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Anti-Theft Protection of Vehicle By GSM and GPS With Keypad Verification And Accident Detection

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Abstract — *The main purpose of this project is protecting vehicle from theft. Now a day's vehicle thefts are increasing rapidly. People have started to use the theft control systems installed in their vehicles. The commercially available anti-theft vehicular systems are very expensive. And this project is developed as low cost vehicle theft control scheme using a microcontroller and with usage of GPS and GSM technology. Also the accident detection feature in this system will send emergency alert message to police and ambulance along with exact location, in case the vehicle is met with an accident. Our system is linked to Google map to locate exact position of vehicles.*

Keywords-*Antitheft system for vehicles, Accident Detection, Keypad Verification, MEMS Sensor, Global Positioning System (GPS), Global System for Mobiles(GSM)*

I. INTRODUCTION

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 project explores how to avoid this kind of stealing and provides more security to the vehicles. The implemented system contains single-board embedded system which is equipped with Global System for Mobile Communication (GSM) and Global Positioning System (GPS) along with a microcontroller installed in the vehicle.

The use of GSM and GPS technologies allows the system to track the vehicle and provides the most up-to-date information about on-going trips. Moreover, keypad verification is done in the implemented system to ensure the driving of correct person. The implemented system is very simple with greater security for vehicle anti-theft protection and low cost technique compared to others.

If the vehicle is met with an accident, an immediate alarm is sent to the ambulance and police with the current location of the vehicle. This technique helps in taking fast steps towards an attempt to steal the vehicle .The design is robust and simple.

II. CONCEPT

This system consists of GPS receiver and GSM modem with a micro controller. The whole system is attached to the vehicle. In the other end (main vehicle station) one GSM mobile phone is attached to the computer with VB application. So the GPS system will send the longitudinal and altitude values corresponding to the position of vehicle to GSM Modem.

Imagine the bus has left Bangalore at 6 o clock in the morning. If the officer in charge for that vehicle wants to know where the vehicle is, he will come to the computer and click on the vehicle number on the VB program .The VB program will send an SMS to the vehicle number.

The SMS sent would come through the GSM service provider and then reach the vehicle, which is traveling, because the vehicle has a GSM device with SIM card. This GSM modem will receive the SMS and send to the microcontroller in the vehicle. The microcontroller will receive this SMS and compare the password and the command. If everything matches then it will perform the request required by the office.

A place name is assigned for each longitude & latitude. The GSM receiver in the vehicle office receives these data & gives to the PC through serial port. The VB program in the PC checks this data with its database & displays the details of the vehicle on the screen. The device is password controlled i.e. person who knows the device password only able to

operate. In case of any mishaps such as fire, theft, accident or obstacle , the device will automatically will send an alert to the registered number , the number that is feeded into the memory of microcontroller.

3.1 EXISTING SYSTEM

In the existing system, user has to enter his password to start the vehicle. The vehicle user must carry an RF receiver device with him. If a thief tries to break the key lock he still cannot start engine ignition without entering the right password. If he enters the wrong password the system sends signals through RF transmitter. These signals are then received by RF receiver device with the user and he is alerted.

DISADVANTAGES

- Not efficient
- Low communication
- Not reliable
- Low performance
- Cannot detect in case of accidents.

3.2 PROPOSED SYSTEM

- In this proposed system, a module has been developed based on microcontroller that consists of a GPS and GSM. A two way communication process is achieved using a GSM modem. This system comprises of a keypad protection system and it is used protect the vehicle from anti-theft.
- When driver gives his password before starting the vehicle, the system will be considered as fair condition. This system makes use of an embedded chip that has an inductive proximity sensor, which senses the key during insertion and sends a text message to the owner's mobile stating that the car is being accessed. This is followed by the system present in the car asking the user to enter a unique password.
- If the user fails to enter the correct password, then for each wrong entry of password , a buzzer will ring upto three trials. If the user still fails to enter the correct password, in three trials, the system will be taken as an abnormal condition.
- Then the system will send an SMS to owner of the vehicle with an URL of 'GOOGLE MAP' having the co-ordinate of the current location of the vehicle. SMS will be then sent to the owner having updated location's co-ordinate every interval of 10 seconds until doing the proper password verification.
- Incase ,the vehicle is met with an accident,the accident will be detected using Micro electro mechanical system (MEMS) Sensor and an immediate SMS is sent to the ambulance and police with the current location of the vehicle.
- The proposed system is used for positioning and navigating the vehicle with an accuracy of 10 m. The Exact location is indicated in the form of latitude and longitude along with the exact Navigated track on Google map.The system tracks the location of particular vehicle and sends to users mobile in form of data and also to microcontroller. The arrived data, in the form of latitude and longitude is used to locate the Vehicle on the Google.

3.3 SYSTEM ARCHITECTURE

In this System, 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 System, arduino 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 arduino 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.

The GPS modem gives many parameters as the output,. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. An EEPROM is used to store the data received by GPS receiver.

The hardware interfaces to microcontroller are LCD display, GSM modem and GPS Receiver. In order to interface GSM modem and GPS Receiver to the controller, a keypad is used. A Program has been developed which is used to locate the exact position of the vehicle and also to navigated track of the moving vehicle on Google Map.

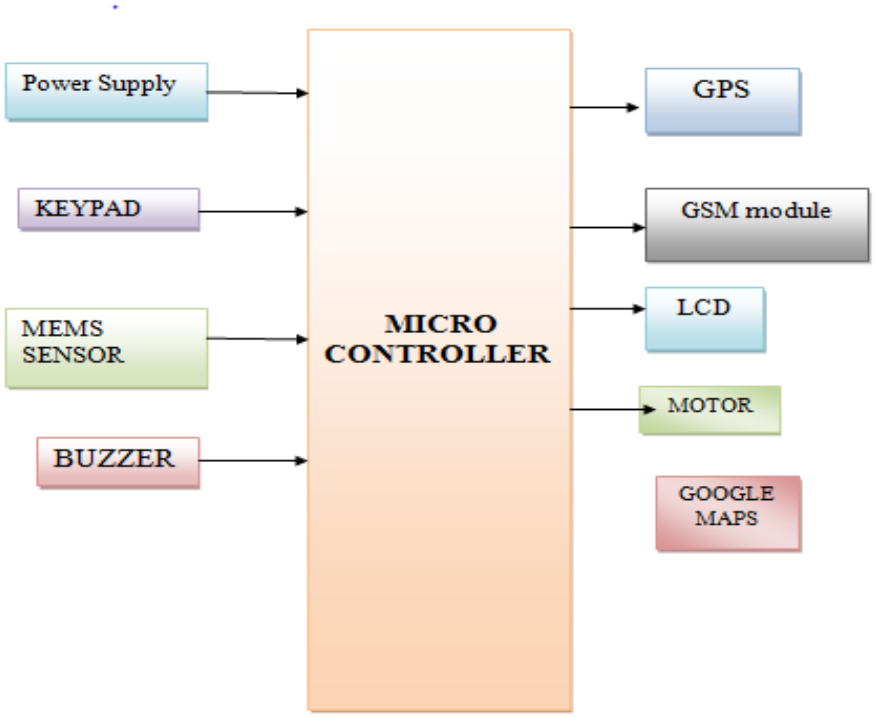

Fig.1 Block diagram

3.4 WORKING OF SYSTEM

This system has been developed based on microcontroller that consists of a GPS and GSM. A two way communication process is achieved using a GSM modem. It comprises of a keypad protection system and it is used protect the vehicle from anti-theft. When driver gives his password before starting the vehicle, the system will be considered as fair condition. This system makes use of an embedded chip that has an inductive proximity sensor, which senses the key during insertion and sends a text message to the owner's mobile stating that the car is being accessed. This is followed by the system present in the car asking the user to enter a unique password. If the user fails to enter the correct password, then for each wrong entry of password , a buzzer will ring upto three trials. If the user still fails to enter the correct password, in three trials, the system will be taken as an abnormal condition. Then the system will send an SMS to owner of the vehicle with an URL of 'GOOGLE MAP' having the co-ordinate of the current location of the vehicle. SMS will be then sent to the owner having updated location's co-ordinates. Incase ,the vehicle is met with an accident,the accident will be detected using Micro electro mechanical system (MEMS) Sensor and an immediate SMS is sent to the ambulance and police with the current location of the vehicle.

IV.REQUIREMENT ANALYSIS

A. HARDWARE REQUIREMENT

A.1. POWER SUPPLY

It consists of step down transformer, bridge rectifier, capacitors,resistors and voltage regulator ICs. 230V AC is converted to 12V DC using transformer and bridge rectifier. This 12VDC is further reduced to 5V DC using voltage regulator IC.

A.2. KEYPAD

A keypad is a set of buttons arranged in a block or pad which bear digits, symbols or alphabetical letters. Pads mostly containing numbers are called a numeric keypad. Numeric keypads are found on alphanumeric keyboards and on other devices which require mainly numeric input such as calculators, push-button telephones, vending machines, ATMs, Point of Sale devices, combination locks, and digital door locks.

Fig.2 Keypad

A.3. LCD

A Liquid-Crystal Display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly. *LCDs* are very thin but are actually composed of several layers.

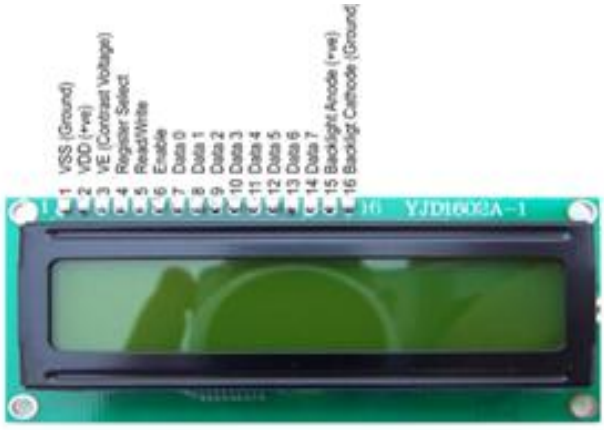

Fig. 3 LCD display

A.4. GSM

A GSM (Global System for Mobile Communication) 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. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

Fig . 4 GSM module

A.4. GPS

A GPS (Global Positioning System) navigation device is a device that accurately calculates geographical location by receiving information from GPS satellites. . The signals are obtained by GPS receivers, such as navigation devices and are used to calculate the exact position, speed and time at the vehicles location.

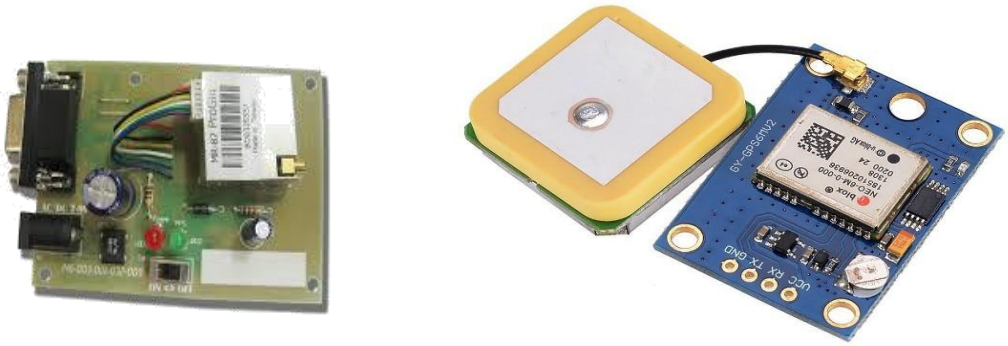

Fig .5 GPS module

A.5. ARDUINO UNO MICROCONTROLLER

Arduino Uno is a microcontroller board based on the ATmega328P . It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.

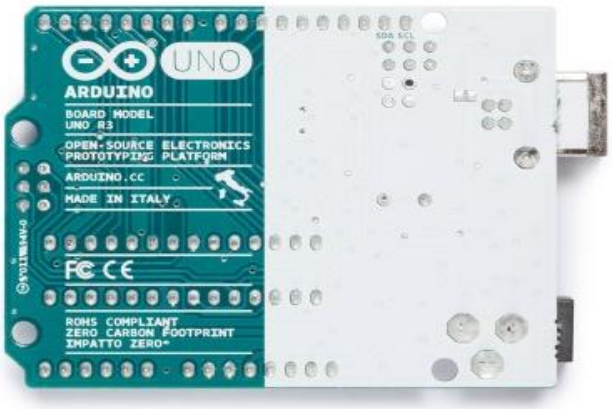

Fig.6 Arduino UNO

A.6. MEMS SENSOR

The accident can be detected precisely with the help of Micro Electro Mechanical System (MEMS) sensor. The Angle of the rolls over of the car can also be known by the message through the MEMS sensor. This application provides the optimum solution to poor emergency facilities provided to the roads accidents in the most feasible way.

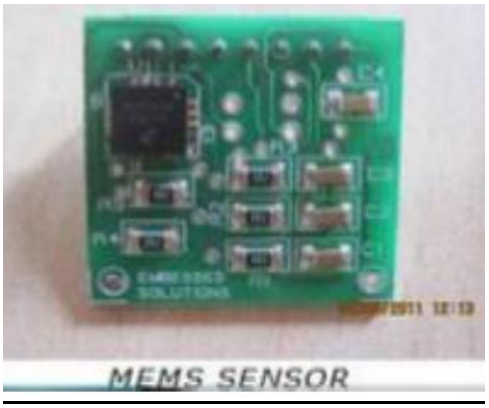

Fig.7 MEMS Sensor

A.7. MOTOR

An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor.

Fig.8 Motor

A.8. BUZZER

A ***buzzer*** is an electrical device that is used to make a buzzing sound for example, to attract someone's attention.

Fig.9 Buzzer

B. SOFTWARE REQUIRMENTS

B.1. Embedded C

Embedded C is a set of language extensions for theC programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embeddedsystems.

B.2. Arduino compiler

The *Arduino IDE* supports the languages C and C++ using special rules of code structuring. The*Arduino IDE* supplies a software library from the Wiring project, which provides many common input and output procedures.

B.3. Proteus

The **Proteus Design Suite** is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

V. FEATURES

1. Can be used for vehicle navigation and tracking.
2. Used in Fleet management services.
3. Can be viewed by means of PalmPC, Laptop, PDA, and Handheld devices.
4. Location Based Services can be done by means of enabled devices.
5. Stolen vehicles can be easily recovered by means of GSM and GPS and location can be viewed in google map.
6. Accident Detection can be done and instant alert messages are sent.

VI. CONCLUSION & FUTURE ENHANCEMENTS

In this paper, vehicle location can be tracked , prevention of vehicle from theft is done with minimum cost and even accident detection can be done in real-time mode. Vehicle navigation can also be done. GSM and GPS technology is an effective security check technology and also in optimum cost to avoid theft of vehicles. When the latitude and longitude values obtained and fed into Google Earth software, the location of the vehicle could be found out accurately. Authentication is also provided so that only the authorized users can access the vehicle. A wide future scope guarantees that an enhancement to this system finds a great importance in real time system. This model can be implemented in two wheelers with adjustments made to spark plug, battery and key and can also be implemented in four wheelers and multiaxle vehicles too. In future,t he system can further be improved for providing parental guidance that is to stop the vehicle if it crosses a certain range of distance.Smart phone (i.e. android, windows) application can be made and interfacing a dedicated smart-phone installed in vehicle with device can be done to get real-time vehicle tracking. Moreover, wind screen paint spray system and electric shock system can be added for much enhanced security.

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