Location Tracking System for Academics using GPS and Android System

Prof. T.Venkat Narayana Rao[1] , Sai Nihar Tadichetty[2], Lekha Cheruku[2]

[1]*Professor, CSE, Sreenidhi Institute of Science and Technology,*
Yamnampet, Hyderabad,T.S, India
[2,3]*Student, CSE, Sreenidhi Institute of Science and Technology ,*
Yamnampet, Hyderabad,T.S, India

Abstract: **Tracking people has become a difficult task in the ever growing internetworking world. It is not only exhausting but also consumes lot of time. A simple solution for this problem can be given by using the GPS technology in mobile phones which accurately gives the position of the mobile phone and therefore its user.The GPS tracks the user's location and keeps updating the server in preset intervals. The location when requested is retrieved from the server and provided. This technology will give the users the access to location of willing user by the push of a button which results directly in saving time and energy. This paper demonstrates the application of GPS technology to track the location of staff members in college which would help in managing the academic sessions in the institutions more efficiently.**

Keywords – **GPS, Internet, Android, Database, PHP.**

I. INTRODUCTION

A.GPS

The Global Positioning System is a satellite based navigation system developed and maintained by the US Department of Defense. GPS permits location based services on land, water and air to determine their three dimensional position, velocity and time. The service is available to military and civilian users all around the world at any given time.

It is a constellation of satellites that orbit the earth twice a day, transmitting precise time and position information. The complete system is made of 24 satellites orbiting about 19312.128 kilometers above the Earth and five ground satellites provide 24-hour-a-day coverage for both two and three dimensional positioning at any location on Earth. The principle of the GPS is that it measure the time interval between the transmission and the reception of a satellite signal and then it calculates the distance between the user and each satellite. Through the distance measurements, based on the delay in signal transmission and reception, of at least three satellites in an algorithmic computation, the GPS receiver arrives at an accurate position fix. To obtain a 2-D fix, information must be received from three satellites and for a 3-D fix, information must be from four satellites.

There are no set ways to keep track of faculty anywhere in the world. bThey are few conventional ways of calling them personally and leaving messages, other than that, there are no automated ways of tracking them. As we can

see, the disadvantages of this system is evident, personally calling a lecturer when in class may not be feasible, and also, leaving messages might not be very convenient as, the faculty person's reply is awaited and time is wasted.

B. Internet Facilty

The Internet is a worldwide collection of computer networks, a network of networks in which users at one computer can share information with any other computer or device with an internet connection. It was conceived by the Advanced Research Projects Agency of the U.S. government and was first known as the ARPANet. The aim was to create a network that would allow users of a research computer at one university to "communicate with" research computers at other universities. A benefit of ARPANet's design was that, because messages could be routed in more than a single direction, the network can continue to function even if parts of it were destroyed in the event of a disaster.

C. Android System

Android is a software system for mobile devices that includes an operating system, middleware and system applications. Android is originally a software platform and operating system for mobile devices based on the Linux operating system and developed by Google and the Open Handset Alliance (OHA). It allows developers to write managed code in a Java-like language that utilizes Google-developed Java libraries, but does not support programs developed in native code.
The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android. Android has a large community of developers writing application programs ("*apps*") that extend the functionality of the devices. There are currently over 200,000 apps available for Android. Android Market is the online app store run by Google, though apps can be downloaded from third-party sites.

D. Database Requirements

MySQL is a freely available open source Relational Database Management System (**RDBMS**) that uses **Structured Query Language** (**SQL**). **SQL** is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use.

E. PHP Technology

PHP is a web technology something like client-side JavaScript is that the code is executed on the server, generating HTML which is then sent to the client. The client would receive the results of running that script, but would not know what the underlying code was. You can even configure your web server to process all your application files with PHP, and then there's really no way that users can tell what you have up your sleeve. This plays a very important role for this application as all the user and location related data is stored in the server using PHP.

II. DEVICES FOR GPS

Any device with an Android operating system with version 4 or more can be used.

The main platform is the ARM architecture for android (ARMv7 and ARMv8-A architectures). Android devices also incorporate additional components including cameras, GPS, orientations sensors, gyroscopes, accelerometers, barometers, magnetometers, proximity sensors, pressure sensors and touch screens. Android not being limited to mobile phones, the location tracking application can also be accessed from computers and other non-mobile android systems as well.

A. Android Device

In this section of the paper, the hardware system used for demonstrating the proposed system is being dealt.

An Android device – Galaxy note 2with A-GPS with added GLONASS made more satellites available to the device, meaning faster and more accurate fix of position especially in areas with high concrete building density which tends to distort the signals.

B. Implementation of location tracking system using android OS

In this section of the paper, the phases involved in designing the system are discussed and explained with the needed information as shown in figure 1 and 2.

The phases involved in developing a case study are:

1. Installing the Location Data Sender application on mobiles to be tracked.
2. Registering the devices with the server and activating location services on trackers.
3. Installing the user side SnistMaps application to search for a particular user.

This implementation can easily be extended to any other corner of the earth since the position coordinates are the only factor that is going to vary which will make no difference in giving locations.

III STEPS INVOLVED IN SYSTEM DEVELOPMENT

The application is divided into two modules, one for the sender part and the other for the receiver part of it.

A. Module 1 – The sender part
(SnistMapsDataSender)
(See fig. 1)

Step 1: Switch on the GPS and internet on the system and allow it to calibrate for 15 seconds.

Step 2: The sender application now collects the data from the device using the Location Manager class from Android API.

Step 3: The collected latitude, longitude and time coordinates from the device are sent to the database server to be stored in intervals of every 10 minutes.

Step 4: The steps 2 and 3 keep repeating from 0900 hours to 1600 hours during weekdays, this is to save battery.

Step 5: All the above processes happen in the background service thread of the android api, so no user interface problems will be observed.

Start and stop track options available to switch the tracking on and off at will.

B. Module 2 – The receiving part (SnistMaps)
(See fig. 2, 3, 4)

Step 1: Switch on the internet on the system to run the searching application.

Step 2: The application takes in the Username and Branch entries given in by the user and requests the server to provide information based on the given username.*(fig. 2)*

Step 3: The server responds through a php code if the information is available and rejects the request if no data is found.*(fig. 3)*

Step 4: The retrieved data is projected on a Google map screen developed using the google maps api.*(fig. 4)*

A Installing Location Data Sender application on mobiles

In order to track a mobile, the first thing we need is the GPS coordinates, for this, we developed an application to first register a user and then collect the Latitude, Longitude, Time, Mobile number and Name of the user at an interval of every 10 minutes. This data is then sent to the server only to be stored.

This application is will be put up on google play store for free download. This is the only work of the sender application.
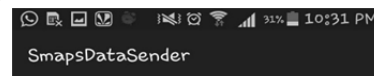

Figure 1: Home page of the SmapsDataSender

B Registration of Devices

Once the installation is done, the registration of the user is necessary to track his movements, as it is illegal to stalk.

The registration includes entering the details of the person into the server, which can be done at ease by the user interface provided on the application.

The location services on the device must be switched on at all times while using the tracker.

C. Installing SnistMaps to Search

The retrieval of information from the server is what tells the location of the user. The SnistMaps application on the google play store, gives an interface to search for any particular user.

It essentially retrieves the latitude and longitude coordinates and also the mobile number, time last seen and other details which makes it more comfortable to read and understand.
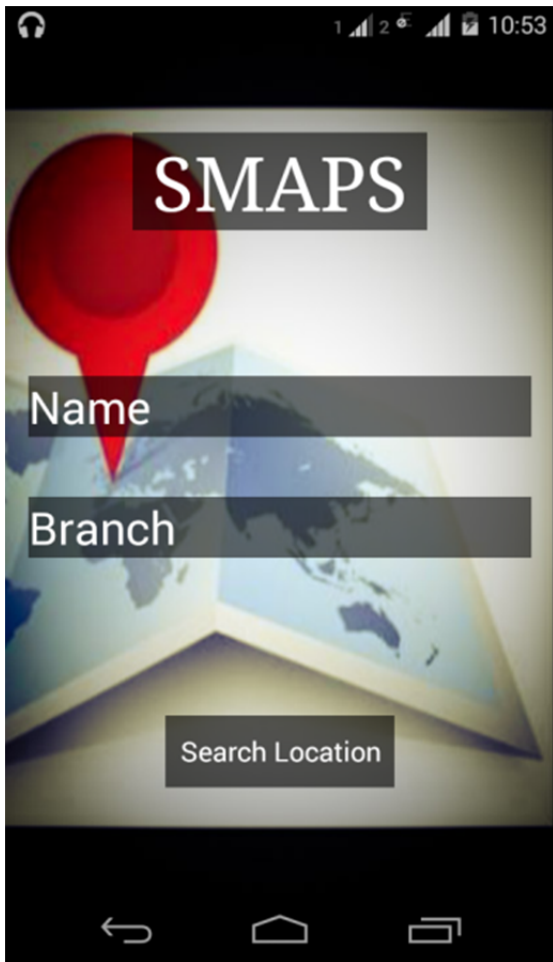

Figure 3: Smaps data screen

The map screen shows the pin point location of the person.

Figure 4: Smaps Map Screen

Figure 2: Smaps

The username and branch should be entered in the above screen to retrieve the information of that person. The information retrieved is shown in the next page.
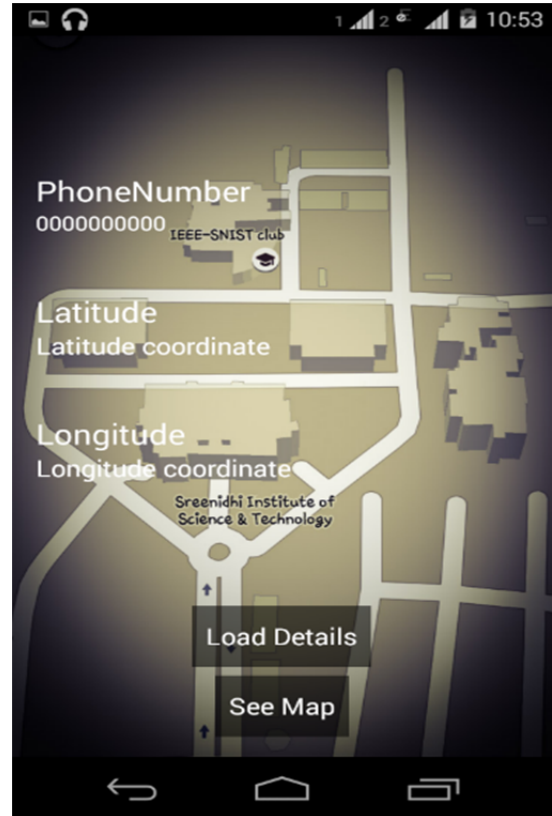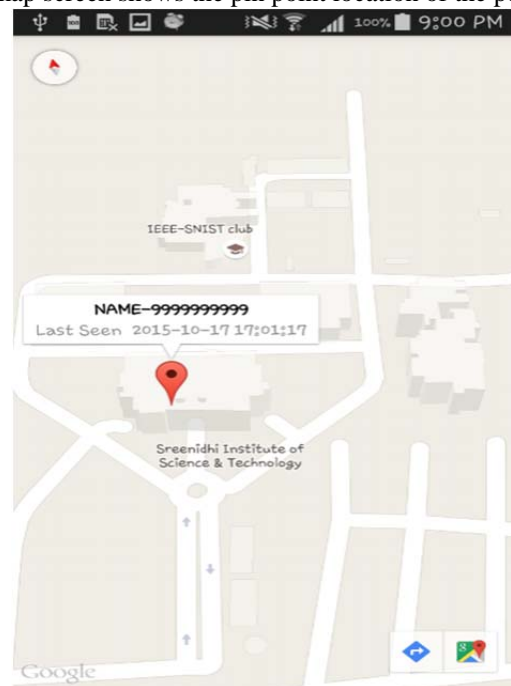
This method of finding faculty in college will not only reduce the time wasted to running around but also saves energy which can be used elsewhere.

IV. TEST RESULTS AND DISCUSSION

Name	Branch	PhoneNumber	Latitude	Longitude	Level	LastSeen
LEKHA	IT	9292939394	19.86704222	79.33934086	0	2015-17-30 20:23:31
ADITHYA	CSE	7702849888	17.455293	78.666381	-1	2015-10-30 20:23:31
NIHAR	CSE	8179797372	17.43613966	78.50279902	-1	2015-20-30 10:53:31
TEST	TEST	9999999999	17.455293	78.666381	0	2015-10-17 17:01:17
HOD	CSE	9849426707	17.43648762	78.50286422	-1	2015-10-30 20:23:31

Figure 5: Test results database

The tests gave 100% results*(fig. 5 shows the database readings)*, the accuracy of the GPS location depends on the GPS module that the sender device is carrying with a maximum error of +/-5 meters.

CONCLUSION

This application can be interpreted as the quickest way to find your faculty and also can be extended to keeping track of anyone close to you with their consent. The application can be of great use to students as lot of time and effort is saved in searching for their faculty. The concern person would also be receiving lesser calls requesting their location.

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