Vehicle Real-Time Location Tracking Using Android App

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Abstract- *Navigation-based services allow consumers to find and track other people, objects, machines, cars, and resources from the comfort of their own homes, as long as they have the appropriate device, such as a mobile phone or a tablet computer. Location sensitive information is requested by the client or network provider from location-based services that utilise navigational satellites.*

The Global Positioning System (GPS) is built into almost every device that provides location updates; for example, social networking sites like Facebook and WhatsApp allow users to share their location with friends and family, and an application that allows users to retrieve weather forecast data based on their current location is another common example.

Along with the numerous advantages of adopting location-based services, there are also concerns, such as user privacy. As a result, effective government rules are required. The goal of this project is to create an Android tracking and monitoring application (mobile) that uses object GPS devices to track the current and prior locations of a vehicle.

At predetermined intervals, the client's smartphone will receive live updates on the location of the vehicle being followed. This system, unlike prior tracking systems, would allow users to make bookmarks of their present location and utilise Google Maps APIs to route back to it from anywhere.

Keywords- GPS, Location Based Service, Tracking, Android Device

I. INTRODUCTION

A vehicle monitoring system that uses GPS and an Android-based smart phone can track a vehicle from anywhere. Basically, the goal of this project is to create a car tracking system that uses GPS and an Android(Operating System) mobile which has many uses and higher reliability Vehicle tracking systems were created to make life easier.

This idea employs a smart phone and a personal computer, with one serving as a tracker and the other as a vehicle location monitor. Because it is more comfortable and versatile, The mobile terminal in this system is an Android phone. The data will be written to the web server by the Android phone. As a result, the user can obtain the information and proceed with their actions.

GPS is utilised to deliver extremely precise location, time, and date information. The information will be transmitted from the satellite to the GPS, which will receive it. By calculating the distance from the satellite, it permits the data to control the position due to its distance from the satellite. Our car tracking system makes use of an Android application that captures vehicle location data from individual automobiles automatically. It basically gathers fleet data from different vehicle locations. The Global Positioning System, or GPS, is used to locate each car in this tracking system. With the passage of time, mobile technology has evolved significantly in recent years.

II. RELATED WORKS

1. 1. Paper name: Near Real Time Vehicle Tracking Using GIS.

Author: Nilakshi Joshi, Amiya Kumar Tripathy, Suryakant Sawant, Tanvi Patel, Sailee Waghmare, Blessy Clusher.

Abstract: Traffic congestion is a serious issue that has an impact on vehicle travel times.Unorganized traffic flow, lack of dividers, sharp curves, and other factors contribute to traffic congestion. The emergency vehicle routing is hampered by a lack of knowledge of shortest path. Although natural disasters, accidents, casualties are caused by variables that cannot be predicted, preventive steps can help to prevent them. The goal of the project is to create a GIS based vehicle management system On the clients side, GPS obtains clients coordinates and provides them to web server. The server processes the request and updates the database with all of the vehicles location. The data is plotted on a GIS MAP, which the administrator can view to assist the user. The client can be routed to the most efficient path and updated with accident-prone locations using the information provided by the client. For efficient transit in this system, the dynamic shortest path is

used. The shortest path algorithm is based on the Dijkstra algorithm. This information can also be exported as daily reports. When a client deviates from his routed path, alarms are issued to the client using Geo Fencing ideas.

2. Paper name: Design and Implementation of a Low-Cost Secure Vehicle Tracking System

Author: Ibraheem Kasim , Salam Wisam Hadi

Abstract: We utilised XBee wireless technology in this study because of the advantages it offers in terms of low cost and strong security, which allows for more dependable information transfer, penetration avoidance and unwanted access without incurring any costs. The goal of this project is to combine XBee wireless technology with the Global Positioning System (GPS) to create a low- cost, real-time, secure car tracking system that can be displayed on Google Earth. The total system consisted of two main modules: the monitoring station and the tracking station (vehicle unit). A microcontroller (Arduino) platform, an XBee, and a GPS for navigation make up the tracking module. The GPS provides real-time information about the vehicle's location and sends the coordinates to the XBee via the Arduino platform. Between the XBee transmission unit and the GPS receiver, the latter serves as a connecting buffer. The monitoring station is responsible for receiving the tracked vehicle's location data and safely displaying it on Google Earth.

3. Paper name: Ubiquitous GPS Vehicle Tracking and Management System

Author: Iman M. Almomani, Nour Y. Alkhalil, Enas M. Ahmad, Rania M. Jodeh

Abstract: For tracking and monitoring automobiles, the Global Positioning System (GPS) is becoming increasingly popular. Many systems have been developed to provide such services, making them more popular and necessary than ever. A "GPS vehicle tracking system" is proposed in this work. This technology can be used by fleet operators to monitor staff driving behaviour or by parents to monitor their teen drivers. In addition to operating as a security system in conjunction with car alarms, this system can be utilised in theft prevention as a recovery device. This paper's key contribution is the provision of two types of end- user applications: a web application and a mobile application. The system's tracking functions include obtaining a vehicle's present location and ground speed, as well as any past date. It also keeps track of the car by setting speed and geographical limitations and sending SMS notifications when the vehicle exceeds these limits. Additionally, all of a specific vehicle's movements and stops can be tracked.

4. Paper name: Design and Implementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smartphone Application

Author: Seok Ju Lee, Girma Tewolde, Jaerock K won

Abstract: The movement of any equipped vehicle from any location at any time is tracked using an effective vehicle tracking system that is devised and deployed. The proposed solution took advantage of a common technology that integrates a Smartphone application with a microcontroller. This will be simple to produce and cost less than alternative options. The developed in-car gadget uses GPS and GSM/GPRS (Global System for Mobile Communication/General Packet Radio Service) technology, which is one of the most used methods for vehicle tracking. The gadget is installed inside a car, and its location must be detected and tracked in real time. The GPS and GSM/GPRS modules are controlled by a microprocessor. The GPS module is used by the vehicle tracking system to obtain geographic coordinates at regular intervals. The GSM/GPRS module is used to send and update vehicle position information to a database. A Smartphone application is also being developed to track the vehicle's whereabouts in real time. The automobile is displayed on the map on the Smartphone app using the Google Maps API. Users will be able to use the Smartphone application to continually track a moving vehicle on demand and determine the expected distance and time for the vehicle to arrive at a specific destination.

5. Paper name: Development and Performance analysis of a GPS-GSM Guided System for Vehicle Tracking

Author: Bernard Akindade Adaramol, Ayodeji Olalekan Salau, Favour Oluwatobi Adetunji, Olatomide Gbenga Fadodun,, Adebayo Tunbosun Ogundipe

Abstract: Vehicle theft is becoming an increasingly severe problem in society. This difficulty can be solved with a cost-effective and reliable tracking gadget. As a result, the creation of a GPS-GSM guided vehicle tracking system is presented in this work. A microcontroller (Arduino), GPS module, GSM module, and vibration sensor are among the hardware and software components of the built system. The GPS module, GSM module, Arduino, and vibration sensor are all wired together in the hardware development. Arduino, source code, GSM module AT instructions, and the GPS protocol command are all used in the programme development. The system is managed through text messages sent by the user. The system

sends the vehicle coordinates immediately to the vehicle owner or local authorities using the correlation between text messages and predefined phrases.The technology communicates coordinates to the owner whether or not the vehicle is moving, according to tests. For monitoring vehicles in the event of automobile, motorcycle, or bicycle theft, the system is reliable and cost-effective.

6.Paper name: A GPS-GSM Predicated Vehicle Tracking System, Monitored in A Mobile App based on Google Maps

Author: Neha Mangla, Sivananda G, Aishwarya Kashyap, Vinutha

Abstract: Many people in today's world are fascinated by the term "Internet of Things." Scholars and academics have long predicted and worked toward the Internet of Things. With cross- disciplinary collaboration, the Internet of Things attempts to bring everything under one cover. The pinnacle of IoT is the unification of everything in the world, using a common infrastructure that can not only give users with control but also make it simple for them to understand the state of everything. Vehicle tracking is one example of an IoT application. A GPS antenna, a GSM modem, an Atmega microprocessor, and a mobile application that locates the vehicle on a map and assists the user in navigating to it make up this system.

7. Paper name: An Economic Tracking Scheme for GPS-GSM Based Moving Object Tracking System

Author: Fatima Nadhim Ameen, Ziad Saeed Mohammed, Abdulrahman Ikram Siddiqui

Abstract: Because of their widespread availability and dependability, many tracking systems rely on GPS, GSM, and smart phones. It broadcasts its GPS locations to the observer through SMS as it moves. However, the overall cost of SMS messages used determines the economic viability of these systems. A cost-cutting tracking technique is proposed in this research. Two practical test cases are used to develop and test a GPS-GSM tracking system that employs the proposed method alongside two traditional tracking technologies. The first test case is a 121-kilometer vehicle ride, whereas the second involves a 2.4-kilometer walk. The outcomes demonstrated efficiency and cost effectiveness. The results demonstrated the usefulness and economic viability of the proposed system, which saved up to 64 percent on tracking costs when compared to the tested conventional methods.

III. EXISTINGSYSTEM

Real-time tracking system based on Arduino Intel Galileo: Design and implementation:

This study describes an effective real-time vehicle tracking system. with a GPS-based monitoring system. Vehicle data is gathered using a device such as an integrated board, Arduino Intel Galileo and SIM908 module. The module contains a GPS/GPRS GSM service

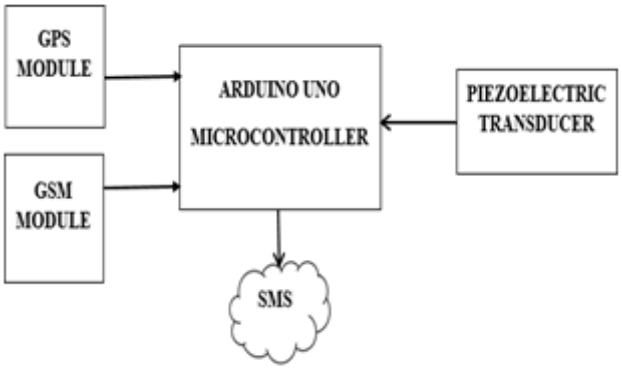
Working Procedures:

1. The system receives the vehicle's GPS coordinates. as a GPS signal and transferred the data from this signal to Web server Apache 2.5.9.
2. The data is sent to the car owner through SMS.
3. If a vehicle is stolen, the suggested system provides. longitude, latitude, and altitude of the vehicle data, satellites, speed OTG, and attitude, altitude course.
4. A stolen vehicle can be tracked using this information. And in the shortest time feasible.

Limitation:

1) Without initial tracking, the device will only track the car after it has been involved in an accident.
2) Possibility of harming hardware due to an accident that is impossible to track.
3) App location on the app has an error of around 10 metres due to a hardware constraint.
4) Expensive hardware is required.

Conventional VTS using GPS-GSM.



Block diagram of conventional system

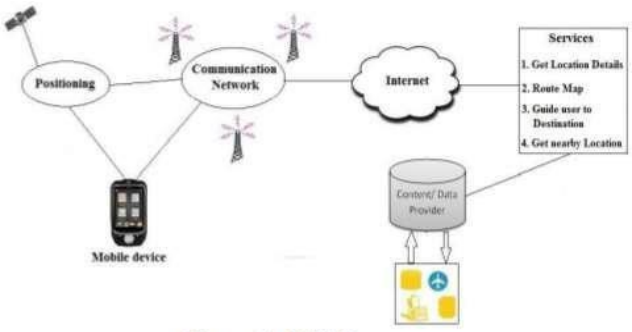


Figure 1: LBS Process

Location based services google map

IV. PROPOSEDSYSTEM

This idea employs a smart phone and a personal computer, with one serving as a tracker and the other as a vehicle location monitor. Because it is more comfortable and versatile, The mobile terminal in this system is an Android phone.

The data will be written to the web server by the Android mobile.As a result, the user can retrieve the data for further action.

LBS uses technology such as GPS, mobile networks, and wifi modules to provide services such as position tracking, navigation, and more. Android applications offer services for developing location-based apps. Applications such as location API, direction API, and Google map allow developers create location-aware apps on the Android platform.

Real time vehicle tracking system

V. DESCRIPTION

1. Google API:

Google APIs are application programming interfaces (APIs) established by Google that allow communication and interaction with Google Services. Search, Gmail, Translate, and Google Maps are just a few examples. These APIs can be used by third-party programmes to access or extend the functionality of existing services. The APIs include features such as analytics, machine learning as a service (the Prediction API), and user data access (when permission to read the data is given). Another good example is a website with an embedded Google map, which may be done with the Static Maps API, Places API, or Google Earth API.

2. GPS:

The Global Positioning System (GPS), formerly known as Navstar GPS[2], is a satellite-based radio navigation system owned and administered by the United States Space Force. It is a global navigation satellite system (GNSS) that sends geolocation and time information to a GPS receiver anywhere on or near the Earth where four or more GPS satellites can be seen without obstruction. Mountains and buildings can obstruct the GPS signals, which are quite weak.

The GPS does not require the user to send any data, and it works independently of telephonic or Internet reception, however both technologies can improve the accuracy of GPS positioning data.

3. SQL:

SQLite is a C library that implements a database. SQLite is a C-language library that implements a full- featured SQL database engine that is tiny, quick, self-contained, and high-reliability. The most widely used database engine is SQLite. SQLite is included in all mobile phones and most

laptops, as well as a slew of other programmes that people use on a daily basis. SQL database engine, for example. The most widely used database engine is SQLite. SQLite is included in all mobile phones and most laptops, as well as a slew of other programmes that people use on a daily basis.

4.INTENT:

The message transmitted between components such as activities, content providers, broadcast receivers, and services is known as Android Intent. An intent is a command to do something on the screen. It's typically used to start an activity, send a broadcast receiver, initiate services, or transmit a message between two activities. Implicit Intents and Explicit Intents are the two types of intents available in Android. The message transmitted between components such as activities, content providers, broadcast receivers, and services is known as Android Intent.

5.MYSQL:

MYSQL is a relational database management system that is open-source (RDBMS). A relational database organises data into one or more data tables where data types can be associated to one another, allowing the data to be structured. SQL is a programming language that allows programmers to create, change, and extract data from relational databases, as well as control user access. An RDBMS like MySQL, in addition to relational databases and SQL, works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access, and makes database integrity testing and backup creation

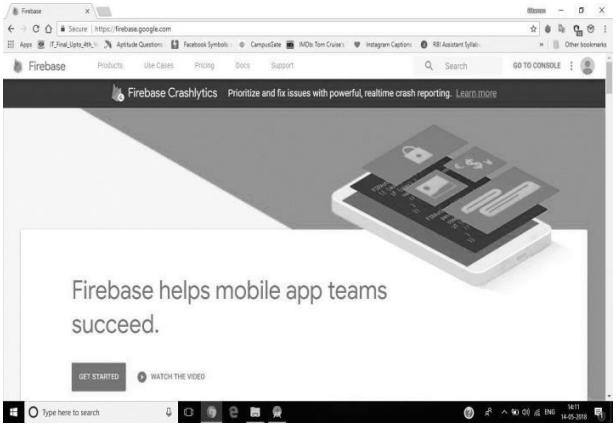
BUILDING BLOCKSOFVTS

VI. SOFTWARES

1.Firebase:

Google Firebase is a Google supported app development platform that allows developers to create apps for iOS, Android and the web. Firebase delivers analytics tracking, reporting, and app issue fixes as well as marketing and product experimentation capabilities

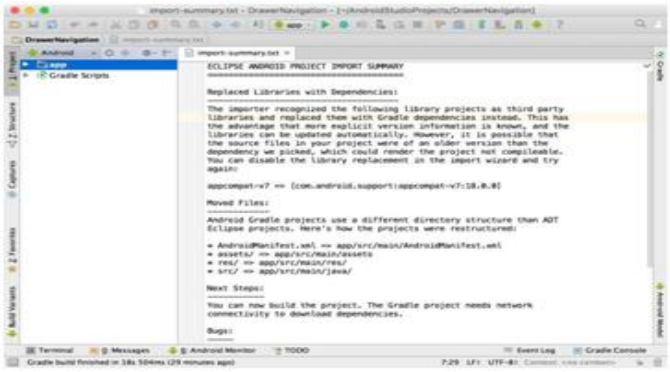
The base of fire real time database is NoSQL (cloud based) allows real time storage and synching of data among users The Real-time Database is essentially one large JSON object that developers may manipulate in real time



Firebase

2.Android Studio:

It is the official integrated a Development Environment (IDE) for development of android apps. It is based on IntelliJ's Idea. in addition to IntelliJ's strong code editor and developer tools, includes additional capabilities that improve your efficiency when developing Android apps.



Android studio

3. Gradle:

Gradle is a software development tool that is noted for its versatility. The construction of applications is automated using a build automation tool. Compiling, linking, and packaging the code are all part of the construction process.

4. Android debug bridge:

The Android Debug Bridge (adb) is a powerful command-line tool for communicating with Android devices. The adb command allows you to do a variety of device tasks, such as installing and debugging apps, as well as access to a Unix shell from which you can run a variety of commands on the device. It's a client-server application with three components:

- A client that issues commands. On your development machine, the client runs. An adb command can be used to start a client from a command-line terminal.
- A device's command execution daemon (adbd). On each device, the daemon runs in the background.
- A server that handles client-daemon communication. The server runs in the background on

5. Android SDK:

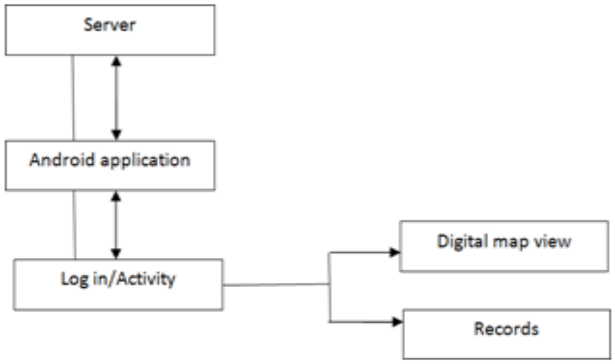
The Android SDK is a software development kit that comes with a wide range of tools for creating apps. A debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials are among the tools available. The.apk file format is used to package Android applications, which are then put beneath On Android, the /data/app folder (the folder is accessible only to the root user for security reasons). APK files include.dex files (compiled byte code files known as Dalvik executables), resource files, and other files.

6. Google Maps:

Google Maps is a desktop and mobile web mapping service application and technology from Google that includes satellite imagery, street maps, and Street View viewpoints, as well as route planners for travelling by foot, automobile, bicycle (beta test), or public transportation.

VII. METHODOLOGY

Many designs have been proposed and developed for vehicle tracking. All recommended methods and implementation are unique in terms of implementation or system architecture. The real-time vehicle monitoring system's GPS module is turned on. Each vehicle's real-time location is transmitted to receiver boards fitted on the vehicle



System Architecture

The two modules included in android application are:

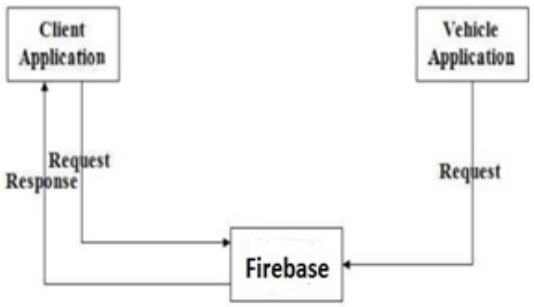
1. Admin module:

- Admin Login: The administrator will sign in to his Firebase account.
- Location of Vehicle and Driver:
  The vehicles and driver's location will be shared with admin.
- Registration: The admin will learn about the trackers' details via the firebase account. only the administrator has access to the application user's current location.

2. Client module:

- Client login: User ID and password are required for client login.
- Vehicle Tracking: The location both vehicle and driver will be tracked using Google maps by the system.
- Client Registration: Registration shall be done using name, email address and password
- Send Location Details: Vehicle's location will be automatically updated in his Firebase account using Google Maps.
- Client Details: Users current location will be visible to admin in his Firebase account.

VIII. WORKING



Block diagram of proposed system

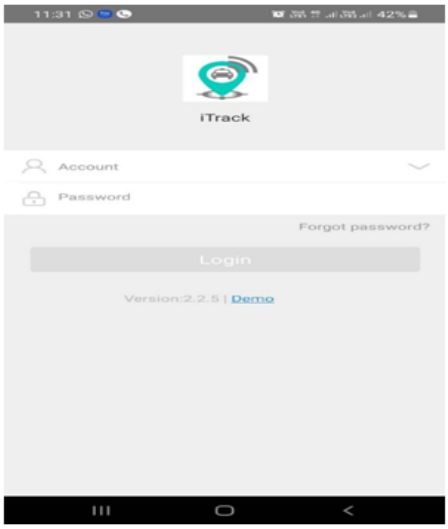
To begin, we require vehicle position data, which is obtained using the following technologies:

1. Global Positioning System (GPS): This is the technology that allows GPS units and receivers to determine their present location by receiving radio signals from satellites (indicated by latitude, longitude and elevation coordinates). At any one time, there are 24 operational satellites circling the earth. The transmission signal from at least three satellites is sought by a GPS navigator or GPS tracker.
2. Client-server technology: Clients will use their Android handsets to request the position of the vehicle. The server is contacted automatically.
3. A GPS gadget will be installed in the vehicle. It will locate itself using GPS and relay it to the server.
4. The server will manage the locations and deliver the information to the correct client.
5. Then we'll use Google Maps to create a map of the location.
6. Finally, we enter the vehicle's details into our database. We use Our software to accomplish this. All route information will be updated by the vehicle in charge. When a client requests vehicle information, the location data in the admin's project account is updated.

IX. RESULTS

The following results are obtained on successful implementation of Vehicle tracking application

Step1: Initially the user must log in to his account. On clicking icon, it opens a login interface

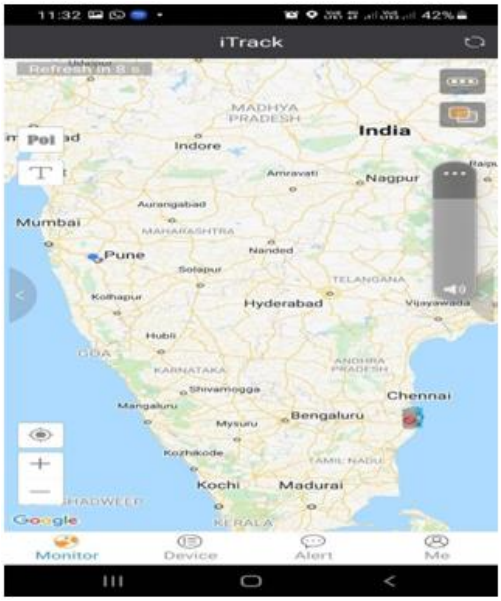


Login Page

Step 2: When a user enters a username and password, the system performs validation to determine whether the username and password are correct. If the login or password entered is incorrect, the system displays an error message. If it's correct, the user is taken to the next page after a successful login.

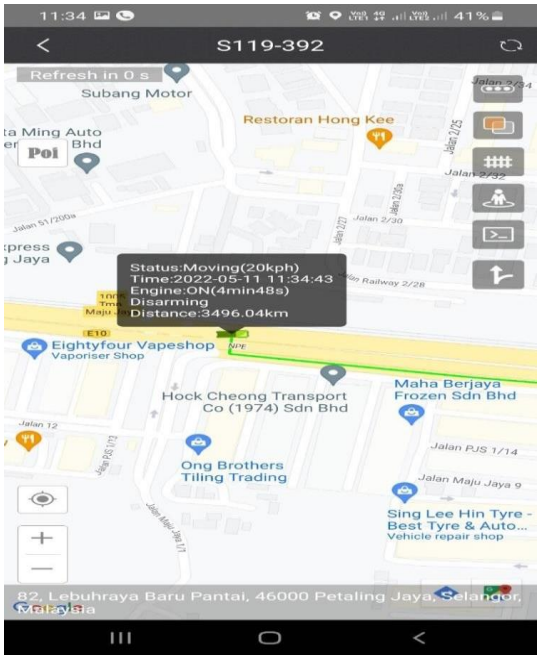
Step 3: New users can create an account using their email address. The above diagram depicts the new registration layout

Step4: When you will enter the credentials and log in to your account a google map interface will appear with active and inactive app users all over the world. When you click on round button at bottom left of interface it will display your location it is current location button.



Blue dot showing current location and users in surrounding(Vehicles)

Step5: Following successful authentication, the body's current location will be shared using the GPS system. will be shared using the GPS system.



Live tracking of vehicle

X. FUTURESCOPE

This application can be extended in the near future by adding the ability to share the tracked data and other collected data by SMS, Bluetooth, or e-mail, as well as through messaging apps ("WhatsApp") and other social networking sites ("Facebook, Twitter"). Any real-world vehicle monitoring approach can benefit from the user-friendly and easy interface.

XI. CONCLUSION

- By improving fleet management, the vehicle monitoring system increased overall productivity, resulting in a higher return on investment. You can handle higher job loads in less time with better scheduling or route planning.
- Vehicle tracking, whether for personal or professional reasons helps in increasing productivity improving safety and security of user, lead to better communication and effective monitoring of data.
- The vehicle tracking system has a wide range of capabilities, low operating costs, efficacy, robust expandability, and ease of use in vehicle traffic control, to name a few.
- The development of the system was a success. To demonstrate its adaptability, some extra functions were implemented. Advanced features could be added by registering the app in the Google Play store and removing the need for user authorization.

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