Enhanced Cloud based Vehicle Tracking System using Android Platform

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Abstract

The document illustrates problem of unbalanced transportation. With the advancement of technology the vehicle usage has become a mandatory part in everyone’s life, without considering the age factor. This paper aims at providing help to the user by tracking the information of the vehicle using efficient technologies without any third party involvement. The proposed application gives the parameters of current vehicle location at regular intervals of time from GPS (Global Positioning System) then the values from GPS are passed to the raspberry pi 2, the values are processed there and stored in Amazon cloud EC2 instance. A request is sent from android application to fetch the data from Amazon server, the appropriate data is sent to the android application. The system is developed using Android Studio, GPS module, Python, Elastic Search Technology, Raspberry pi 2 OS (NOOBS) and Amazon Web Service EC2 Instance.

Keywords- Android Studio, Amazon Web Service EC2 Instance, Elastic Search Technology, GPS Module, NOOBS, Python, Raspberry Pi 2

I. INTRODUCTION

In present world, owning a vehicle for each member in a family is considered as a social status in the society. Since it has become a necessity for each one of us, it has also some adverse effects on the society, consequently the road accidents have immensely increased and burglary of vehicles is on the high pace. The proposed work facilitates the user to know the location of the vehicle in case of any theft. This application provides guidance for the user where they can track the location of the vehicle and monitor the speed and distance, as well as it shows the path travelled by the vehicle from sea level. The system developed applies enhanced technologies such as android, cloud computing, elastic search and rasbian os (NOOBS).

Android developer studio is the fastest tool to develop all advanced applications such as editing, debugging and performance tooling. We use this software to access all the tracking information from Amazon cloud server.

Cloud Computing plays a major role to manipulate, configure and access the hardware and software resources remotely. The proposed system uses cloud server platform provided by Amazon, it stores the processed values from the raspberry pi 2 for the further process.

Elastic Search is a searching technique where search is done by index mapping.

Python is currently one of the most popular dynamic hardware and software programming language. In our application the hardware is programmed using python 2.7, the latitude, longitude and altitude values to track the vehicle location, which are extracted from NMEA values conveyed through GPS. This whole process of mathematical conversion is done by python 2.7. Raspberry pi 2 is a single board capable device enables people to explore computing, one of the main components of our system is raspberry pi 2. The task of raspberry pi 2 is to take the raw data, process it and send to Amazon web service with the help of python and elastic search.

The main objective of this paper includes
1) To trace the current location of the vehicle.
2) To monitor the speed and distance of the vehicle
3) To provide the path travelled by the vehicle through Google map.
4) To provide the altitude of the vehicle from sea level

II. SURVEY RELATED

[1], the system will facilitate the users in a number of ways such as notification for immediate aid in case of accident, tracking the vehicle in case of theft, disabling the vehicle remotely and monitoring the sensor values in order to send alert for air pollution caused by the vehicle. This system is developed using .Net framework, MS Access and Microsoft Azzure cloud services.
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In [2], the vehicular module is used to track, monitor & surveillance, find the accident spot and intimate to the monitoring station. This design provides information regarding vehicle identity, speed and on real-time basis. This information is collected by the Raspberry pi & Microsoft Visual studio.

In [3], this system used the ARM7 controller. The real-time vehicle tracking and monitoring system tracks the vehicle and displays the current location of the vehicle in the remote server using Google maps. It has the ability to communicate over the remote areas where user needs the current location of vehicle. This system is integrated with GPS and GSM to provide features like Location information and Real-time tracking using SMS.

In [4], the proposed technology is based on GPS technology, GSM and cloud computing infrastructure. The vehicles are fitted with specialized embedded device, GPS device and GSM enabled device. The embedded device fitted with sensors. This all stimulus data are transferred to cloud server through GSM enabled device. The GPS device used to track the vehicle locations. All the data are stored in centralized server which is maintained in cloud. Each licensed vehicle owner can access the cloud using web portal. From the web portal user can retrieve all the real-time data.

In [5], Vehicle tracking and locking system installed in the vehicle, to track the place and locking engine motor. The place of the vehicle identified using Global Positioning System (GPS) and Global system mobile communication (GSM). These systems constantly watch a moving vehicle and report the status on demand. When the theft identified, the responsible person send SMS to the micro controller, then micro controller issues the control signals to stop the engine motor. Authorized person need to send the password to controller to restart the vehicle and open the door. This is more secured, reliable and low cost.

Our proposed application gives the parameters of current vehicle location, continues monitoring of the speed & distance and it shows the path travelled by the vehicle. It is a guidance application for the users (example, parents) those who concerned about their dear ones (example, children) to keep track of their vehicle even without their knowledge. It also act as an anti-theft system that is, if the vehicle is stolen the user can track his/her vehicle using their android smart phone on Google map without any third party requirement. In our proposed paper we are highlighting the fact that system uses the enhanced technologies such as Amazon cloud server, Android developer studio, Elastic search, GPS device, Python 2.7, Raspberry pi2.

III. PROPOSED WORK

Our Proposed work, an enhanced cloud-based vehicle tracking system using Android platform has been developed. It provides help to the user by tracking the information of the vehicle using efficient technologies without any third party involvement.

For instance, consider a vehicle has been the feted. Then to know the location of the vehicle a particular procedure has to be followed, that is lodge a complaint to the authorized committee to trace the vehicle which involves a third party. But in this system the owner of the vehicle can trace the location of the vehicle. It also provide user to monitor the speed distance and shows the path travelled by the vehicle and altitude of the vehicle from sea level.

A. Hardware and Server Overview

Raspberry pi2 Model B is the main component of our hardware module. The task of Raspberry pi2 Model B is that it takes the raw data that is NMEA value from the GPS and convert those NMEA values into the latitude, longitude and altitude and post these values into the Amazon web server in JSON format using the Elastic search.

NMEA is an acronym for the National Marine Electronics Association [www.nmea.org]. Today in world of GPS, NMEA is a standard data format supported by all GPS manufactures. NMEA formatted GPS data also makes life easier for software developers to write software for a wide variety of GPS receivers instead of having to write a custom interface for each GPS receiver.

A sample file produced by GPS logger (should get the NMEA values)

B. Noobs

NOOBS (New out Of Box Software) is a user interface enabling the easy installation of a choice of operating systems for your Raspberry pi.[www.raspberryi.org].

C. Python 2.7

In our application the hardware is programmed using python2.7 [www.python.org], the latitude, longitude and altitude values to track the vehicle location, which are extracted from NMEA values conveyed through GPS. This whole process of mathematical conversion is done by python 2.7.

D. Amazon web service (aws)

Amazon Web Services (AWS) is a powerful cloud computing platform provided by Amazon.com. Web services are simultaneously called cloud services or Remote Computing Services.[https://Awsamazon.com]

1) Amazon Web Service EC2 Instance

Amazon Elastic Compute (Amazon EC2) is a web service that provide re-usable compute capacity in the cloud. The instance type that is specified determines the hardware of the host computer used for the instance. Each instance type offers different...
compute, memory and storage capabilities and are grouped in instance families based on these capabilities. We use Amazon web service EC2 instance t2.micro as our server in our proposed system.

E. Elastic search
Elastic search is a searching technique and where search is done by index mapping[www.elastic.com]/ Download the latest version of elastic search from the Internet, copy the downloaded elastic search into the server using the Win SCP or Putty, and open the elastic search in the server. Amazon Web Service EC2 instance act just like an engine. In order to post and get values, we need to open the elastic search present in the server. The data which is stored in the server is sin Json format.

Json Example

```json
{
    "_index": "vts",
    "_type": "9535",
    "_id": "1460881444",
    "_version": 1,
    "found": true,
    "_source": {
        "latitude": "12.336703",
        "altitude": "765.1",
        "longitude": "076.659805"
    }
}
```

F. Application Overview

1) Android Studio
Android Studio provides the fastest tools for building apps on every type of Android device.[developer.android.com]. It has features like code editing, debugging, performance tooling and allows you to focus on building unique and high quality applications. In this proposed system we have developed an application by using Android developer studio to fetch the necessary data from Amazon web server to trace the vehicle location.

G. Application Activities

1) Login Activity
Login is a process by which an individual gains an access to a system by identifying and authenticating themselves.
2) **Main Activity**

The main activity contains four image buttons. The image button location directs to the next activity which shows the location of the vehicle. The image button speed and distance direct to the next activity which shows the speed, distance and altitude of the vehicle. The image button path directs to the activity which shows the path where vehicle is traveled. The image button settings directs to the next activity which contains help, about and logout buttons.
3) **Location Activity**
By clicking the location image button from main activity it directs to the next activity which shows the current location of the vehicle using Google maps.

![Location Activity](image)

**Fig. 3: Location Activity**

4) **Speed Activity**
By clicking the speed image button from main activity it directs to the next activity which shows the current speed, highest speed, distance and altitude from the vehicle.

![Speed Activity](image)
5) **Path Activity**
By clicking the path image button from main activity it directs to the next activity which shows the path travelled by the vehicle using Google maps.

6) **Settings Activity**
By clicking the settings image button from main activity it directs to the next activity which contains help, about and logout buttons.
7) Help Activity

The help activity guides the user with relevant information.

IV. CONCLUSION

In this paper, we have proposed an enhanced vehicle location tracking system by using enhanced technologies. This proposed system acts as anti-theft system to trace vehicle location, monitor the speed and distance and it shows the path travelled by the vehicle, it comprises of GPS, raspberry pi 2 hardware, python 2.7, elastic search and android developer studio.
REFERENCES