GPS based Location Tracking using Android

Submitted in partial fulfilment of the requirements

For the degree of

Bachelor of Engineering

Synopsis Report

By

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Certificate

This is to certify that the project entitled GPS based Location Tracking using Android is a bonafide work of UTKARSHA KHACHANE (Roll No.29), PRIYA PANDEY (Roll No.42), SURBHI VARANDE (ROLL No.56) submitted to the University of Mumbai in partial fulfilment of the requirement for the award of the degree of Undergraduate in DEPARTMENT OF INFORMATION TECHNOLOGY.

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Examiners

1.....

2.....

Date: -

Place: -

Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data /fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Abstract

With recent technological advancement of modern science people are now expecting the information about the location of any object for tracking purposes. Presently, we want more location based services for being advanced and to save time and money also.

GPS is a system which is already implemented and everyone can access it without any restriction. Having the facility of GPS to develop this system we need a GPS device to calculate the location from the information taken from GPS.

Hence, we have chosen Android device to perform this calculation because Android mobile phone is cost effective and offers multidimensional purposes having some special built-in features like GPS service.

Thus, this system is developed for location tracking of a group of people with a proximity alert system using various latest demanding tools and technology like Jason, Java, AVD, LAMP etc.

Acknowledgement

Apart from the efforts of me, the success of this mini project depends largely on the encouragement and guidelines of many others. I take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this project.

I am highly indebted to our project guide Prof. J.P. Patil, for his guidance and constant support. I can't thank enough for his tremendous support and help. I feel motivated and encouraged every time I attended his meeting. Without his encouragement and guidance this project would not have materialized.

I take this opportunity to convey our sincere thanks to (Prof. J.P. Patil), (Head of Department), for providing guidance and whole-hearted cooperation. I am thankful to (Dr. M. J. Lengare), Principal KGCE, for his encouraging attitude.

Finally, yet importantly, I would like to express my heartfelt thanks to my beloved parents for their blessings, and my friends and all others for their help and wishes for the successful completion of this mini project.

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GPS: Global Positioning System

Chapter 1
INTRODUCTION

1.1 Introduction

Our project is having a Proximity alert system helps you to manage your tasks on a location based alarm system. If you have assigned a task in the application to a location, then whenever you are near to your place of interest, regardless of timing the application will issue you an alarm. Thus no task that is assigned to the phone once would be forgotten.

The application is very useful when you are at unknown place one can easily be lost and become unable to find a way back to base. But if the GPS based tracking system is installed on your phone, you are leaving your footprints on a website which is monitored by someone who would be on the way when you really need someone to get you back to the base.

We will be using GPS device which will find out the current location from the satellite. Depending on certain condition we will find the location again. Might after certain distance of location change we will count the location again. We will plot this location to map. At the same time we will connect with an external web server to send this information there. The web server will store the visiting path as a summation of some co-ordinates points.

The GPS, elaborated as Global Positioning System, is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defence in 1973. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilians. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.

GPS was invented by the U.S. Department of Defence (D.O.D) and Ivan Getting, at the cost of twelve billion taxpayer dollars. The Global Positioning System is a satellite navigational system, predominantly designed for navigation. GPS is now gaining prominence as a timing tool. Eighteen satellites, six in each of three orbital planes spaced 120^{o} apart, and their ground stations, formed the original GPS. GPS uses these "man-made stars" or satellites as reference points to calculate geographical positions, accurate to a matter of meters. In fact, with advanced forms of GPS, you can make measurements to better than a centi-meter. GPSs are very quickly becoming a standard in most new automobiles, and are even finding their way onto a variety of new cell phones. The mapping devices can come in handy under a variety of circumstances. If we are thinking about purchasing a GPS or a device that has a GPS built-in, here are some of the benefits of having one.

A GPS can help us to determine exactly where we are at any given moment. Not only can a GPS give us the name of the street we might be traveling on, but many GPS systems can also give us the exact latitude and longitude of where you are located. On the other hand, Android

mobile platform is becoming more popular to the users for its multi-dimensional purposes. Thus, this proposed system namely “GPS-based Location Tracking System via Android Device” uses GPS and any mobile phones having an Android operating system to track the location of a person whenever necessary. GPS tracking is the surveillance of location through use of the Global Positioning System (GPS) to track the location of an entity or object remotely.

The technology can pinpoint longitude, latitude, ground speed, and course direction of the target. The GPS is a "constellation" of 24 well-spaced satellites that orbit the Earth and make it possible for people with ground receivers to pinpoint their geographic location. The location accuracy is anywhere from 100 to 10 meters for most equipment. Accuracy can be pinpointed to within one meter with special military-approved equipment. GPS equipment is widely used in science and has now become sufficiently low-cost so that almost anyone can own a GPS and many do in a smartphone, tablet or GPS navigation device. GPS tracking is invaluable for police, firefighters, military personnel and large courier businesses. Many of these use automatic vehicle locator (AVL) systems. AVL systems generally include a network of vehicles that are each equipped with a mobile radio receiver, a GPS receiver, a GPS modem and a GPS antenna.

This network connects with a base radio consisting of a PC computer station as well as a GPS receiver and interface. GPS uses interactive maps rather than static map images on the Web. AVL systems can be used to increase the accountability of field personnel and boost the efficiency of a company's dispatching procedure through tracking and communication. Other GPS tracking technologies include GPS guns that law enforcement can fire at a fleeing car, avoiding a dangerous pursuit. In some places, law enforcement representatives also use GPS dust, which consists of GPS trackers so small they might be blown or rubbed on a target’s clothing. GPS devices in smartphones and other mobile devices are often used to track employee location. Privacy advocates warn that the technology can also make it possible for advertisers, government, hackers and cyber stalkers to track users through their mobile devices. Various GPS-based tracking systems have been successfully deployed and utilized in various. The implementation of a mobile indoor application that delivers maps and linked database information to indoor wireless devices such as mobile phones and PDAs. Users would then interact with the web pages on their phones while viewing floor plans around their current location, searching for an office or a classroom. In today’s world, child’s safety is a major concern. It becomes difficult for the parents to keep track of their children all the time they are away from home. Hence a need arises to provide a way to do so in order to ensure child’s safety. This application is of interest to the parents and police department to restrict the roaming of a mobile user to a predefined geographical boundary. If mobile user breaches this boundary, then a alert message containing mobile’s current location is sent to register mobile phone numbers and email ids.

1.2 OBJECTIVES:

1. The objective of project is to create a technical solution that serves both the user and the admin.
2. To develop a system that will be able to locate the GPS position of device and track its current route.
3. To develop an algorithms that will enable end user bookmark their previous location and trace back to that location using descriptive navigation mapping.
4. To create an interface to Google Map and obtain data.

1.3 PURPOSE, SCOPE AND APPLICATION:

Purpose scope and application. The description of purpose scope and application are given below:

1.3.1 PURPOSE:

1 **Individual Task Management**
Often people are guilty of themselves that they move to a place to finish a job but returned from there without finishing it. To solve this problem, the proximity alert system helps you manage your tasks on a location based alarm system. If you have assigned a task in the application to a location, then whenever you are near to your place of interest, regardless of timing the application will issue you an alarm. Thus no task that is assigned to the phone once would be forgotten.

2 **Safety Tool**
The application is very useful when you are on a trip. On a trip, one can easily be lost and become unable to find a way back to the base. This especially happens in forest areas. But if the GPS based tracking system is installed on your phone, you are leaving your footprints on a website which is monitored by someone who would be on the way when you really need someone to get you back to the base. So if there a problem occurs with the user, he can easily be found by the administrator simply by having a look at his last location. Thus, the application provides you safety in an unknown area.

3 **Reliability**
The application is based on GPS location provider embedded on your Android Smartphone. GPS is a technology that is available 24/7. So, you can rely on this application.

4 **Ease of Access**
The application was developed to serve mass population. That is why the user interface of the application is kept simple.

1.3.2 SCOPE:

1. The scope of this project to develop a tracking / monitoring Android application (mobile) using object GPS devices to ascertain its current location, and previous location at specified intervals.
2. The preparation of the environment need to build the system the testing of the system and the migration and the preparation of the data that will ultimately be used by system are equally important.
3. The location based tracking system is a real life problem solving application both the admin section and user section are designed in such a way that both are easily usable.
4. This project is developed for location tracking of an individual person with a proximity alert system using various latest demanding tools and technology like Json, Java, AVD, LAMP, etc

1.3.3 APPLICABILITY:

GPS based Location Tracking System have immense areas of applicability, we list some of them that are practical interest to us:

1. Easy to locate a person's location.
2. To find any destination place.
3. No one can misplace anywhere.
4. User cannot forget any task because of proximity alert.
5. GPS Tracking System helps you to keep a track of your car, luggage, valuable possessions, pets and even loved ones.
6. They can be located easily keeping you free of stress and worries.
7. GPS Tracker can also help you in locating where your child is going late at night.
8. To find your loved ones where they are about to go have they reached where they wanted to go and many more we can know through this system.

Chapter 2
LITERATURE SURVEY

2.1 Literature Survey

Literature Survey: Is the process of analysing, summarizing, organizing and presenting novel conclusions from the results of technical review of large number of recently published scholarly articles. In this chapter we survey previous research done on GPS based Location Tracking System, we have studied about following papers published by some experts.

1. GPS-based Location Tracking System via Android Device

With recent technological advancement of modern science people are now expecting the information about the location of any object for tracking purposes. Presently, we want more location based services for being advanced and to save time and money also. GPS is a system which is already implemented and everyone can access it without any restriction. Having the facility of GPS to develop this system we need a GPS device to calculate the location from the information taken from GPS. Hence, we have chosen Android device to perform this calculations because Android mobile phone is cost effective and offers multidimensional purposes having some special built-in features like GPS service. Thus, this system is developed for location tracking of a group of people with a proximity alert system using various latest demanding tools and technology.

2. Implementation of GPS Based Object Location and Route Tracking on Android Device

Location based services has enable people to locate and track the location of other people, objects, machine, vehicles and resources, from the comfort of their home as long as they have the required gadget such as smart phone, PDA's, and others (Adusei, et al, 2004). Requesting location sensitive information is usually initiated by a user called the client or network provider. Most application today use Global Positioning System (GPS) provide location information; for example social network site like Facebook allow users to share their location with friends and family, another common example are application that allow users retrieve weather forecast data based on their current location. With the numerous benefits emanating from the use of location-based service, there is however issues that bothers on the privacy of user; hence there is need for proper government regulations. The purpose of this project to develop a tracking / monitoring Android application (mobile) using object GPS devices to ascertain its current location, and previous location at specified intervals, this system unlike previous tracking system will give user the ability to create bookmark of current location and ability to route back to that location from anywhere using Google Maps API's in case they can't remember the prices location.

3. Human Tracking in a Certain Closed Area based on Global Positioning System (GPS)

Global Positioning System (GPS) in smart phone is a common application that is used in determining the position of the user. However, the navigation is still limited to open street and cannot be used in certain closed area such as in a sport club, playground or parks. In this research we develop an application based on Android which can determine the aproximate position of the user within a certain closed area. The area covered of this research is outdoor around 10000 m2. The research was done inside ABC sport building of Gelora Bung Karno – Jakarta. The result shows that the application is working with error estimation in 4 meters range.

4. A RESEARCH ON MOBILE APPLICATIONS FOR LOCATION TRACKING THROUGH WEB SERVER AND SHORT MESSAGES SERVICES (SMS)

This paper aims to develop an android application for android operating system (OS) platform that automatically send the current address location of the user to the server database and can also be sent periodically through SMS (short message services) to store mobile numbers by the user. Location of mobile device is in the form of latitude and longitude which is converted into full address by this application that includes country/state, city, and street number. In case of emergency the user can simply press the emergency button and the application will automatically send SMS alert including location address to the store mobile numbers that might be a police station or close relative. Another way to trace the user is the web server database which keeps updating the location address as long as the application is connected or last location address. The design shows how to implement and develop this app and has been tested on few mobile devices it well be tested on huge number of mobile devices later.

5. Global Positioning System (GPS) Based Location Finder on Android

This thesis presents the development of an android application which has the capability of using the concepts of augmented reality to submerge the virtual information of user's surroundings by detecting and tracking user's location in real time. Eclipse is an open source software, used in professional development of software solutions and programming applications. It provides extensive availability of free libraries. It has been employed for the development of software used in this thesis. As the android GPS is notified, the application is fully location aware which keeps the track of user's location. When the user points the camera in a specific direction, the application tracks the camera orientation and displays the records of a specific place. Then the application keeps on updating the information as the direction changes. The additional information is displayed with the help of "Google" databases. The information when gathered is then displayed to the live feed of camera which helps the users to interact in a more reliable way. Option for viewing the places in map view with the help of Google Maps is also available.

Chapter 3
SURVEY OF TECHNOLOGIES

In this chapter Survey of Technologies we demonstrate our awareness and understanding of Available Technologies related to the topic of our project. Given below are the detail of all the related technologies that are necessary to complete our project.

Global Positioning System(GPS):

GPS or the **G**lobal **P**ositioning **S**ystem was invented by the U.S. Department of Defense (D.O.D) and Ivan Getting, at the cost of twelve billion taxpayer dollars. The Global Positioning System is a satellite navigational system, predominantly designed for navigation. GPS is now gaining prominence as a timing tool. Eighteen satellites, six in each of three orbital planes spaced 120º apart, and their ground stations, formed the original GPS.

GPS uses these "man-made stars" or satellites as reference points to calculate geographical positions, accurate to a matter of meters. In fact, with advanced forms of GPS, you can make measurements to better than a centi-meter. Uses For GPS - Global Positioning System GPS receivers have been miniaturized to just a few integrated circuits, becoming very economical.

Today, GPS is finding its way into cars, boats, planes, construction equipment, movie making gear, farm machinery and even laptop computers. Dr Ivan Getting - GPS - Global Positioning System Dr. Ivan Getting was born in 1912 in New York City. He attended the Massachusetts Institute of Technology as an Edison Scholar, receiving his Bachelor of Science in 1933.

Following his undergraduate study at MIT, Dr Getting was a Graduate Rhodes scholar at Oxford University. He was awarded a Ph.D. in Astrophysics in 1935. In 1951, Ivan Getting became the vice president for engineering and research at the Raytheon Corporation. The first three-dimensional, time-difference-of-arrival position-finding system was suggested by Raytheon Corporation in response to an Air Force requirement for a guidance system to be used with a proposed ICBM that would achieve mobility by traveling on a railroad system.

When Ivan Getting left Raytheon in 1960, this proposed technique was among the most advanced forms of navigational technology in the world, and its concepts were crucial stepping stones in the development of the Global Positioning System or GPS. Under Dr Getting's direction Aerospace engineers and scientists studied the use of satellites as the basis for a navigation system for vehicles moving rapidly in three dimensions, ultimately developing the concept essential to GPS. The Global Positioning System (GPS) is the only fully functional Global Navigation Satellite System (GNSS). Utilizing a constellation of at least 24 medium Earth orbit satellites that transmit precise microwave signals, the system enables a GPS receiver to determine its location, speed, direction, and time. Developed by the United States Department of Defence, it is officially named NAVSTAR GPS (Contrary to popular belief, NAVSTAR is not an acronym, but simply a name given by Mr. John Walsh, a key decision maker.

The satellite constellation is managed by the United States Air Force 50th Space Wing. The cost of maintaining the system is approximately US$750 million per year, including the replacement of aging satellites, and research and development.

Google Map API:

To develop application Java ME platform will be used. Java ME is a development tool which enables to develop programs for different mobile phones. As a background map Google Maps will be used. Google Maps API for Java ME is available on the internet. The coordinates of users will be taken from GPS and interpreted. After getting latitude and longitude values, location of users are represented on map by symbols. User will be able to zoom in and out of map. In addition he will be able to look around using directions which might be set differently for different mobile phones such as using fingers for smart phones and number for other phones. Through the known geographic position, this application enables the user to track a mobile device and send alerts if it is out of the radius around an interest point, previously defined by the application administrator. The advantages of this technology is by using existing equipments and free services like Google maps and GPS, we can construct a very reliable location tracking system. The basis of this program is GPS.

Location Tracking – This component allows the route and location of a GPS device to be tracked and stored (Shek, 2010). Some function of location tracking component as given by Shek (2010) are: • Record current and past location of an object / device • It helps in notifying other components when a GPS object / device moves in and out of a specific location. It serves as the basic for sending location changed alerts. • It has support for geo-casting feature which helps in detecting all objects within a well-defined location.

Location Collection Services – this component is used in obtaining the longitude and latitude values for any object / device. Global Positioning Systems (GPS) receiver on android devices receives radio-signal from the satellites and then compares it with local geo data duplication in order to calculate the actual location of the device / object on the Earth. The address / street name of the location the device can be derived from Google Maps API. Data receives from satellites can be used to perform two or three dimensional location calculation (Two dimensional includes only the longitude and latitude while three dimensional includes longitude, latitude, and altitude) which can increase the accuracy of result (Gadri, et al, 2012).

ANDROID -The word "ANDROID" is an acronym for "Automated Numeration of Data Realized by Optimized Image Detection" (Gadri, et al, 2012). "Android Beta SDK" an open source and free mobile OS was released in November 2007 by Open Handset Alliance (Rani, et al, 2012) based on Linux 2.6 kernel Features of Android OS

- No distribution / licensing fees is required
- Support complete IPC message passing

- Application and background processes can run concurrently on the device
- It utilises shared data stores
- It is supported by 3G, 4G Edge network and GSM
- Full interactive multimedia programs hardware mechanism is possible
- Inbuilt API's (Application Protocol Interfaces) such as GPS used for location based services.

Chapter 4

REQUIREMENT AND ANALYSIS

4.1 Requirements Specification

4.1.1 Functional Requirements

Graphical User interface which the user

• Provide accessibility to the application through Wi-Fi or cellular network

• MySQL that stores the information to be displayed to the user.

4.2 Hardware Requirement

- System: core i3
- RAM : 4GB minimum
- Hard disk : 100GB
- Device : Internet enabled Mobile Phone with Android OS

4.3 Software Requirement

- Android Studio
- Java SDK 21

Chapter 5

Implementation

The GPS-based Location Tracking System via Android Device consists of the following two sections

. • User

• Admin

5.1 User Side Implementation

The facilities for the users are in below:

• Set his/her own password and user name

• Record his/her location data on a website

• Start and stop services any time he/she wants

• Set up proximity alerts based on location A user using the application owns his own user name and password so that no other person can enter on the application and create confusion to the admin about the location of the user. The user enjoys safety in a dangerous place against being lost as he/she is leaving his/her footprints on a website that is being viewed by the admin. So if there any mis-communication occurs, the admin can get there soon to help him/her. Additionally, if the user wants to set an alarm system based on location, then the proximity alert system can help him/her.

It allows a user to manage his/her tasks better.Every user who will be tracked must have the following capabilities:

• Operate a Smartphone with Android OS

• Must have a basic knowledge of English

5.2 Admin Side Implementation

The facilities for the admin are in below:

• Can add or delete a user whenever necessary

• Can have the access to the location and traveling path of each userAn admin can enjoy the peace of mind that he/she is able to track each one in his/her network. He/she can have a look at the path of each user that he/she has used to get to the last location that his/her device has uploaded to the site. So he/she is able to manage his/her task of ensuring safety. A user with a PC wishing to track the Smartphone users must have the following capabilities:

• Operate a PC comfortably

• He/she must have a minimum knowledge about the world

Chapter 5

System Design

5.3 Use Case Diagram:-

a) User side Use Case Diagram

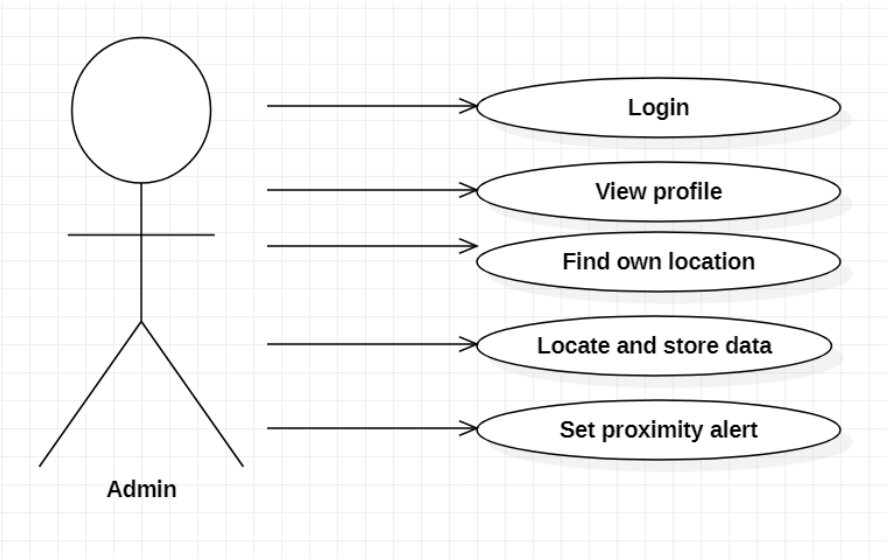

Fig:- User Side Use Case Diagram

b) Admin Side Use Case Diagram

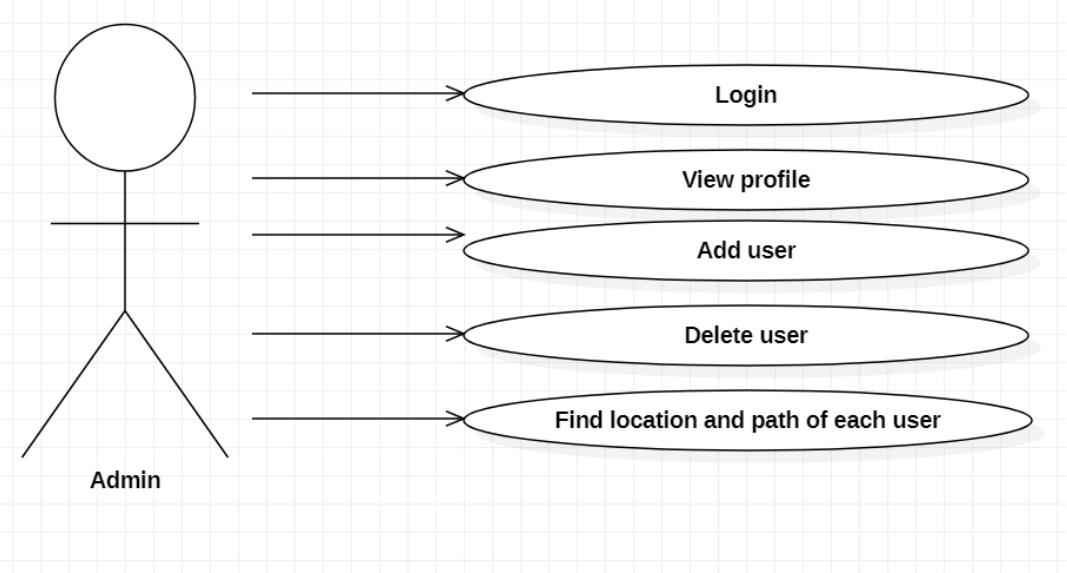

Fig:- Admin Side Use Case Diagram

5.4 DataFLow Diagram:-

a) Level 0 Data Flow Diagram

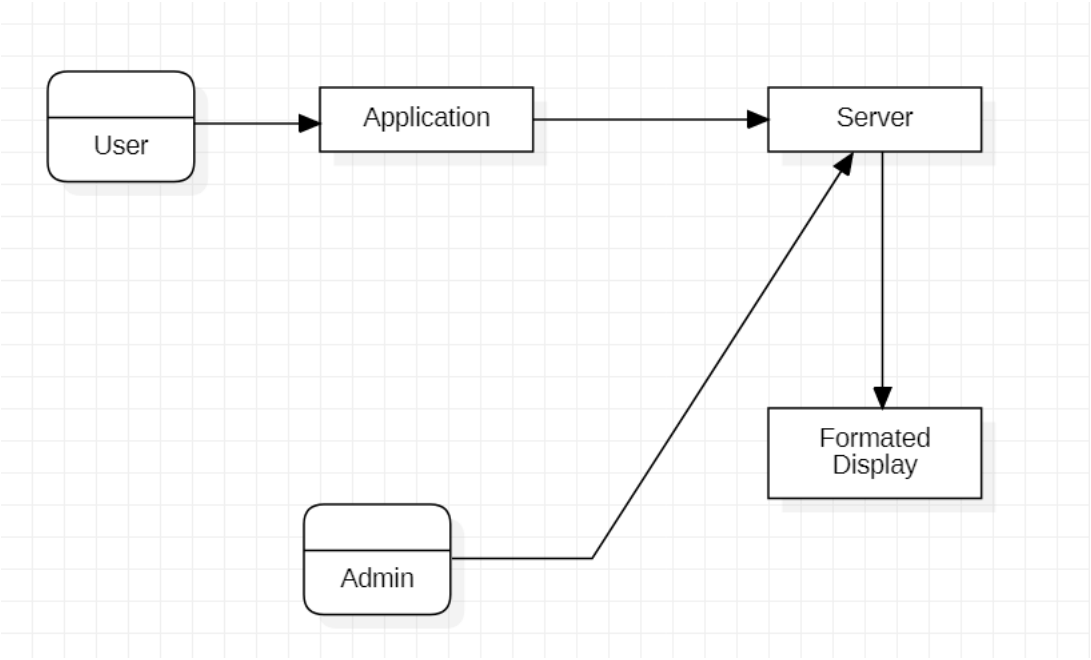

Fig:- Level 0 Data Flow Diagram

b) Level 1 Data Flow Diagram

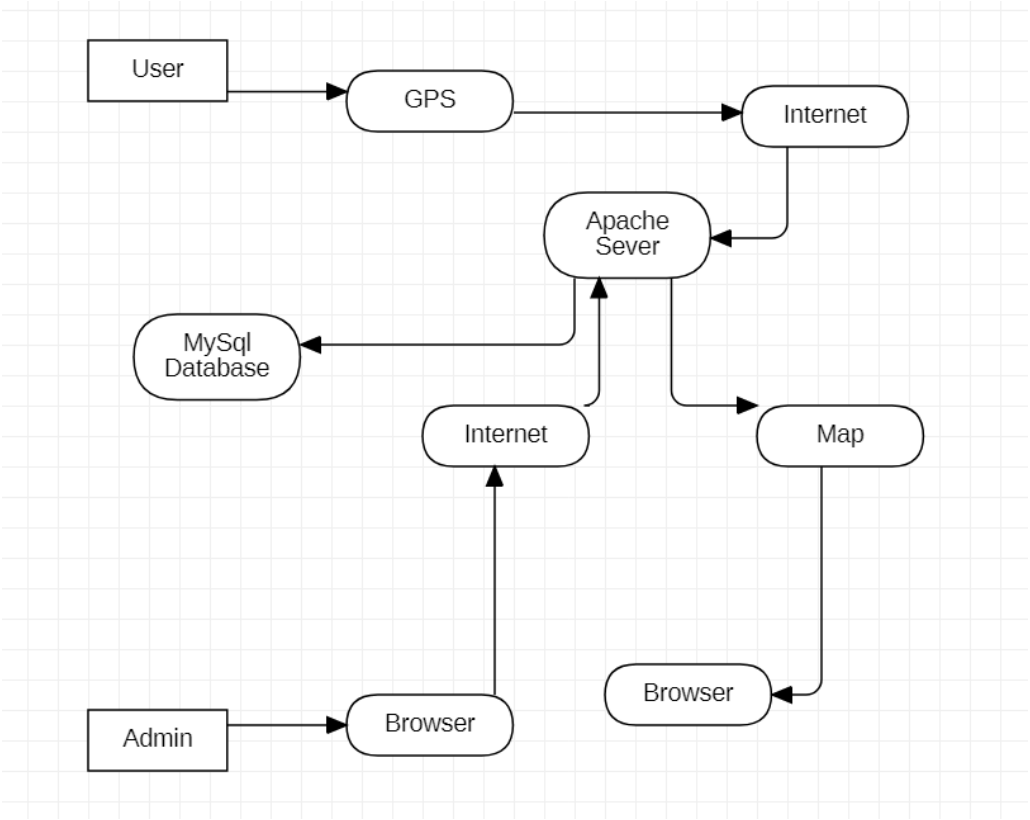

Fig:- Level 1 Data Flow Diagram

5.5 E-R Diagram:

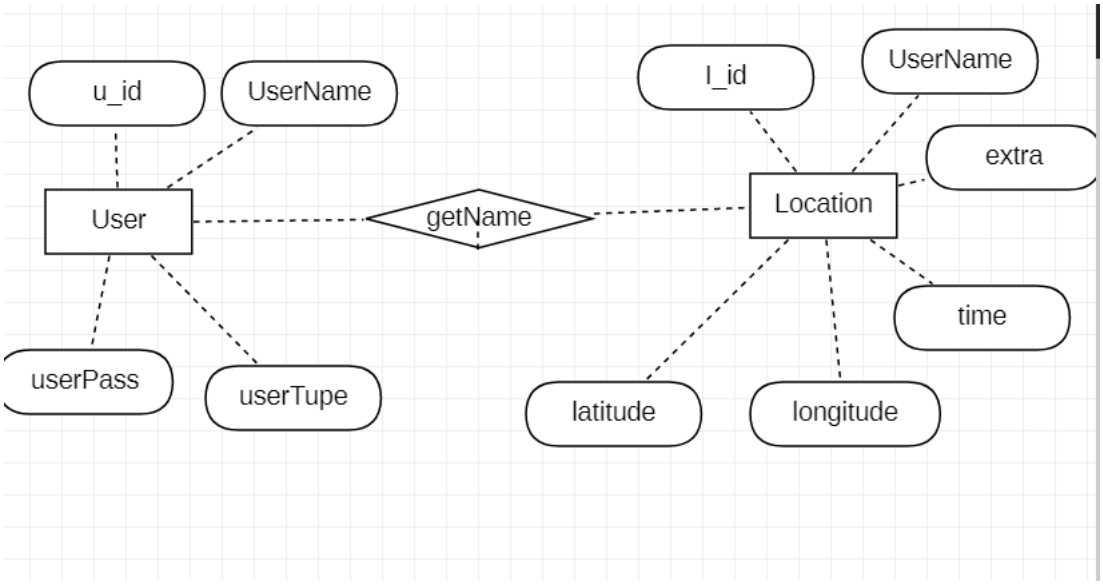

Fig:- E-R Diagram

Chapter 6
Conclusion

7.1 Conclusion:

As the dedicated GPS devices are costly we have chosen an-droid mobile phone as GPS device. Because all the android mobile phones have this built-in feature. GPS device will find out the current location from satellite. Depending on certain condition we will find the location again. Might after certain distance of location change we will count the location again. We will plot this location to map. At the same time we will connect with an external web server to send this information there. The web server will store the visiting path as a summa-tion of some co-coordinating points. Actually, the web server is a restricted area. So we will have to use username and password to login that area. We can see the visiting path from the desktop or any other portable device. Like other systems it is also not free from drawbacks. It will need the GPS service on from the time we want to track. It will mostly use the battery power of the mobile phone. For this reason our mobile phone can be automatically switched off for lack of power. We need to depend on Internet connection to store the information to the web server. If there is some prob-lem with Internet connection or lack of necessary bandwidth, we may not be able to send the data correctly.

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