IOT BASED VEHICLE LIVE TRACKING BY USING GSM AND GPS TECHNOLOGY

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Abstract: A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track the vehicle's location. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology, which would be the cheapest source of vehicle tracking and it would work as anti-theft system. It is an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM) and it sends message to configured phone number when it detects any obstacle. This design will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so an Atmega328 microcontroller is interfaced serially to a GSM Modem and GPS Receiver.

Keywords – GPS, GSM, Vehicle tracking, Microcontroller.

1 INTRODUCTION

A vehicle tracking system is a device that uses the Global Positioning System to determine the precise location of a vehicle to which it is attached and to record the position of the vehicle at regular intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location Server connected to the Internet using a cellular (GPRS or SMS), modem embedded in the unit.

The safety of private and public vehicles is a major concern nowadays so having GPS vehicle tracking system ensures their safety while travelling. This vehicle tracking system can be found in consumers vehicles as a theft prevention and retrieval device. Police can follow the signal emitted by the tracking system to locate a stolen vehicle. Generally this system is meant to be installed for the four wheelers but for country like India where majority of the people using two wheelers, here is the cheapest source of an anti-theft tracking system. Vehicle tracking systems are commonly used by fleet operators for fleet management functions such as routing, dispatch, on-board information and security. Other applications include monitoring driving behavior, such as an employer of an employee, or a parent with a teen driver. Vehicle tracking systems are also popular in consumer vehicles as a theft prevention and retrieval device. Police can simply follow the signal emitted by the tracking system and locate the stolen vehicle.

2 RELATED TECHNOLOGIES
2.1 ARDUINO UNOOVERVIEW

The Arduino Uno is a microcontroller board based on the ATmega328. 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. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDIUSB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter."Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version1.0 will be the reference versions of Arduno, moving forward.

Figure 1. Arduino Uno

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. The key features are: Arduino boards are able to read analog or digital input signals from differentsensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions. Arduino IDE uses a simplified version of C++, making it easier tolearn to program.

2.2 GPS TECHNOLOGY

The Global Positioning System (GPS) is the only fully functional Global Navigation System (GNSS). The GPS uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals that enable GPS receivers to determine their location, speed, direction, and time. A GPS receiver receives the signals from at least three satellites to calculate distance and uses a triangulation technique to compute its two dimension (latitude and longitude) position or at least four satellites to compute its three dimension (latitude, longitude and altitude) position.

2.3GSM TECHNOLOGY

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. GSM (Global system for mobile) uses a process called circuit switching. This method of communication allows a path to be established between two devices. Once the two devices are connected, a constant stream of digital data is relayed. GSM networks consist of three major systems the Switching System (SS), The Base Station (BSS) and the Mobile station (MS).

2.4 ULTRA SONIC SENSOR

Ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

3 DESIGN OF TRACKING SYSTEM

In this Paper it is proposed to design an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). In this DeviceAtmega328 microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so an Atmega328 microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. It sends message to configured phone number when it detects any obstacle.

Figure 2.Block Diagram

The block diagram of tracking system using GPS and GSM technology is presented in figure 2. The project is vehicle positioning and navigation system we can locate the vehicle around the globe with micro controller, GPS receiver, GSM modem. Microcontroller used isAtmega328. The code is written in the internal memory of Microcontroller i.e. ROM. With help of instruction set it processes the instructions and it acts as interface between GSM and GPS with help of serial communication of Atmega328. GPS always transmits the data and GSM transmits and receive the data.

GPS pin TX is connected to microcontroller and GSM pins TX and RX are connected to microcontroller serial ports. Microcontroller communicates with the help of serial communication. First it takes the data from the GPS receiver and then sends the information to the owner in the form of SMS with help of GSM modem. GPS receiver works on 9600 baud rate is used to receive the data from space Segment (from Satellites), the GPS values of different Satellites are sent to microcontroller Atmega328, where these are processed and forwarded to GSM. From these values microcontroller takes only latitude and longitude values excluding time, altitude, name of the satellite, authentication etc. E.g. LAT: 13.622564LOG: 79.411057 GSM modem with a baud rate 57600.GSM is a Global system for mobile communication in this device it acts as a SMS Receiver and SMS sender. The power is supplied to components like GSM, GPS and Micro control circuitry using a 12V/3.2A battery .GSM requires 12v,GPS and microcontroller requires 5v .with the help of regulators we regulate the power between three components.

4 BYLNK APP

Bylnk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

- Bylnk App - allows to you create amazing interfaces for your projects using various widgets we provide.
- BylnkServer - responsible for all the communications between the smartphone and hardware. You can use our BylnkCloud or run your private Bylnkserver locally. Its open-source could easily handle thousands of devices and can even be launched on a Raspberry Pi.
- BylnkLibraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

5 EXPERIMENTAL RESULTS

The figure 3 shows the hardware setup of IOT Based Vehicle Live Tracking by using GSM and GPS Technology. When the power is switched on, then Bylnk Appasks username & password. After entering username and password it shows the location by calculating latitude and longitude shown in figure 4.If any obstacle is identified then the device send message to the registered number shown in figure 5.
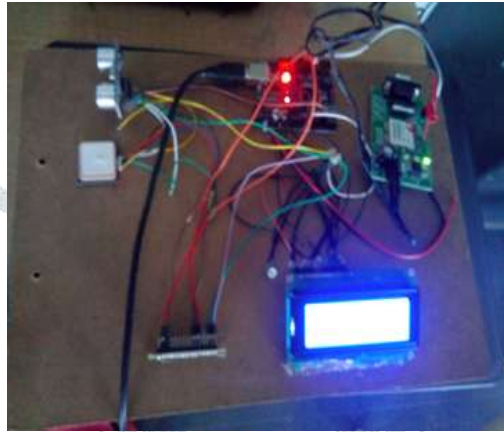

Figure 3.Hardware Setup
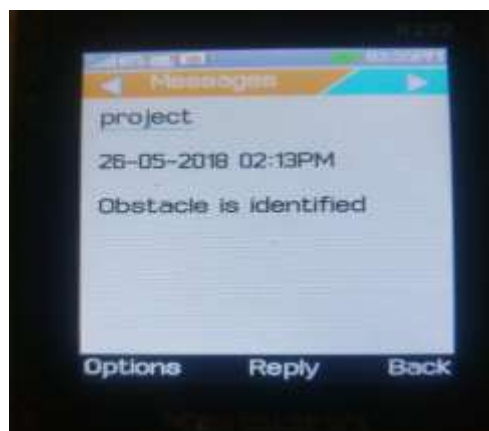

Figure 4.Location of Vehicle

Figure 5.Obstacle Identification

6 ADVANTAGES

Commercial fleet operators are by far the largest users of vehicle tracking systems. These systems are used for operational functions such as routing, security, dispatch and collecting on-board information.

The applications for this project are

- Military Navigation
- Fleet monitoring
- Vehicle scheduling
- Route monitoring
- Driver monitoring
- Accident analysis , etc.

These are just a few advantages of the project that has been introduced in this report. We can interface more number of sensors in order to serve multiple purposes.

7 CONCLUSIONS

In this, a system is proposed which can be used to track a vehicle with the help of IOT. By using this it can also be used in wildlife tracking, asset tracking and in stolen vehicle recovery. In the future by having a server and integrating all the devices we can see the vehicle route and other information on our mobile and we can save the trajectory of it. By using sensors in the vehicle we can get the report of the vehicle information to the server and it can form an intelligent tracking system. By this determination of exact location is possible with the help of the GPS device attached to it.

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