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# IOT Based Vehicle Theft and Tracking Using GPS Technology

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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 web application with a microcontroller. The designed in-vehicle device works using Global Positioning System (GPS) and Global system for mobile communication web Service (google firebase) 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 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 web application is also developed for continuously monitoring the vehicle The Google Maps API is used to display the vehicle on the map in the web application. Thus, users will be able to continuously monitor a moving vehicle on using the web application and determine the estimated distance and time for the vehicle to arrive at a given destination.

**KEYWORDS:** NodeMCU, I2C LCD, GPS Module.

## I. INTRODUCTION

A vehicle tracking system combines the installation of an electronic device in a vehicle or fleet of vehicle to enable the owner or third party to track the vehicle's location and collecting data in the process. Modern Vehicle Tracking system (VTS) is the technology used to determine the location of a vehicle using different methods like GSM and GPS module and other radio navigation systems operating through satellites and ground based stations GSM and GPS based vehicle location and tracking system provides effective, real time mapping based vehicle location tracking. The system uses geographic position and time information from the Global Positioning Satellites.

A security system is essential for motorist as the number of motorcycle theft increases every year. Various security systems are available in the market with variety of functions, operating modes and features. Most of the systems are expensive which make security system that offers excellent protection to your vehicle using GPS and GSM is effective one. The main aim of the system is to design and develop an advanced bike locking system in the real time environment. The user will send a status message from his cell phone and it will check for the user's authentication when the GSM module gets the message, and if found to be valid, it will immediately forward the details of the locations like the latitude and the longitude using GPS device. So the user will know the exact location of the vehicle. At the same time message will be sent to a personal computer or mobile application where user can get the exact location of vehicle pointed out on the google maps

## II. OBJECTIVE

- Recently vehicle tracking system is getting vast popularity because of the rising number of the stolen vehicles.
- Vehicle theft is happening on parking and sometimes driving in unsecured places.
- This research work explores how to avoid this kind of stealing and provides more security to the vehicles

## III. METHODOLOGY

The Internet of Things (IoT) is the physical network of things or objects devices, buildings, vehicles, and other items embedded with electronics, software, sensors, and network connectivity that enables these things or objects to collect and exchange data. An anti-theft system is any device or method used to prevent or deter the unauthorized



appropriation of items considered valuable. Theft preemption based on IOT provides a system. Internet of Things is expected to produce high degree of human to machine communication along with machine to machine communication. This project proposes the security system using IOT, which prevents theft in home, bank etc. The primary objective of this project is to reduce human work. Automation has always been a prime factor for security system. We aimed in the project is to design and implement a security system. System that offers controllability through a hand held mobile phone by means of IOT. The commands from a mobile phone are used to switch ON and OFF the alerting system. This project is implanted as prototype model.

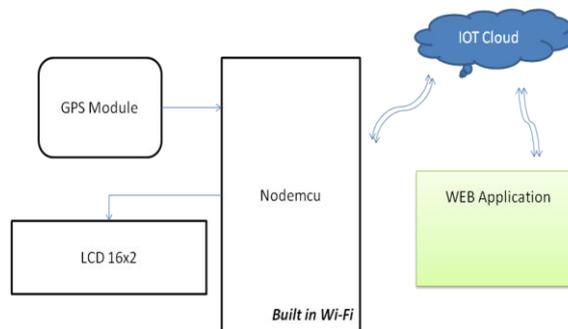
**IV. SYSTEM ANALYSIS**

**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 Fig2.2. 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 2.2. Block Diagram of Proposed IOT Based Vehicle Theft and Tracking Using GPS Technology**

**A) NodeMCU**

It is open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua



project and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs.



Fig A: NodeMCU

**B) I2C LCD Module**

The I2C 1602 LCD module is a 2 line by 15 character display interfaced to a daughter board. The I2C interface only requires 2 data connections, +5VDC and GND to operate.

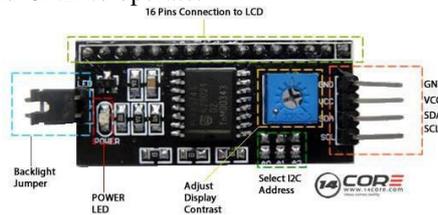


Fig B: - I2C LCD MODULE

**C) 16\*2 LCD**

We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits. The 16x2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix.

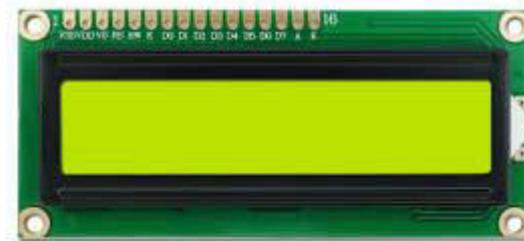


Fig C: - 16\*2 LCD

**D) GPS Module**

The NEO-6MV2 is a GPS (Global Positioning System) module and is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high performance u-box 6 positioning engine. These flexible and cost effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package. The compact architecture, power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. Its Innovative design gives NEO-6MV2 excellent navigation performance even in the most challenging environments.



**Fig D: GPS Module**

**E) Arduino IDE**

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

a. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open. Steps to run code and examine the outputs are as follows.

**Verify**

Checks your code -for errors compiling it.

**Upload**

Compiles your code and uploads it to the configured board. See uploading below for details.

**New Creates a new sketch**

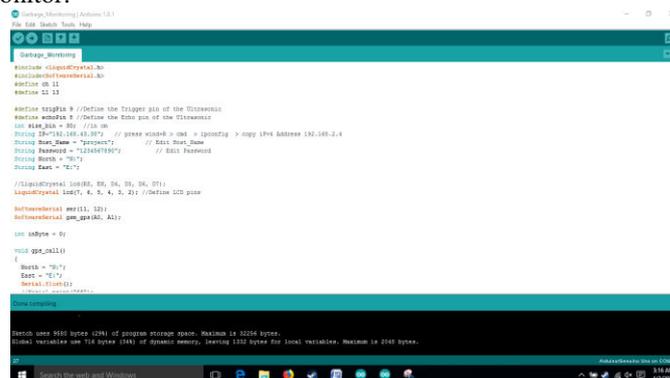
Open presents a menu of all the sketches in your sketchbook. Clicking one will open it within the current window overwriting its content.

**Save**

Saves your sketch.

**Serial Monitor**

Opens the serial monitor.



**Fig E: Arduino IDE window**



### V. EXPERIMENTAL SETUP

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 Dock light 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.

### VI. RESULT

Our proposed Two Wheeler Vehicle Security System is the advanced, reliable and robust version of security mechanism for two wheeler vehicles. The proposed security system also gives space, in terms of hardware and software, to add up custom applications to make the product even more user-friendly. Proposed TWVSS can be installed on two wheeler vehicle of any class or company, thereby creating the following results is obtained from data analysis:

As shown in the fig below, 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 technologies.

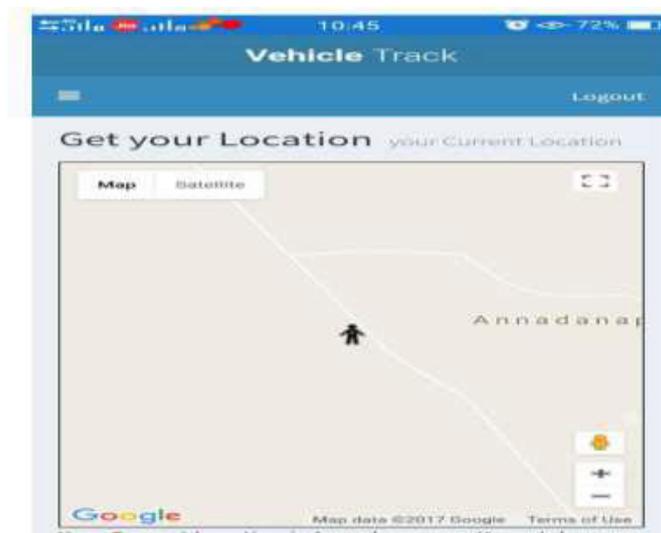


Fig F: Screenshot of vehicle tracking

### VI. CONCLUSION

In this paper, we have proposed a novel method of vehicle tracking and locking systems used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that bike locked. the engine authorized person needs to enter the commend release the dc gunn then vehicle will be moment. In this method, easily to used in vehicle security

### VII. FUTURE WORK

Hopping code algorithm could be used in Remote Keyless System (RKS) for added security. Presently only SMS feature is available, we can include the Call feature for ease of operation. Like for example giving miscall would lockdown the vehicle. SIM 300 even supports GPRS coding schemes hence data network could be used to send alerts



and receive control messages. Hall Effect sensor could be used to find the position of gear, which could be displayed with a single seven segment display.

#### VIII. DISCUSSION

A practical system for routing and tracking mobile vehicle is presented in the project. In some cases GPS may give us no answer, the wrong answer, or an answer with insufficient accuracy which was one of the main reasons for the limitations of GPS accuracy. The accuracy of system is affected by some factors such as weather, environment around the mobile vehicle, GPS receiver, compass sensor and the variation between True North Direction and Magnetic North Direction, etc. The future works include optimizing the hardware system, choosing a suitable GPS receiver and compass sensors and for more accuracy one can go for DGPS i.e. Differential Global Positioning System, by using DGPS accuracy can be increased up to 1-4 meters whereas in GPS it is 5-10 meters.

#### IX. FUTURE SCOPE

- Remote door locking system to capture the thief.
- Accident detection and generating message which will inform family members about the location of accident.
- The owner can switch on the digital camera recorder to record the face of the thief. This will help in identifying and capturing the thief.

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