4</i>	<i>October 31, 2013</i>	<i>19</i>	<i>Supported;<sup>[13]</sup> Seeclarification</i>
<i>Lollipop</i>	<i>5.0–5.1.1</i>	<i>November 12, 2014</i>	<i>21–22</i>	<i>Supported</i>
<i>Marshmallow</i>	<i>6.0–6.0.1</i>	<i>October 5, 2015</i>	<i>23</i>	<i>Supported</i>
<i>Nougat</i>	<i>7.0–7.1.2</i>	<i>August 22, 2016</i>	<i>24–25</i>	<i>Supported</i>

<i>Android</i>	<i>8.0</i>	<i>TBA</i>	<i>26</i>	<i>Beta</i>
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**Table 1. Versions of Android**

### **2.3 Problem Formulation:**

Some work has already been done for the GPS Tracker. Almost all of them uses GPS and GSM architecture to design systems with increased features. We will be using Arduino to design the modules as it has microprocessors for control. Furthermore, it has Trans receiver pins defined and power regulator. It is our aim to make a device that uses features of GPS to provide a faster and efficient solution to secure any anything from being lost/abducted.

## **CHAPTER 3:**

### **DESIGN:**

#### **3.1 Technical Specifications:**

Project is aimed at developing a module with an android application that will be designed to help in tracking lost people to know their location [6]. Now a days a lot of cases of kidnapping was reported. The proposed solution takes the advantage of the android application on mobile phone and at tracked end we design small size tracking module. The motivation for the project is to help the person to track the people they care for in case of any disaster/calamity or because of any kind of accident [7].

Components required for hardware are:

- 1)Arduino UNO ( Microcontroller Board )
- 2)GSM Module (Sim900 - It will be used for SMS sending and receiving )
- 3) GSM Module ( SKM53 - It will be used to get the longitude and Latitude )
- 4) 7805 ( IC Regulator - Used to convert 12V into 5V )
- 5) Battery ( 12V )
- 6) Push Button
- 7) Resistors
- 8) Capacitors
- 9) Jumper wires
- 10) Male and Female Pins

#### **Arduino UNO:**

It is made up microcontrollers based on Atmega328P.

Arduino has 14 Input/output pins:

- 6 pins used as power outputs
- 6 analog inputs
- 16 M Hz quartz
- A USB connection
- Power jack
- ICSP header [8]



**Figure 4. Arduino**

**Sim900:**

It will be used for SMS sending and receiving. It is the module can also name as GSM module.



**Figure 5: SIM900**

**SKM53:**

It will be used to get the longitude and Latitude.

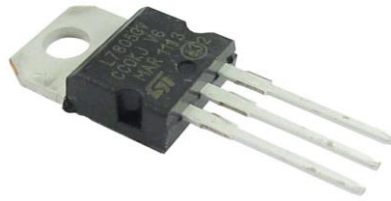
It has a receiver and a transmitter. Its receiver gets attached with transmitter of the Arduino.



**Figure 6:SKM53**

**7805:**

It is a voltage regulator. Use to regulate the voltage. IC 7805 is a 5V Voltage Regulator that draws 5V regulated power supply. It comes with exception of heat sink. IC 7805 is a part of 78XX voltage regulators series. It is a standard, while in name the last two digits 05 denotes the voltage that it regulates. Hence a 7805 would regulate 5v



**Figure 7:7805 Regulator**

**Push button:**

It is use to operate the circuit. When it is pressed circuit starts working.



**Figure 8: Push Button**

**3.2 Design Requirements:**

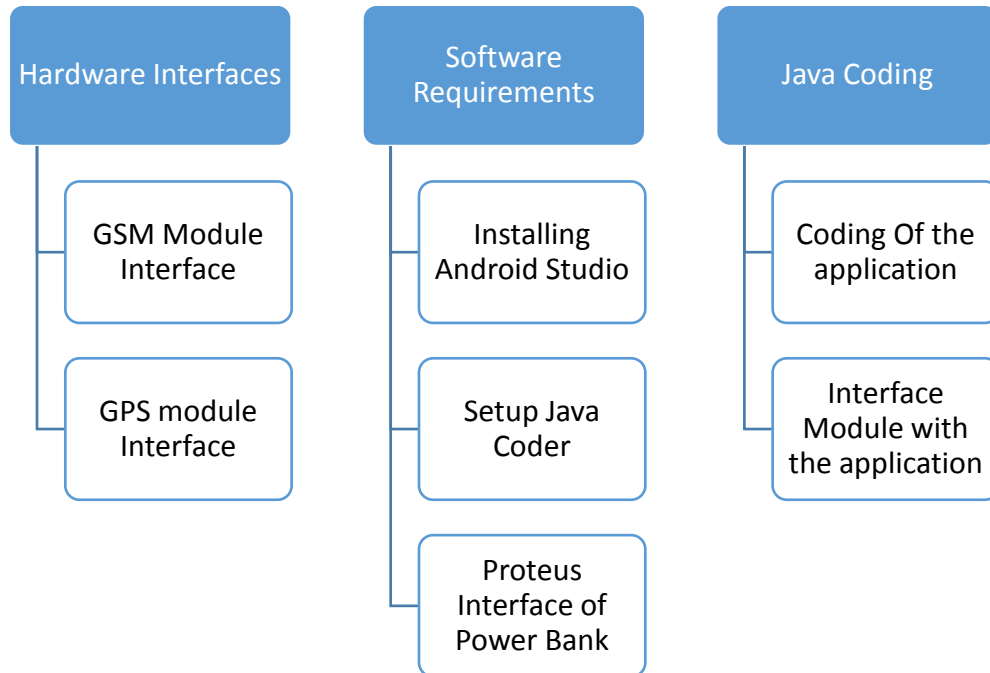
We want to design a device that can cost as low as possible so that it can be easily bought by majority of people.

The size of the module at the trackers end must be compact. In this way it can be easily attached to the vehicle and can be placed in the child bag without it being noticed.

The android application must be easily available and should be easy to operate. So people can use it without any hesitation.

As the initial output will be the coordinates, proper instructions regarding how to locate the exact location using google maps should be provided or the application should be linked in such a way that the location is given automatically when Wi-Fi is available.

The power consumption of the module should be minimum so that it can operate for a longer period of time without the need to change the battery.



**Figure 9. Work Break down Chart**

### 3.3 Design Specification:

We have a hardware and a software part.

- The software part consist of the development of the android application. The programming is done using java and xml coding.
- The hardware consist of the Arduino UNO. This will be used to store all the data. The sending and receiving of the sms and the generation of the coordinates.
- GSM module sim900 will be used for the sending and the receiving of the sms and GPS module SKM53 will be used to generate the coordinates of latitude and longitudes.
- IC regulator 7805 will be used to convert 12v into 5v and Battery of 12v will be used to supply power to the module.

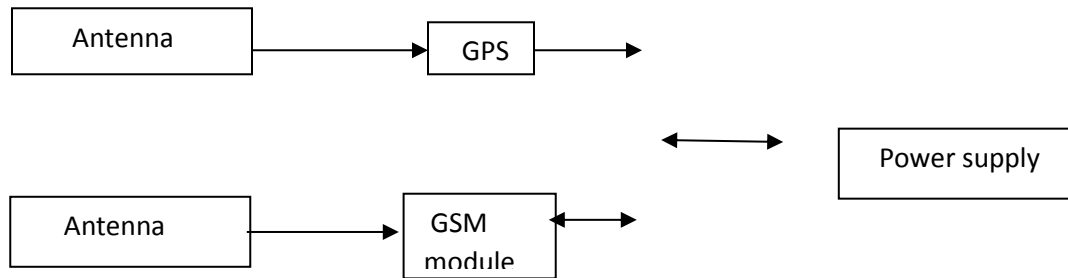
All these hardware components will be connected together and will be assembled in such a way to make it as compact as possible.

### 3.4 Design Requirements:

#### 3.4.1 Description:

The project works with the integration of a microcontroller, a GSM module and a GPS receiver. The tracked end (user) is connected to the application installed on the tracker mobile. So in this project, what basically happening is that longitudinal and latitudinal data will be sent by a GPS receiver in correspondence with the position of user connected to

GSM module. The GSM module receives an SIMS and because the GSM holding device has a SIM card, it will then send the data to microcontroller (arduino).



**Figure 10. Block Diagram of Module**

A GPS is a navigation system based up of 24 or 30 satellites and tells us the correct geographical information. GPS takes satellite input continuously and stores the geographical information of the user being tracked in the form of latitude and longitude in Radio's buffer. When the user is being tracked, the tracker needs to send a text message to GSM device which gets it activated. Once the GSM is activated, it takes the previously stored latitudinal and longitudinal position from the buffer and sends an SIMS to a number for example in our case the android application we have designed and installed in our mobile phone to track a user. The hardware module can be fitted in any form, like arm band, waist band, leg band, on the children for tracking them. Our project will help us observe and enable the previous locations of the individual as well. We can also install emergency alert system in case of any bad accident for example a smoke sensor in case of fire.

This project is divided into two parts:

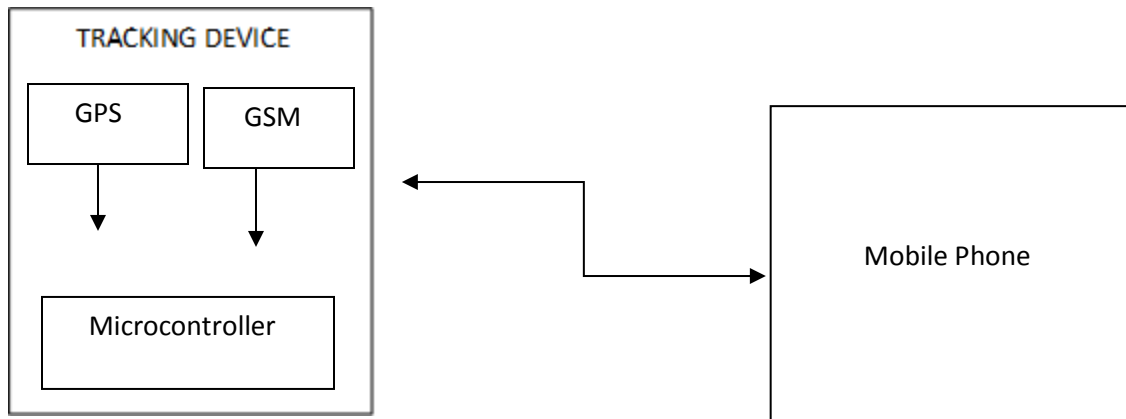
- software development
- hardware development

Hardware development is about GPS, Arduino and GSM interfacing. The software development part is to write Arduino code which includes NMEA commands and GSM commands. The software development includes the development of an Android application which runs on the mobile of the user who is tracking an individual. The purpose of this project was to design a GPS/GSM individual tracking system in order to fully understand what basically the workings of GPS and GSM are.

For the hardware development part, focus would be the Arduino and GPS pairing/interfacing and for the second part, the objective would be to pair GPS-Arduino interface with the GSM module since both the hardware and the software parts have to work together so both have to be integrated.

GPS is used because it gives an accurate geographical location, and a clear line of sight is required for the operation. For 2D 3 satellites are used and for 3D, above 3 satellites are required. GSM is one of the leading technologies and also it used narrowband TDMA. The basic system architecture is depicted as:





**Figure 11. Block Diagram of Tracker**

### 3.4.2 About Hardware interface:

Global positioning system gives the user the latitude and longitude along with Universal Time Coding. GPS module is the most important component of our system since it gets coordinates from the satellite every second. It send the tracked information in the format of NMEA codes. If there are 2 commas then it would be latitude and if 4 commas are there then it would-be longitude. The latitude and longitude information is then stored in an array format. In this project, Arduino monitors the whole process alongside the GSM module and GPS module where GSM module is used to send an SMS which has the coordinates. GSM module sends the coordinate information data to Arduino which after reading the data from the whole message, extracts the main information. The Rx pin of GSM and TX pin of Arduino are connected directly. TX pin of GPS and Rx pin of Arduino are directly joint.

Arduino is the brain to control the GPS/GSM tracker which is controlled by a software application whose code is compiled in Java programming language. The gsm/gprs module is responsible for the establishment of connection between the tinvidual being tracked and the remote application using a TCP/IP connection. If we use the SIM900 GSM module then it means that the supporting band is in the range of 900 MHz band. In our project, we are requiring an input of 12V. This is how we are going to integrate the hardware and test it as well:

- We are going to assemble all the components on the Arduino. TX and Rx pins will be paired.
- Then we will insert a valid SIM in the GSM module.
- Then we will integrate the GSM module with the GPS module.
- Then we will test the system by drive testing

### 3.5 Detailed design with Justification:

#### 3.5.1 Description:

We will be working with Android programming for Application designing. [9]

The controllers will be used to receive tracked request from smart phone and sends back the location using GPS antenna in the form of latitude and longitude and smart phone open it on Map using Wi-Fi/Wi-max connection.

The project provides cost effective solution for the tracking of an individual with the use of a mobile phone at the user end and a tracking prototype carried by the individual to be tracked.

After completing the design an android app for the tracking purpose, map our App on GPS module for generic tracking, by this we remove necessity of smart phone on the tracked end.

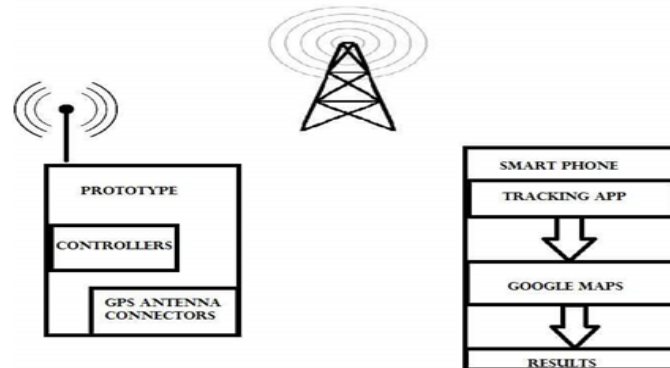
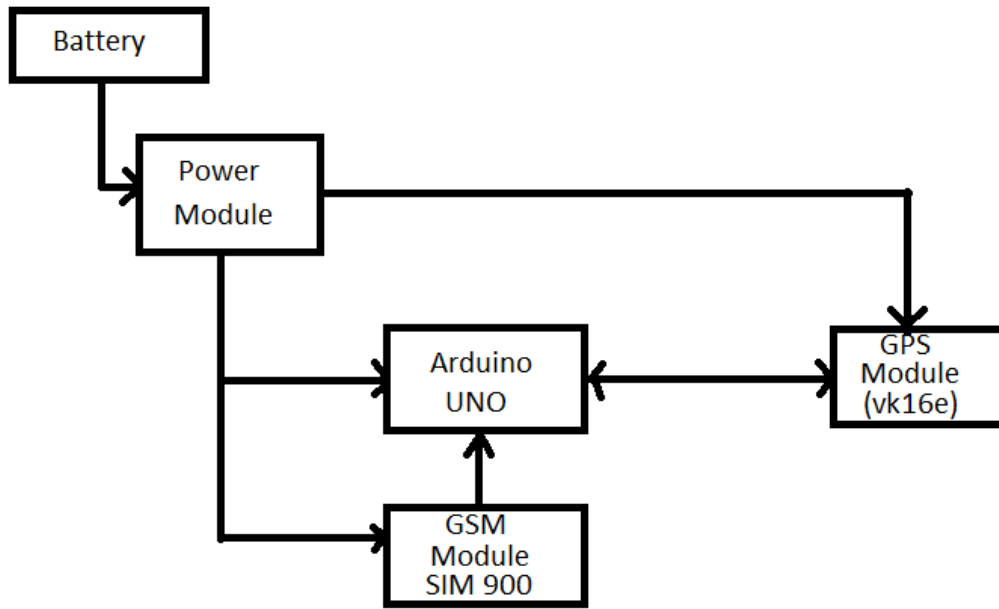


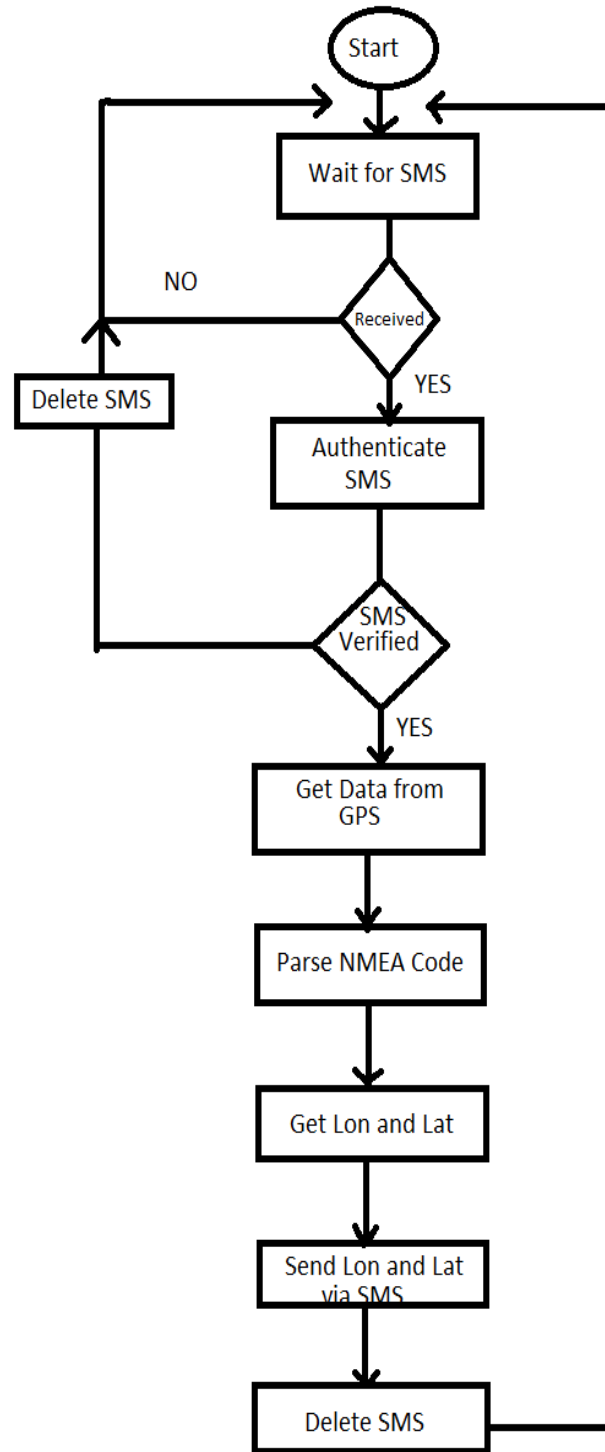
Figure 12: Complete Block diagram of Module and App Integration



Figure 13: Functioning of Tracker



**Figure 14. Flow Chart of Modules Integration**



**Figure 15. Flow chart of module working**

## **CHAPTER 4:**

### **SIMULATION:**

#### **4.1 Android Application:**

It is an application which is running on the android platform. Designed for the record and transaction purposes.

#### **4.2 Description of android app development:**

The second phase is the application development. The app development is very important as all the commands will be initiated by the use of the android app.

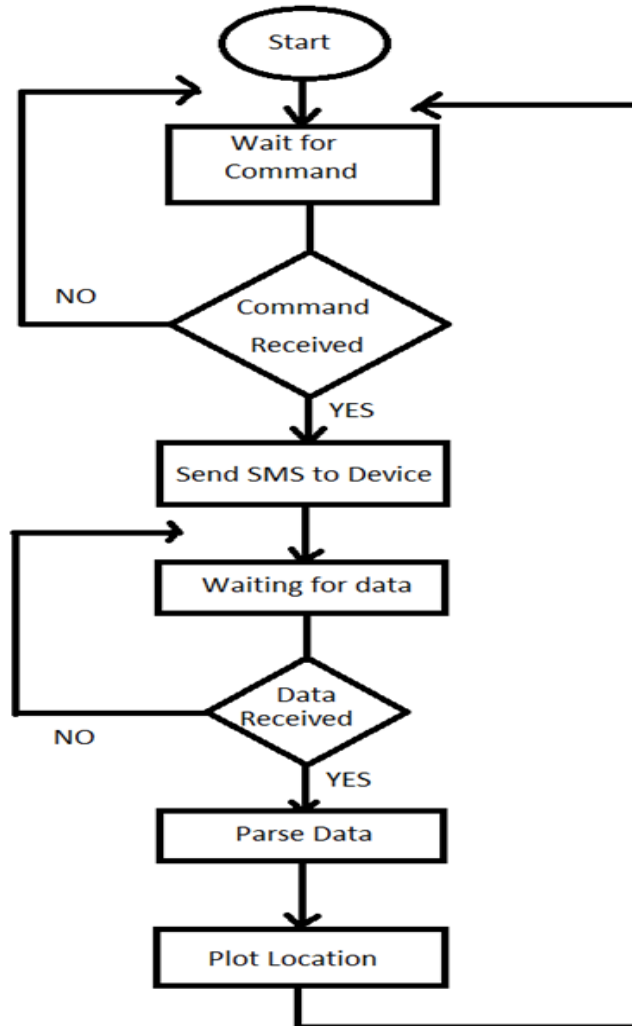
The main task is to design the graphics of the android application. For the development of the android application the basic software that is used was android studio version 10.

Android studio is such a software application that provides its user (computer programmers) such a comprehensive environment that can help them to develop new android applications.

The JAVA programming is the basic tool to better understand the android studio 10. So to use android studio one has a better command on the JAVA programming.

So what is the need for android app? Obviously to link the authenticated user to the module, a bridge is needed. The android application will work as a bridge between the user and the module.

Then the question arises that how will the android app get linked with the module? Or how the android app controls the working of the module? To answer this question more efficiently just go through the following flow chart.



**Figure 17. Flow chart of App Working**

The app will wait for the command from the user and when the app receives the command from the user to track the module it generates a sms and send it to the tracking module requesting to share its location. It then waits for the module to reply back its position in the form of longitude and latitude. When the data is received the application will analyze the data into logical syntactic components. The data received provides just longitude and latitude of the module. But as a layman person cannot guess what actually the position of that module is by just knowing the longitude and latitude of the module. For that purpose one can take the help of Google map. The application would further design in such a way that it can open the Google map to show the exact location of the module.

### 4.3 Android Application Start up:

We develop an android application in following step for its proper functioning:

#### Creating new Android Project:

1. Create a new project in Eclipse
2. Open AndroidManifest.xml to save the file.

#### Writing GPS Manager Class:

3. Create a new class.
4. Add the required global variables and a constructor for this class.
5. Add the implementation for the function.

#### Getting user's current location (Latitude and Longitude):

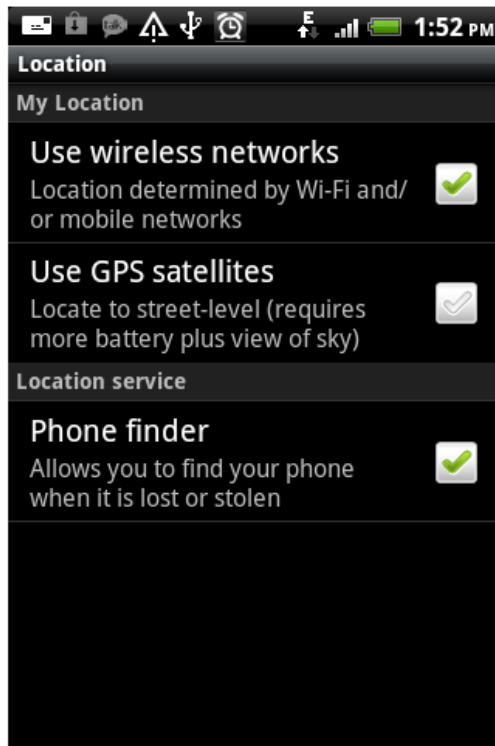
6. Add the coordinates function for location.

#### Prompting users to Turn On GPS:

7. Setup the menu for GPS enabling.



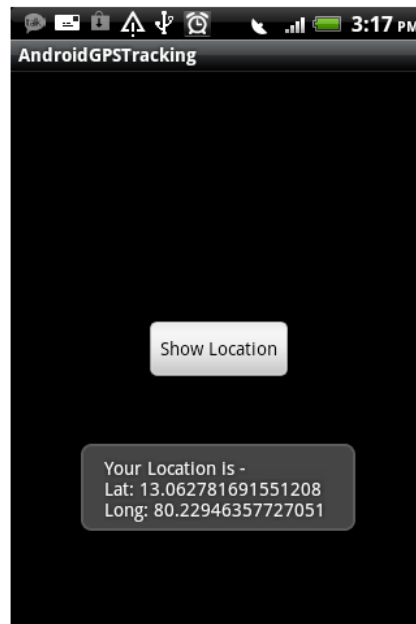
Figure 18. App initial display



**Figure 19. Network Setting**

**How to Use:**

8. When the current location is obtained we display it up.

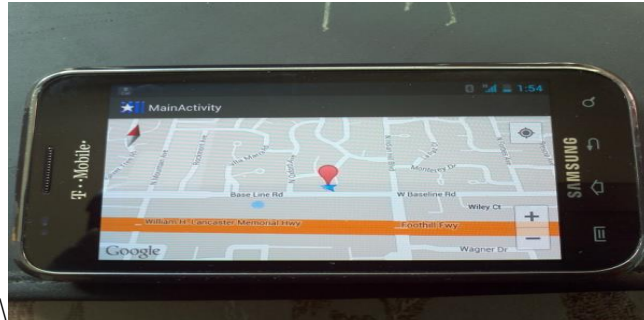


**Figure 20. Location Display**



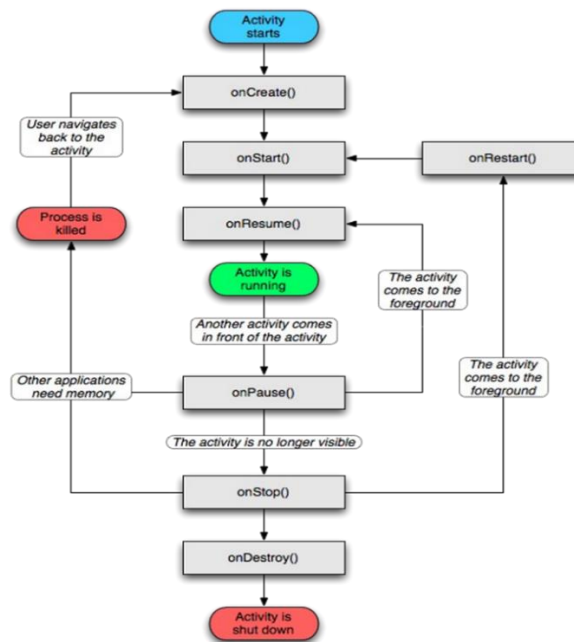
### Locating it on the MAP:

9. The current location is send to Google map through code.



**Figure 21. Map display**

### Flow Chart:



**Figure 22. App coding flow chart**

### NOTE:

This all can be done by writing the code in JAVA Language.

## CHAPTER 5:

### IMPLEMENTATION:

#### 5.1 Physical Interface:

The GSM interface with GPS and Antenna is shown below:

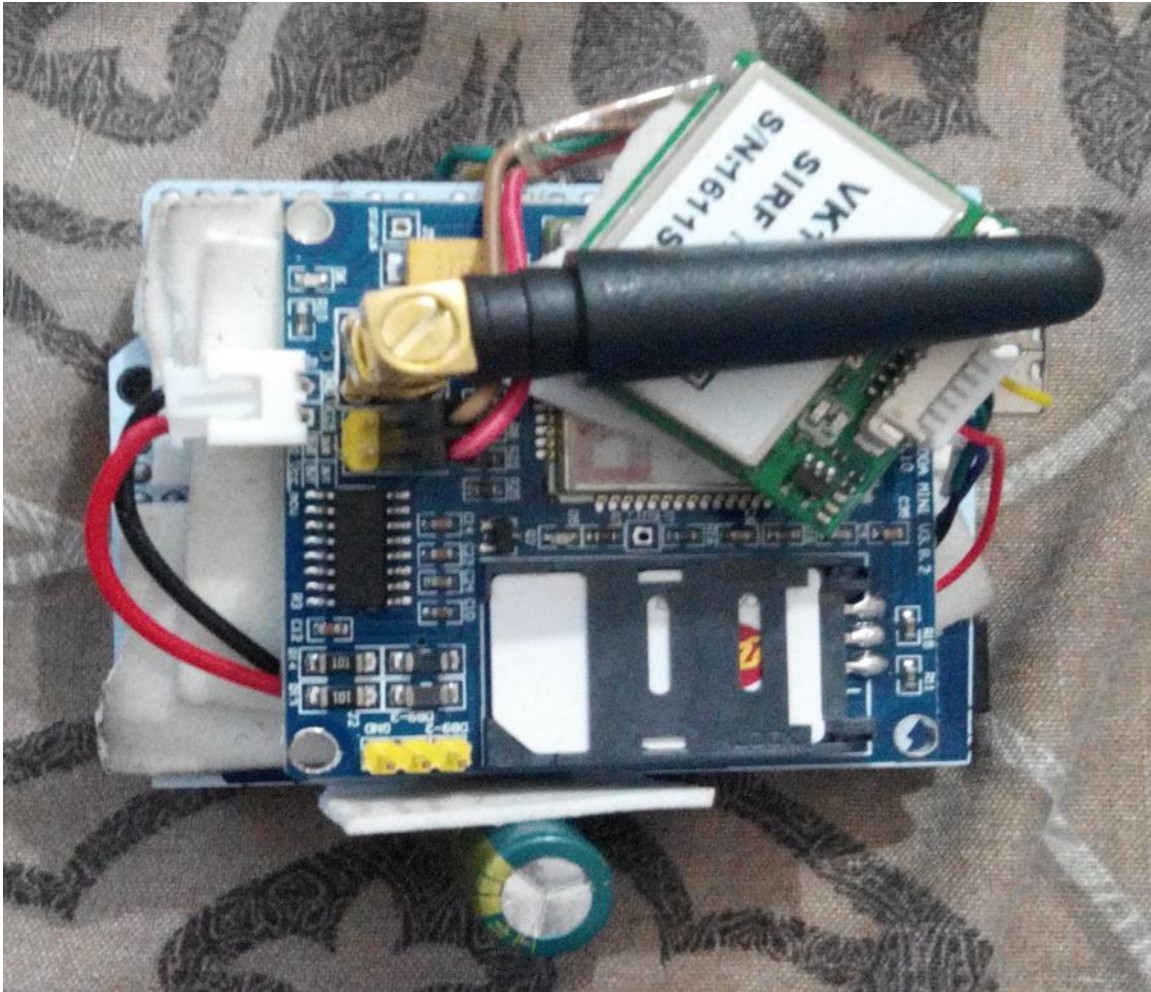
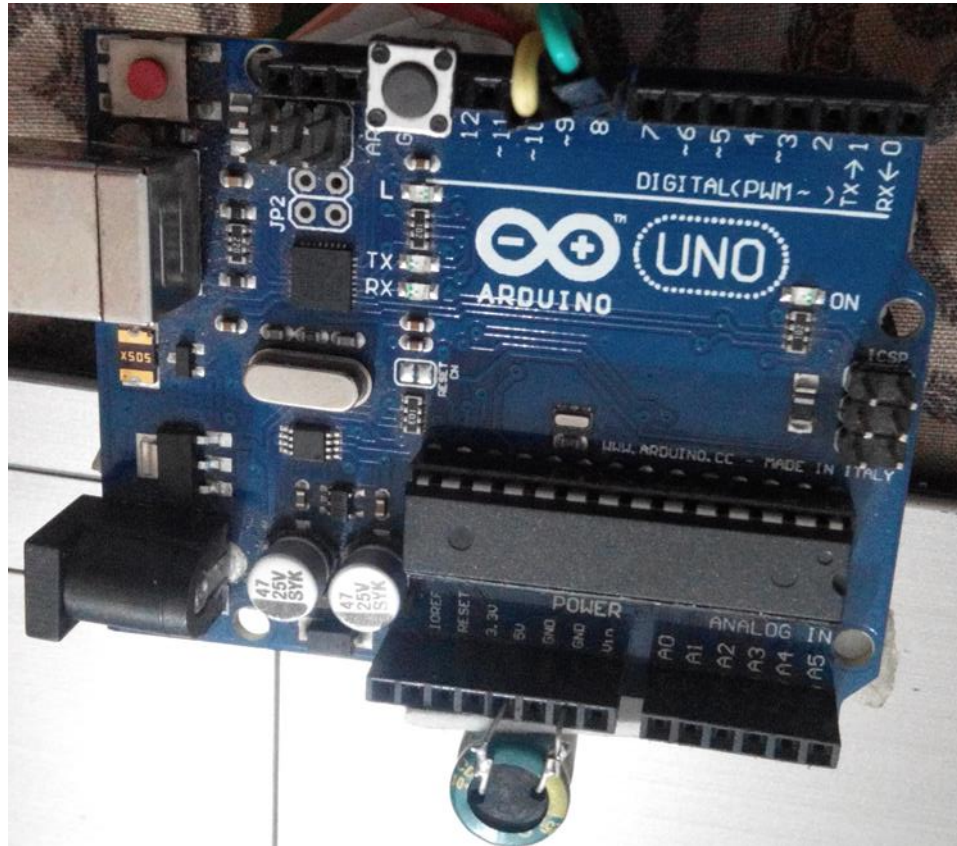


Figure 23. Interface of modules

Arduino interface with modules and Push button is shown below:



**Figure 24. Arduino Embedment**

### **5.2 Function of Push Button:**

When the person having module press the push button its an alert to the mobile having APP that the person may be in danger by having miss call through that number.

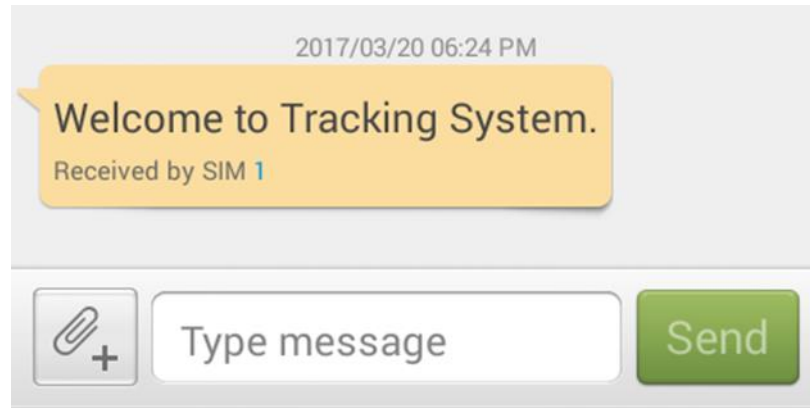
## CHAPTER 6:

### RESULTS:

#### 6.1 Simulation Results:

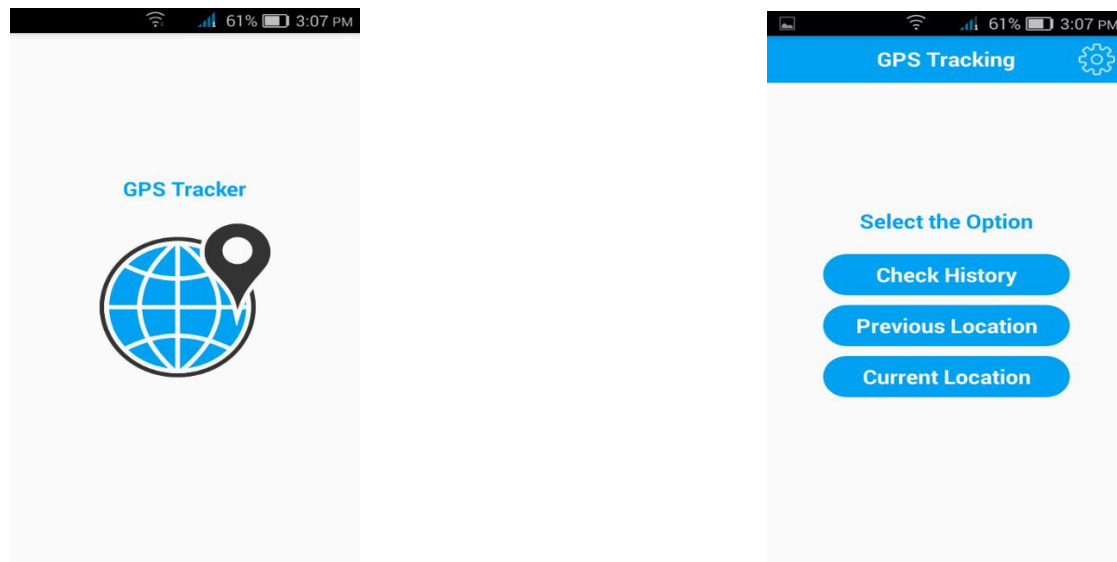
##### Initializing:

When we switch on the module as GSM pick up the signal we receive the Message “Welcome to the Tracking System”



**Figure 25. Welcome Note**

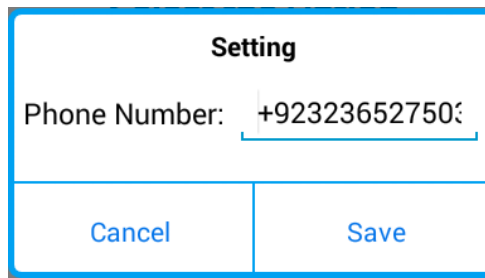
##### Startup Screen with Menu:



**Figure 26. Start up screen with Menu**

### Setting Menu:

Here we can set and save the number of SIM placed in the Module as an edit able text

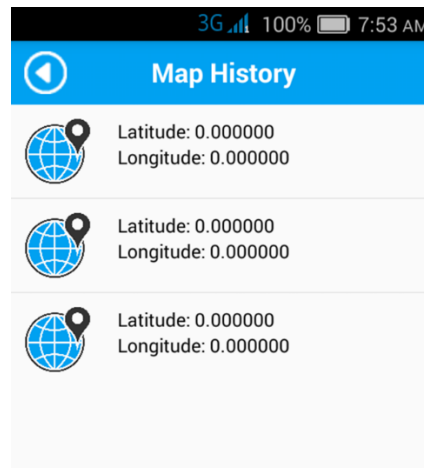


The screenshot shows a dialog box titled "Setting". It contains a text input field labeled "Phone Number:" with the value "+923236527503". Below the input field are two buttons: "Cancel" on the left and "Save" on the right.

**Figure 27 Number Setting**

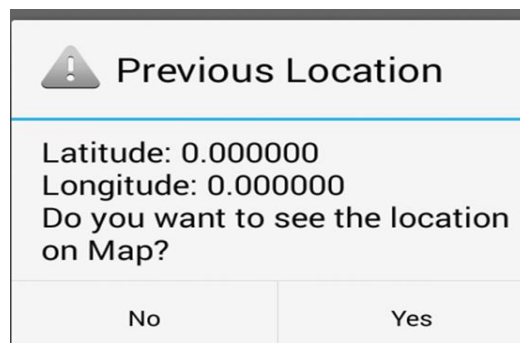
### History Menu:

The History Menu has all the Requested location from start till and upto 100 items .



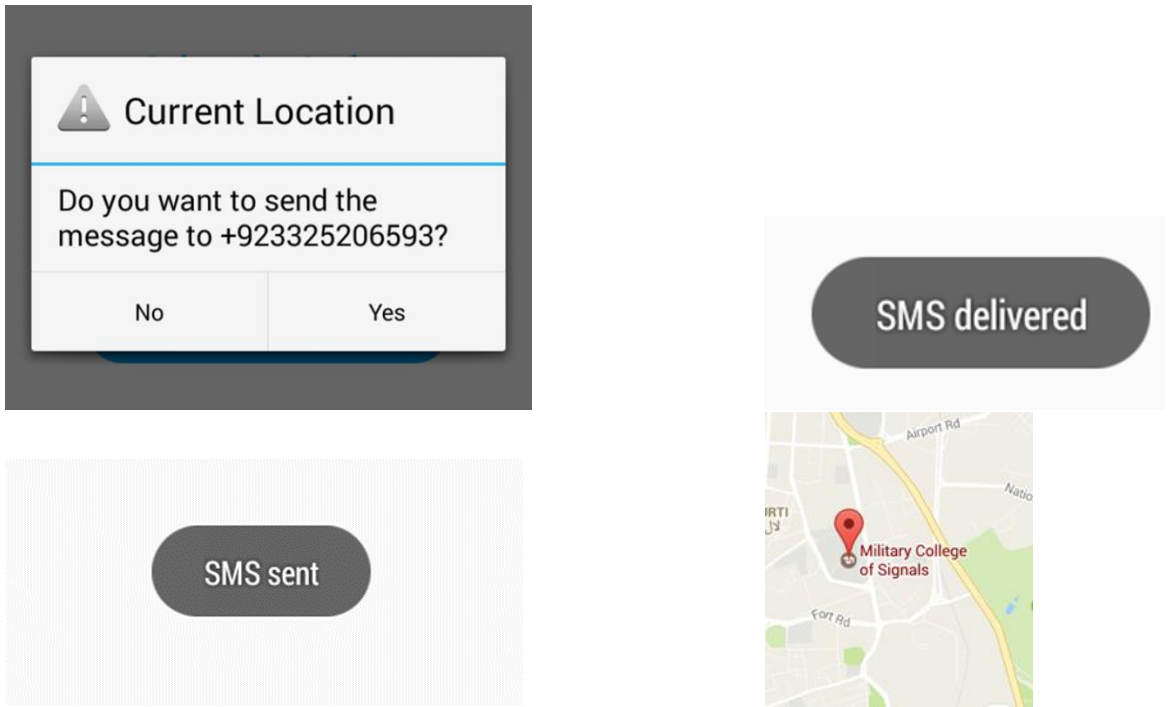
**Figure 28. History List**

### Previous Location Menu:



**Figure 29. Previous Location**

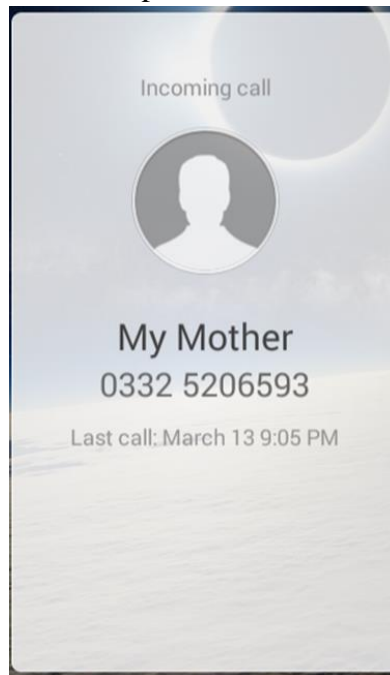
**Current Location:**



**Figure 30 Current Location**

**6.2 Implementation Results:**

Below is the figure when push button is pressed a missed call is send to assigned number:



**Figure. 31 Miss call Alert**



### 6.3 Scope:

This project has a very vast scope in the security field. It will help people especially parents to track the person (child) while performing their daily routine in a satisfied manner. This will be made on a low cost and affordable to all segments of the society.

This module is developed on GSM900 with little modification and backward compatibility (according to standard of ITU) it can be upgraded to GSM1800 or UMTS2100 for while various components are not available at present.

### 6.4 Resources Utilized:

Softwares	Specifications
Android Studio	Version 1.0 and 1.0.0.0
JAVA Programming Software	Version jdk 1.8.0_77 and jre 1.8.0_101
PROTEUS	Version 8.0
MATLAB	Version 2012
Keil	Version 2.0.1
Open Map	Version 1.18

**Table 2. Software used**

Name of Equipment	Cost-estimate	References
Arduino Kit	1950 PKR	<a href="http://pakistanstuff.com/ProductDetail.aspx?ProductID=1188">http://pakistanstuff.com/ProductDetail.aspx?ProductID=1188</a>
GSM(Sim 900) module	4000 PKR	<a href="https://www.aliexpress.com/item/Free-shipping-GSM-SIM900-SIM900A-Module-GPRS-Shield-Compatible-with-Arduino-for-GSM-Cell-Phone-Achieve/32442021383.html">https://www.aliexpress.com/item/Free-shipping-GSM-SIM900-SIM900A-Module-GPRS-Shield-Compatible-with-Arduino-for-GSM-Cell-Phone-Achieve/32442021383.html</a>
GSM Module (SKM53)	1700 PKR	<a href="https://www.alibaba.com/product-detail/High-performance-embedded-ethernet-skylab-gps_60277871650.html?s=p">https://www.alibaba.com/product-detail/High-performance-embedded-ethernet-skylab-gps_60277871650.html?s=p</a>
Power Bank+ Remaining components	4600 PKR	-
Total	12550 PKR	-

**Table 3. Components Utilized**

# **BIBLIOGRAPHY**



## **CHAPTER 7:**

### **BIBLIOGRAPHY:**

#### **7.1 List of similar projects done at MCS:**

BS 13 Syndicates Capt Umer, Capt Ahmed and Capt Nazir

#### **7.2 List of similar projects elsewhere:**

##### **➤ GPS TRACKER:**

By Pascal Bruegger at University of Fribourg, Switzerland in March 9, 2006

The project proposed a solution to trace people during a trip using a web-based application. Takes advantage of the location features of mobiles (GSM and GPS functionalities).

##### **➤ POSTGRADUATE DISSERTATION E-TRACKER:**

By Wong Loo Woon at University of Malaya, Kuala Lumpur in March, 2011

Provides timely data collection of students taking the dissertation course which helps the other students, lectures and university management staff. It helps the students to complete their dissertation in a timely manner.

##### **➤ VEHICLE TRACKING SYSTEM:**

By MOHAMMAD FAIZUL BLN SABAWI at University of Malaysia, in July 2009

It comprises integration of GSM, GPS and microcontroller to track vehicles using a centralized command interface on computers. Supports Android platform. This system is very useful for car owners.

##### **➤ GPS/GSM TRACKING SYSTEM USING TELIT GM862 MODULE:**

Idea was to combine telit GM 862 module, a GSM module, is integrated with a GPS module to track individuals. It aids at locating lost individuals, cars, etc. Based on GPS satellite and GSM antenna. Further enhancements could be made in this project, for example geo fencing, emergency alerts etc.

#### **7.3 ONLINE HELP:**

- <http://www.wrdsystems.com>
- <http://www.trackpeers.com>
- <http://www.visirun.com>

- <http://www.gpsinformation.org/dale/nmea.htm#RMC>
- <https://developer.android.com/guide/index.html>
- <http://www.sqlite.org/about.html>
- <https://developers.google.com/maps/?csw=1>
- <https://corporate.dna.fi/en/privatecustomers/mobilecommunication/priceplans/S>
- <http://mobithinking.com/mobile-marketing-tools/latest-mobilestats/a#smartphone-shipments>
- [http://webone.novatel.ca/assets/Documents/Papers/GPSINSIntegrationwiththeIMARFSAS\\_IMU.pdf](http://webone.novatel.ca/assets/Documents/Papers/GPSINSIntegrationwiththeIMARFSAS_IMU.pdf)
- <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=942858&isnumber=20416>
- [https://lookaside.fbsbx.com/file/GPS-and-SMS-Based-Child-Tracking-System-Using-Smart-Phone.pdf?token=AWxHdEIi0ikaXBsmOgsG1PEo0ND7EnZ37WtYYF2Ar\\_kPmYzIPNwGcSe2IiowaC1YRWDjyTGzfdKaL4jL1dfMjAbKWXHCwyfoFNIAJI6ab8X4Hd79LHa1OUmKKsbLmr6pb4NafJVzWP9AizmQ-Mal6RR](https://lookaside.fbsbx.com/file/GPS-and-SMS-Based-Child-Tracking-System-Using-Smart-Phone.pdf?token=AWxHdEIi0ikaXBsmOgsG1PEo0ND7EnZ37WtYYF2Ar_kPmYzIPNwGcSe2IiowaC1YRWDjyTGzfdKaL4jL1dfMjAbKWXHCwyfoFNIAJI6ab8X4Hd79LHa1OUmKKsbLmr6pb4NafJVzWP9AizmQ-Mal6RR)
- [file:///C:/Users/user/Downloads/OLUFOWOBI\\_LAWAL\\_BACHELORS\\_THESIS.pdf](file:///C:/Users/user/Downloads/OLUFOWOBI_LAWAL_BACHELORS_THESIS.pdf) <http://www.thecavellgroup.com/downloads/Kidnapping>
- <http://www.cellularnews.com/story/29824.php>
- <https://circuitdigest.com/microcontroller-projects/vehicle-tracking-system-using-arduino-gps-and-gsm>
- <https://www.youtube.com/watch?v=xYNeIp7ZQkQ>
- <https://www.youtube.com/watch?v=hznaj8GaIXA>
- <https://www.youtube.com/watch?v=OsMoowoB2Rg>

#### **7.4 PROJECT RESEARCH WORK (References):**

- [1] Anson Alexander, "Smartphone Usage Statistics 2012," available at: <http://ansonalex.com/infographics/smartphone-usage-statistics-2012infographic/>
- [2] Cyber Travel Tips, "Statistics of Missing Child In Malaysia", available at: <http://www.thecavellgroup.com/downloads/Kidnapping-TheGlobalEpidemic.pdf>
- [3] Ghaith Bader Al-Suwaidi, Mohamed Jamal Zemerly, "Locating friends and family using mobile phones with global positioning system (GPS)," *IEEE/ACS International Conference on Computer Systems and Applications*, 2009.
- [4] Almomani, I.M., Alkhalil, N.Y., Ahmad, E.M., Jodeh, R.M., "Ubiquitous GPS vehicle tracking and management system," *2011 IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT)*, pp.1-6, 6-8 Dec. 2011.
- [5] Chandra, A., Jain, S., Qadeer, M.A., "GPS Locator: An Application for Location Tracking and Sharing Using GPS for Java Enabled Handhelds," *2011 International Conference on Computational Intelligence and Communication Networks (CICN)*, pp.406-410, 7-9 Oct. 2011.
- [6] Anson Alexander, "Smartphone Usage Statistics 2012," available at: <http://ansonalex.com/infographics/smartphone-usage-statistics-2012infographic/>
- [7] Cyber Travel Tips, "Statistics of Missing Child In Malaysia", available at: <http://www.thecavellgroup.com/downloads/Kidnapping-TheGlobalEpidemic.pdf>
- [8] Ghaith Bader Al-Suwaidi, Mohamed Jamal Zemerly, "Locating friends and family using mobile phones with global positioning system (GPS)," *IEEE/ACS International Conference on Computer Systems and Applications*, 2009.
- [9] Almomani, I.M., Alkhalil, N.Y., Ahmad, E.M., Jodeh, R.M., "Ubiquitous GPS vehicle tracking and management system," *2011 IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT)*, pp.1-6, 6-8 Dec. 2011.

## CHAPTER 8

### Improvements:

#### 8.1 Future work:

At tracked end additional application can be incorporated:

- Smoke/fire detection.
- Temperature detection.
- Blood pressure monitoring.
- Modular structure in various sizes and gadget style.

And many more.

#### 8.2 Future Direction:

- Proper business plan and commercialization will make this project successful as it is fulfilling the need of the society and providing a low cost solution to companies
- Being a leader of an imitate idea with new advancement it will open up a lot of new opportunities in the respective field and beyond
- No idea can be made successful without a team hence equal progress for the team members

#### 8.3 Applications:

Tracking systems are used in many different applications:

- Individual Tracking: Will track individual easily and in very short time.
- Fleet tracking: Also known as vehicle tracking or GPS vehicle it provides companies with the insight they need to be able to operate their fleet more effectively and efficiently.
- Stolen vehicle tracking: This systems will helped to ensure that when a vehicle is stolen its location can be detected quickly. It will increased vehicle security.
- Lone worker tracking: This will increased lone worker safety and peace of mind. Light weight devices which are easy to carry.
- Military Applications: one of the very important tools for the forces. Helps to track their locations and the potential dangers of the enemy. It will also detect enemy activity through Intelligence means.
- Office Management: It will also help in keeping an attendance record properly by keeping an eye that whether person is really in office or not.

# APPENDIX A

## APPROVED SYNOPSIS

### LOCATING INDIVIDUAL THROUGH TRACKING SYSTEM

**Extended Title:** SMS BASED ANDROID ASSET TRACKING SYSTEM

**Brief Description of The Project / Thesis with Salient Specifications:** This project provides a cheap solution for tracking purposes with the use of a mobile phone for monitoring an SMS-based GPS tracker provided by WRD Systems Ltd especially in locations where GPRS may not be available. The present solution provided by WRD Systems involves a tracking unit, a SIM based gateway and a software that runs on a Laptop or Desktop PC. The gateway hardware is always connected to the laptop or PC, so when a location update is requested, the tracker sends the location to the gateway via SMS and the desktop application then reads the data off the gateway. This project eliminates the need for the gateway hardware, thus cutting cost in two folds. First, we have the fact that the cost of the gateway hardware is totally eradicated. Secondly, the maintenance cost of this SIM-based hardware is also eliminated as this project allows users to leverage an existing SIM-based hardware, the mobile phone. Also worth noting is that this solution is server-less and does not require a monthly fee. After android development we design the GPS module and mapped our App on it for generic tracking by this we remove necessity of smart phone on the tracked end (receiver).

**Scope of Work :**

This project will support the Android OS platform and able to communicate with the tracker through SMS only.

**Academic Objectives :**

- Know the features of tracking systems
- Programming skill
- Designing of GPS Module

**Application / End Goal Objectives:** A GPS Module (PCB prototype) capable of tracking individual and even transport using Android App on the user smart phone.

**Previous Work Done on The Subject:** In 2011 by Lawal Olufowobi, in Oxford University London.

**Material Resources Required:** Android Studio, Java programming software, Proteus, MATLAB, Open map, Keil and smart phone.  
Neo 2115 GPS controller, PIC32, AN1373 (they can be replace by supplement if not available in market).

**No of Students Required : 5**

**Group Members:**

1. Sheeza Khalid
2. Basirah Noor
3. Saad Munawar
4. Maheen Sajid
5. Sania Nadeem

**Special Skills Required:** Android programming, module construction, circuit design, JAVA basics, XML coding.

**Approval Status**

**Supervisor Name:** Asst. Prof Maj Fazal Ahmed (Retd)

**Assigned to:** NC Sheeza Khalid, NC Saad Munawar, NC Maheen Sajid, NC Basirah Noor, NC Sania Nadeem.

# APPENDIX B



### KEY MILESTONES OF THE PROJECT

<b>Week No</b>	<b>Work done during the week</b>
Week 1 & 2	Android Studio installation and basic understanding of its operations
Week 3	Basic examples of coding like blinking an LED
Week 4 & 5	Java coding and its basic working literature work
Week 6	Hardware circuit designing on PROTEUS
Week 7 & 8	GPS Interface.
Week 9 & 10	GSM Interface.
Week 11 & 12	Hardware final interfacing.
Week 13, 14 & 15	JAVA and XML coding of software with interfacing to JAVA.
Week 16	Compression (reducing storage)
Week 17 & 18	Android App processing.
Week 19 & 20	Interface App on Module
Week 21 & 22	Testing the complete module with App using Smart phone.
Week 23, 24 & 25	Removing any ambiguity parallel to thesis write up.
Week 26 & 27	Complete Thesis with plagiarism removal.
Week 28 & 29	Proofread of Thesis.
Week 30 & 31	Final Testing of Project as hardware modules power backing.
Remaining weeks	Additional applications.