

Design and Implementation of IoT based Vehicle tracking and Theft control

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ABSTRACT

Nowadays security of a vehicle is up most important to everyone. Everyday hundreds of vehicle is being stolen in a city. It is necessary to include a system to avoid theft of vehicles. To provide that an efficient vehicle tracking system is designed and implemented for tracking the movement of any equipped vehicle from any location at any time. The proposed system made good use of a popular technology that combines a Smart phone application with a micro controller. The designed in-vehicle device works using Global Positioning System (GPS) and Global system for mobile communication / General Packet Radio Service (GSM/GPRS) technology that is one of the most common ways for vehicle tracking. The device is embedded inside a vehicle whose position is to be determined and tracked in real-time. A micro controller is used to control the GPS and GSM/GPRS modules. The vehicle system uses the GPS module to get geographic coordinates at regular time intervals. The GSM/GPRS module is used to transmit and update the vehicle location to a database. A Smart phone application is also developed for continuously monitoring the vehicle The Google Maps API is used to display the vehicle on the map in the Smart phone application. Thus, users will be able to continuously monitor a moving vehicle on using the Smart phone application and determine the estimated distance and time for the vehicle to arrive at a given destination.

Keyword –IoT, GSM/GPRS,GPS, Arduino Uno

1. INTRODUCTION

Each day, our lives become more dependent on 'embedded systems', digital information technology that is embedded in our environment. This includes not only safety-critical applications such as automotive devices and controls, railways, aircraft, aerospace and medical devices, but also communications, 'mobile worlds' and 'e-worlds', the 'smart' home, clothes, factories etc. All of these have wide-ranging impacts on society, including security, privacy and modes of working and living. More than 98% of processors applied today are in embedded systems, and are no longer visible to the customer as 'computers' in the ordinary sense. New processors and methods of processing, sensors, actuators, communications and infrastructures are 'enablers' for this very pervasive computing. They are in a sense ubiquitous, that is, almost invisible to the user and almost omnipresent. As such, they form the basis for a significant economic push. Typically, IoT is expected to offer advanced connectivity of devices, systems and services that goes beyond machine to machine communication (M2M) and covers a variety of protocols, domains and applications. The interconnection of these embedded devices including smart objects is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid, and expanding to areas such as smart cities.

The ubiquity of the GSM standard has been an advantage to both consumers (who benefit from the ability to roam and switch carriers without switching phones) and also to network operators (who can choose equipment from any of the many vendors implementing GSM). GSM also pioneered a low-cost, to the network carrier, alternative to voice calls, the Short message service (SMS, also called "text messaging"), which is now supported on other mobile

standards as well. Another advantage is that the standard includes one worldwide Emergency telephone number, 112. This makes it easier for international travelers to connect to emergency services without knowing the local emergency number. In 1982, the European Conference of Postal and Telecommunications Administrations (CEPT) created the Groupe Special Mobile (GSM) to develop a standard for a mobile telephone system that could be used across Europe in 1987.

2. SYSTEM ANALYSIS

2.1 Existing System

There are several features which have already been implemented in a vehicle, to provide both safety and security to the vehicle. In many systems, Bluetooth technology and RFID sensors are used to detect the distance of any approaching vehicle to the automobile. But the range of operation of this technology is quite narrow. In certain systems, when a vehicle has been stolen, the owner notifies a central controller system about the theft. The central controller system then sends signals to the security system installed in the vehicle, which can stop the vehicle's movement or even lock the engine. The disadvantage found in this system is that, this entire operation relies majorly on the central controller system. If the central controller system is unable to transmit the signals to the stolen vehicle, then the entire system's operation can be deemed ineffective.

Some of the problems faced by the existing system are. Loud blaring siren is emitted from the vehicle, when an unauthorized person attempts to unlock the vehicle. It's hard to distinguish which vehicle is being stolen, since all the vehicles emanate similar siren in case of attempt of vehicle theft. In cases where a vehicle is involved in an accident, it is found to be immensely difficult to track the exact location of the vehicle. All the previous solutions lack an automated approach to detect theft of the vehicle or if the vehicle is involved in an accident.

2.2 Proposed System

The block diagram of proposed system is shown in Fig1. The system helps in location monitoring that is whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using a Smart phone application and also whenever the owner gets notified that his vehicle is being misused, he can stop the vehicle by switching off its engine and can locate the vehicle by using the smart phone application thus preventing from theft. i.e. the owner can make use of this location and get his vehicle back. The proposed system helps in location monitoring that is whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using a Smart phone application and also whenever the owner gets notified that his vehicle is being misused, he can stop the vehicle by switching off its engine and can locate the vehicle by using the smart phone application thus preventing from theft. i.e. the owner can make use of this location and get his vehicle back.

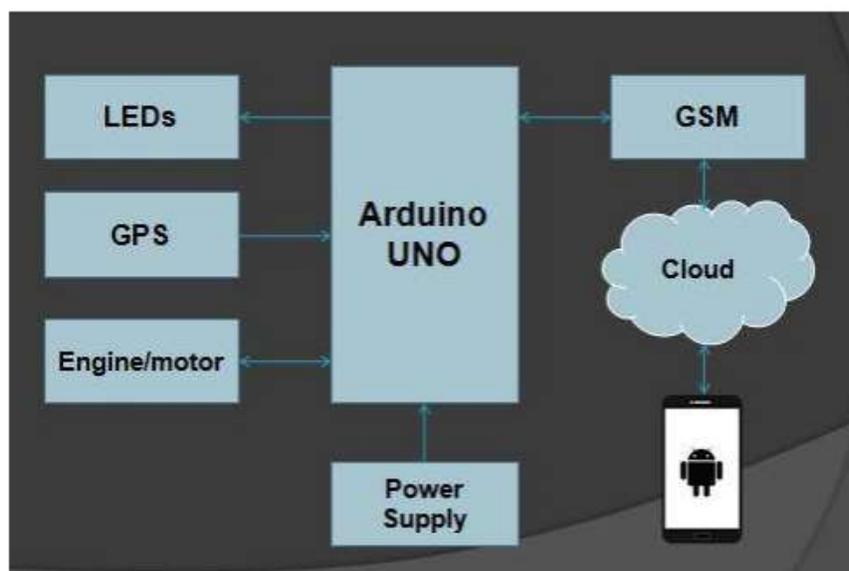


Fig.1 Block Diagram of Proposed System

For wireless data transmission, GPRS technology is commonly used. The SMS technology through GSM network and GSM modem provide a user with vehicle location information. Utilization of internet technology has become popular because it does not require much cost. It is convenient and accessible way of transferring and receiving data with high reliability. Instead of using SMS, the proposed vehicle tracking system uses the Smart phone application to track and monitor a vehicle location obtained from the in-vehicle tracking device controlled by a micro controller. The vehicle location is automatically placed on Google maps, which make it easier for tracking a vehicle and provides users with more accurate vehicle location information. The basic purpose of a vehicle tracking system is to track a specific target vehicle or other objects. The tracking device is able to relay information concerning the current location of the vehicle. Most of such tracking systems consist of an electronic device as usually installed in-vehicle and can be used for tracking motor cycles, buses, and trains. The vehicle tracking system proposed in the project has the following features: Acquisition of a vehicle's geographic coordinates and a vehicle's unique ID from an invehicle device in real time using the GPS module
Transmission of a vehicle's location information and a vehicle's ID to a web server after a specified time interval using the GSM/GPRS module. Database is designed to store and manage received vehicle's location information.

2.3 Advantages Of Proposed System

The system implemented for anti-theft, requires low maintenance and less power consumption. The cost of the system, designed in this project, is very less and highly reliable. Provides better control of the vehicle as well as its whereabouts to the owner of the vehicle.

3. HARDWARE AND SOFTWARE REQUIREMENTS

3.1 Hardware Requirements

Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform;

GSM SIM800 Module designed for global market, SIM800 is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications.

SIM900 (used in the project) is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM900 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high performance u-blox 6 positioning engine. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments. A GPS navigation device is a device that accurately calculates geographical location by receiving information from GPS satellites. Initially it was used by the United States military, but now most receivers are in automobiles and smartphones.

3.2 Software Requirements

Arduino 1.6.9 is the open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

Docklight RS232 Terminal--RS232 Monitor is a development tool for serial communication protocols (RS232, RS485/422 and others). Docklight allows you to monitor the communication between two serial devices or to test the serial communication of a single device. Key functions include: Simulating serial protocols; Logging RS232 data; Detecting specific data sequences; Responding to incoming data. Docklight allows you to monitor the communication between two serial devices or to test the serial communication of a single device.

Docklight is a testing, analysis and simulation tool for serial communication protocols (RS232, RS485/422 and others). It allows you to monitor communications between two serial devices or to test the serial communication of a single device. Docklight is easy to use and works on almost any standard PC running Windows 10, Windows 8, Windows 7, Windows Vista or Windows XP.

Android Studio is the official integrated development environment (IDE) for the Android platform. Based on JetBrains' IntelliJ IDEA software, Android Studio is designed specifically for Android development. It is available for download on Windows, macOS and Linux and replaced Eclipse Android Development Tools as Google's primary IDE for native Android application development.

In our system we are making use of an inbuilt Google Map sdk file for tracking purposes. Google Maps is a web mapping service developed by Google. It offers satellite imagery, street maps, 360° panoramic views of streets (Street View), real-time traffic conditions (Google Traffic), and route planning for traveling by foot, car, bicycle (in beta), or public transportation.

4. IMPLEMENTATION

This vehicle tracking system takes input from GPS and sends it through the GSM module to desired mobile/laptop using mobile communication. Vehicle Tracking System is one of the biggest technological advancements to track the activities of the vehicle. The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite to send the coordinates and the location data to the monitoring center. At monitoring center Docklight is used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles.

5. RESULT

As shown in the d fig 4, starting from the satellite at the top of the diagram, the GPS module receives geographic coordinates from the satellites. Tracking Down Vehicle and controlling the theft remotely using GPS and GSM technologies And also the GSM modem suffered problems with the coverage area of the Mobile Service Provider. So, we used TATA DOCOMO as it has maximum coverage area. In order to solve this problem we can use dedicated servers and purchasing satellite space so that we can track down the vehicle anytime and anywhere .With the knowledge in Electronics and Communications we have successfully completed our project with perfect results.



Fig.2 : Screenshot of Login Page

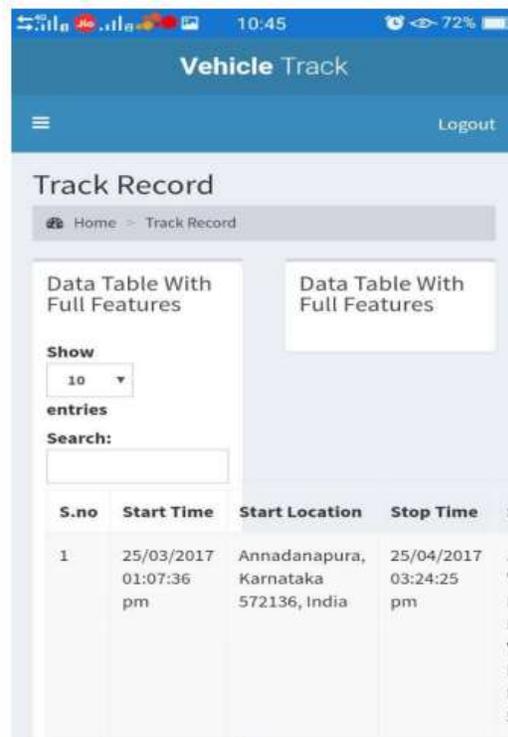


Fig.3: Screenshot of vehicle track record

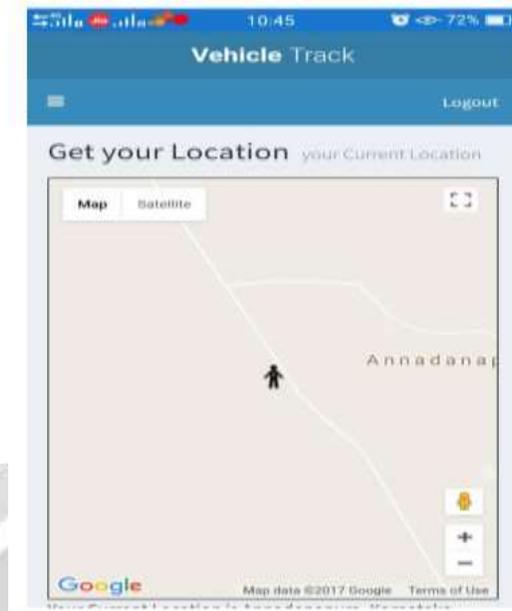


Fig.4: Screenshot of vehicle tracking

6. CONCLUSIONS

The VEHICLE TRACKING AND THEFT CONTROL USING IOT is a model for vehicle tracking unit with the help of gps receivers and GSM modem. Vehicle Tracking System resulted in improving overall productivity with better fleet management that in turn offers better return on your investments. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. Vehicle theft control system reduces the misuse of vehicle by the third person or by the family member who uses the owner's vehicle without the permission. So in the coming year, it is going to play a major role in our day-to-day living. We have completed the project as per the requirements of our project. Finally the aim of the project i.e. to trace the vehicle and theft control which is successfully achieved.

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