Location Tracking using Google Geolocation API

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Abstract

In this paper we present a fully implemented system which is used for tracking the location. The location of the user will be tracked with the help of Google API. Location tracking will be helpful for various applications. By using this system we obtain the current geographical position of the hosting device or the user.
Keywords: Location Tracking, API, GSM, GPS

I. INTRODUCTION

Location Tracking is becoming very much popular in these days. Any location or the place can be identified in terms of the geographical coordinates. The geographical coordinates of the places are latitude and longitude .The location of the user will be tracked via any of the technique either by implementing GPS device or by using one of the services of Google i.e. Google maps API, Google Geolocation API, Google places API. The current location of the user is tracked with the help of the Google's GPS service i.e. Google Geolocation API.

II. RELATED WORK OF COVERAGE

1) Prawat Chaiprapa, Supaporn Kiattisin and Adisorn Leelasantitham[1] presents a real-time vehicle tracking system using a global positioning system (GPS) module to retrieve the present location of the vehicle, and forward it to microcontroller and to connect internet by a general packet radio service (GPRS) for displaying a real time on the website map developed by Google Map which allows inspection of vehicles at all times. With Google maps Vehicles can be monitored and located effectively.
2) Shaveta Bhatia, Saba Hila[2] presents a "Localize Intelligence Algorithm" in the field of Location tracking .In this algoritham the location of the person is tracked with the help of mobile phone. For example, if a mobile user is at his own home or his friends home, then the application tells us his approximate location. For example the sector no.
3) Tekawade, A. Tutake, R. Shinde , P. Dhole,S. Hirve[3] presents a mobile tracking application for locating the friends using location based services. They use the GPS as location provider through geographic location for mobile network. This application enables the users to check the the exact location of mobile user by using Google map.
4) Mahesh Kadibagil, Dr. H S Guruprasad[4] develop a system which includes a mobile client, a repository, a web client and a map service. The mobile client is used to find location and send a Popup SMS to user when his/her friends or family members come around the user's area of direction. This location information can be sent to the server and the same information can be managed and viewed using the web client by other users.
5) Anil Birajdar, Manisha Koul,Mridushi Srivastav, Pooja Nair [5] in their research they develop a simple and cost-effective system which helps the users in tracking the colleagues and friends with in a campus. This system makes use of the IMEI information and Wi-Fi access points within the campus to obtain the current location.
6) Varun Pande, Wafa Elmannai, Khaled Elleithy[7] present present a paper in which they make use of the Google Latitude to define the location of a specific Wi-Fi tower which enables the users to locate the location of the mobile phones**.** They use the coordinate's values for geolocation of the current location.

III. VARIOUS TECHNIQUES USED FOR TRACKING

Location tracking has been used in many of the organizations .There are different ways in which we track the location of the user. These are given below.

A. Global Positioning System GPS:

The GPS is a space-based satellite navigation system which provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides

critical capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver [8].

B. GSM:

GSM uses the cell identification techniques to provide the location of the mobile phones. Cell Identification identifies the cells of the wireless networks which the device is using. The location of the base station is the location of the mobile user. The accuracy of this technique depends upon the size of the cell. The accuracy of this technique can be increased by adding Time advance and signal strength. This technology is only used if mobile user is 550m or more away from base station [2].

C. Google Maps API:

The Google Maps is a web mapping service application and technology provided by Google, that powers many map-based services, including the Google Maps website, Google Ride Finder, Google Transit, and maps embedded on third-party websites via the Google Maps API. The Google Maps JavaScript API lets you embed Google Maps in your own web pages. By using the Google Maps API, it is possible to embed Google Maps site into an external website, on to which site specific data can be overlaid. Version 3 of this API is specially designed to be faster and more applicable to mobile devices, as well as traditional desktop browser applications [6].

IV. APPROACH USED FOR LOCATION TRACKING

Geolocation is a process which identifies of the geographic location of a user or hosting device via a variety of data collection mechanisms. Most of the geolocation services use network routing addresses or internal GPS devices to determine this location. Geolocation is a device-specific API; some browser/devices support it, while others do not. So we can assume that geolocation is always possible for a web application. The Google Geolocation API provides the geographic information of the particular location like latitude and longitude associated with the hosting device. Information about the location can be tracked using the GPS and the other sources which provide the location information such as IP address, Wi-Fi,Bluetooth Mac address ,GSM,CDMA etc [9].

We use Google Geolocation API for identifying the current address of the user.

- Geolocation API provides the geographical location of hosting device.
- This API is used in this project for obtaining the latitude and longitude.

V. PROPOSED METHODOLOGY

We have designed a system for obtaing the current location of the user. The block diagram of the proposed system is shown in fig. 1. The location of the user will be identified with the help of Google Geolocation API. This system provides the current location of the user or the hosting device. We firstly calculate the geographical coordinates i.e. latitude and longitude of the current location of the hosting device .Then based on the values of latitude and longitude, the address will be calculated. Reverse Geocoding will be performed on the set of geographical coordinates to convert the latitude and longitude into the formatted address. This system will use the geolocation API for providing the address of the user.

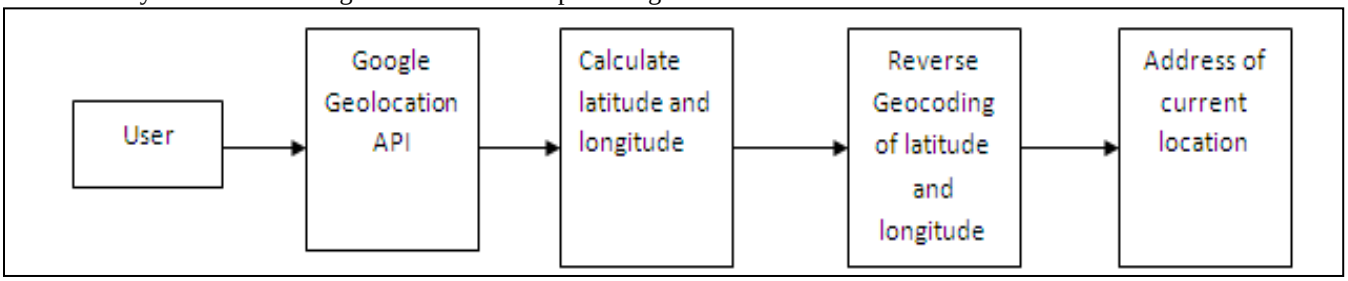

Fig. 1: Block diagram of the proposed system

A. Geographic Coordinates Calculation:

Firstly we calculate the Geographic coordinates i.e. latitude and longitude of the current location the geographical coordinates will be obtained with the help of Geolocation API.

getCurrentPosition ( ) method retrieves the current geographic location of the user and the hosting device. The location is expressed in terms of geographic coordinates i.e. latitude and longitude.

var lat = position.coords.latitude;

var lng = position.coords.longitude;
For E.g. The retrieved value of the geographic coordinates of the current location are given below
Latitude= 26.913564899999997
Longitude= 75.80108489999999

B. Reverse Geocoding:

Reverse Geocoding is the process of reverse coding of a location having geographical coordinates i.e. latitude and longitude to a readable address. This allows the identification of nearby street address, places, and subdivisions such as neighbourhood, county, state, or country [10].

Reverse Geocoding is performed on the set of the geographical coordinates. Using the Reverse Geocoding we convert the value of latitude and longitude into address. Reverse Geocoding will convert the set of geographic coordinate's latitude and longitude (26.913564899999997, 75.80108489999999) into the address.

L-1 to L-4, Panch Batti, C Scheme, Ashok Nagar, Jaipur, Rajasthan 302001, India

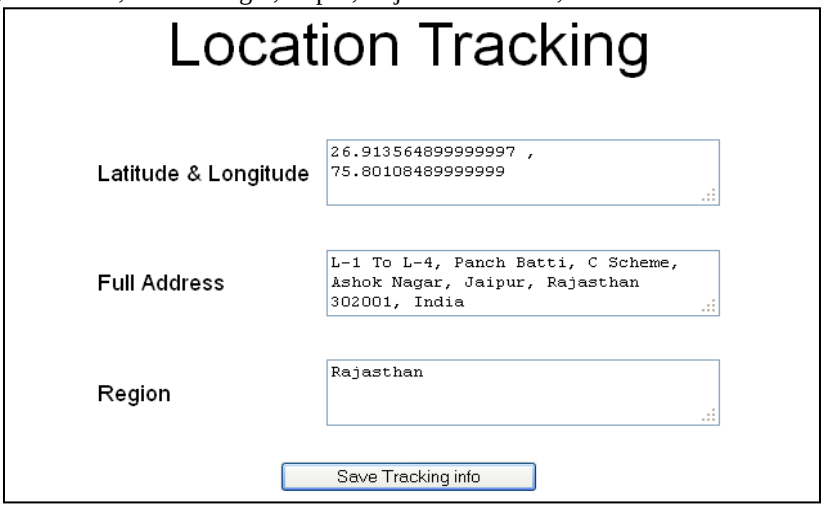

Fig. 2: Snapshot for Location Tracking

The Fig 2 shows the output of the location tracking module. As shown in the fig 2 this will calculate the geographical coordinates and then based on them the whole address of the user and also shows the region according to the address.

VI. APPLICATIONS

1) This System can be useful for the parents to track the location of their childrens.
2) This System can be used for Travelling Agency to track the location of their vehicles.
3) This system can be used for online e-commerece websites to track the customers location and provide the relevant offers as per their geographical location.
4) This system can be useful for business management i.e. for tracking the employees of company.
5) This type of the system can be used with search engines for providing the search result based on the location of the user i.e. the location based web services.

VII. CONCLUSION

In this system we track the location of the user on the basis of the hosting device. So by tracking the location of user it will be useful for the most of applications to track the current position of user. Without using GPS device we obtain the location using Google's online service. But this system does not work if Geolocation API is down due to some reason.So using the Geolocation API we need not to purchase a GPS device for locating the address

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