VEHICLE ADVANCED SECURITY AND UPGRADED THEFT INTIMATION CUM ACCIDENT DETECTION SYSTEM USING GSM AND GPS

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ABSTRACT

The project deals with the theft detection, tracking and positioning, accident detection, over speeding and security using wireless technology effectively used for the automotive environments by using GSM and GPS Module used for sending the position pin via a variable Google maps URL and the android device system application of Google maps shows us the pin location of the automobile .The GPS only can receive signals (can not transmit) by the combination of three satellites to pinpoint the exact 2D location and stores it in microcontroller's buffer now the GSM device provides the transmission of location data via an SMS to the owner's number. The system is equipped with shock sensor and acceleration sensor which when detecting responses send an interrupt to the microcontroller and an SMS is sent to the owner's number or to any other emergency number registered for accident detection and over speeding. The owner can communicate with the system via GSM network and can get the pin location of the automobile and also can stop the ignition through the system via an SMS command which activates the relay that detaches the ignition system motor. An advanced passkey interface is also added in the system as an advanced safety feature which starts engine only on correct passkey else will send an SMS on the owner's phone registering theft of the vehicle.

Keywords: GPS, GSM, Shock sensor, Acceleration sensor, Android device, Microcontroller, Relay

1. INTRODUCTION

Vehicles are now an important part of our lives and we use them for different purposes but when our expensive vehicle is being stolen a larger part of money spent on that and more importantly our lifestyle gets affected, also during an accident which occurs with them there's no communication linked with them for calling of ambulance or police or conveying information to relatives. This project came across with advanced technology that not only has a security passkey function for the vehicle starting but also provides us the ability to detect the vehicle's location on one's device, locating and monitoring the vehicle on theft by getting geographical coordinates via a Google maps variable URL

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and also can communicate with the system via a GSM network. The URL comes as an SMS including GPS coordinates, date, time and status of the vehicle. The vehicle also shares the statistical reports and over speeding data with the owner and provides the owner with the facility to stop the ignition via a relay system operation from the command received from SMS. The system uses wireless communication in combination with GPS and GSM along with embedded applications and sensor units. The unit can be placed anywhere in the car making it not visible for anyone and it serves as an advanced upgraded version of vehicle security system with tracking and monitoring part which adds up to the standard security of central locking as provided in vehicles nowadays.

1.2 Motivation

The purpose is to enhance the security of vehicles against theft. As of now a huge number of vehicles are reported missing every year and the owners are unable to locate the vehicle even after the help from the authorities as the vehicles don't have a default tracking mechanism thus in order to make it easy to track the vehicle, a reliable tracking mechanism is needed. In this we combined advanced security passkey interface with the Global Positioning System for tracking and monitoring the vehicle using GSM which sends the location URL as an SMS which opens in the Google maps application as a pin location, the owner can track it easily with the application of navigation in the Android device the system has a piezoelectric shock sensors integration which serves as an informing feature in case the vehicle meets an accident.

2 LITERATURE REVIEW

Technology sure has made life easier as the time has passed. One of the most important revolutions in science is the development of consumer-friendly and easily accessible navigation system. A couple of decades ago, the navigation systems were large and expensive and were generally used for military applications and aviation purposes. But today consumer grade navigation systems are readily available in Japan, Europe and the United States. They can be used effectively in automobile navigation systems. In-vehicle navigation systems' concept is fairly old but it was not implemented until a couple of years on a wide scale. It started in the US in times as early as the late 1960s but as the supporting infrastructure was really expensive, so the idea was dropped until 1980s when due to road system were taxed to capacity, and hence they launched a campaign to promote the application of high-tech concepts to enhance the efficiency of the road. The aim of the plan is reducing highway congestion, fuel consumption, theft prevention and the number of traffic accidents and other anomalies by providing drivers with real-time traffic information, route guidance, electronic toll collection, advanced vehicle collision avoidance systems, and automatic notification to authorities in the event of traffic emergency conditions. It also had a huge effect on the car sales and they were estimated to increase in a way that the per annum sales of vehicles with factory-installed navigation systems will reach 2.5 million by the year 2000. The cutting-edge technologies that can be used in vehicle tracking are GPS, GSM communication remote Control, GIS server systems and similar types of equipment. Here, we make an attempt to develop an instrument based on 8051 microcontroller family and operated using GSM and GPS technology. As of now, these types of equipment are readily available

and at a low cost which provides a cheap system of theft prevention of vehicle along with security passkey, accident detection and remote engine locking features. These features provide safety to vehicles against theft, emergency assistance can reach in case of an accident as the system is programmed for it, location on Google maps from any corner, over speeding alerts and remote operation of the vehicle using GSM network for engine locking or getting the location.

2.1 *Objective*

The aim of our project is to design a cheap effective vehicle monitoring system. This system is designed to benefit the owner of the vehicle which provides an advanced layer of security besides icats and basic alarming system. The system is so designed that it can response via an SMS command and can provide the location data as a pin location URL which opens in Google maps API all this on a command over GSM network and can also remotely lock the engine over the Command over same GSM network detected by the system if scripted in a particular form and the system follows the routine.

The system has GSM and GPS interface along with piezoelectric sensor, the acceleration sensor and security passkey section also known as immobilizer. The system can be used to track the vehicle in case of theft and provides real-time location of the vehicle via an SMS which contains the pin location of the vehicle in the form of a URL which opens into Google maps and the owner can track it using navigation. The piezoelectric sensors sense the shocks in case of an accident and also bursting of windows thereby registering theft of the vehicle and inform the owner about the same. Also, this system is equipped with an advanced security passkey feature which only allows the vehicle to start on a correct ignition key in case the passkey entered is incorrect it will inform the owner about the theft. Also in any case of theft, the informing alert always contain the pin location along with the message details. The accident detection system informs the emergency services in case of an accident so to reduce the time required for arrival of helpers in case of road accidents where even seconds count. The acceleration sensor senses the speed and if the speed goes high from the set parameters warns the owner and also can be designed in a way that it doesn't allow the vehicle to go above a set speed.

3 PROPOSED METHODOLOGY

The below-Stated block segment contains the overview of vehicle theft intimation cum monitoring embedded system having following components. A microcontroller AT89S52 which is a 40 pin controller having 4KB of flash memory which leads the vehicle monitoring system. The microcontroller is set to a specific set of instructions to as per the requirement and can be programmed to about 1000 read/write cycles, the system also has an LED display which displays the current operation command running or currently being executed and it also displays the location coordinates at its display. An GSM interface which provides a wireless communication over the GSM network which links from the operator or the owner to the system which is to be kept always on the, ON state of the relay as it has to both send as well as receive SMS, The GPS module detects the accurate and precise coordinates up to 6 significant with the help of 3 satellites for a general 2D location and stores it with the system, the IC is responsible for various commands for the operation of ignition motor or operation of relay, the piezoelectric sensor senses the accident by means of severe bang or airbag opening or

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windows crushing and alerts the emergency services about the accident, the power to the system is provided by a 12V/1A DC adapter which is then further regulated to 5Volts by voltage regulator 7805, the max232 converts the signals of GPS and GSM onto a receivable format of microcontroller system and vice versa. The system informs about the theft or accident via an SMS which contains the alert message along with the location URL as follows

Message for theft :
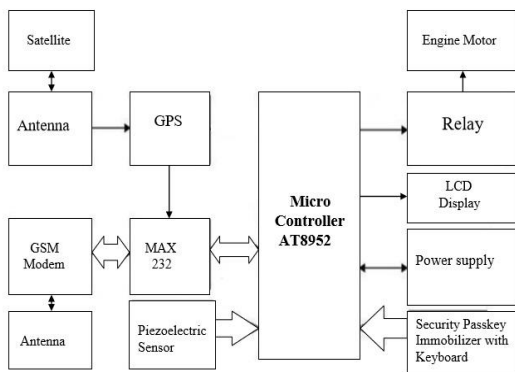 "Vehicle theft alert Invalid access at car www.google.co.in/maps?q=22.5895358,71.869248 "

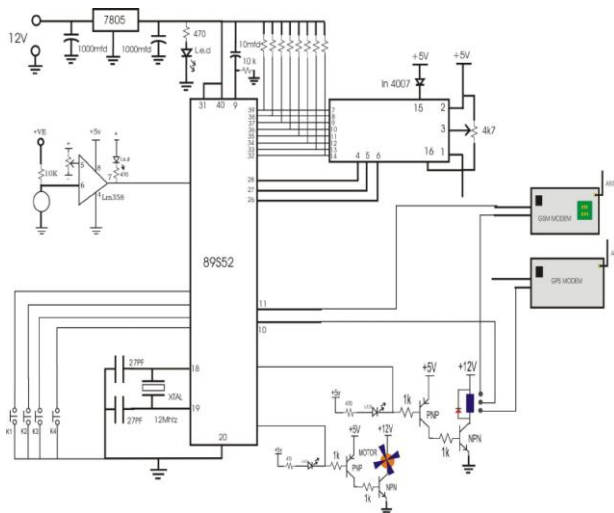**Figure:** Block diagram of vehicle locking and   tracking system

Figure: Circuit diagram

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Components Description

1. Microcontroller

It consists of a single microcontroller belonging to 8051 family manufactured by Atmel AT89S52. Which is an 8-bit microcontroller having 4Kb of flash memory and can be programmed to about 1000 read/write cycles. It has its own CPU and memory and various pins performing different operations.

2. GSM Modem

Abbreviated as the Global system for mobile is a 2G module which contains a unique SIM card number operating in various different frequency ranges of about 900MHz to 1800MHz using a narrow band variation of time division multiple access. Short message service protocol is used by the system for getting commands from this wireless network

3. GPS Modem

Abbreviated as Global Positioning System used to detect the latitude and longitude and time of detection anywhere on earth with the help of 24 satellites moving around the earth which emits microwave signals. The GPS module makes use of at least 3 satellites for a 2D location. This system can only receive cannot communicate with the satellite from the ground, and it serves as the main feature which helps in locating the position of any vehicle

4. Power supply

The system is designed to work at 5volts, we use a 12 Volt/1Ampere DC adapter which supplies 12volts to the circuit, the circuit itself has an LM7805 voltage regulator which regulates the 5Volts DC supply to the circuit. The other components such as GSM modem has its own voltage regulator section

5. LCD display

Abbreviated as Liquid crystal display is a 16x2 size flat display which works on the light modulating property of liquid crystals and displays the current operation being executed.

6. Relay

Relay of 5V is used which operates when controller commands it via a current amplified circuitry mechanism and it switches between GSM and GPS it always remains ON state with the GSM as it has to receive as well as send SMS and when there's any need for location in an occurrence the relay switches to GPS side picks up the data and comes back to normal state

7. Piezoelectric Sensor

The sensor is a device that measures changes in pressure, strain or force by converting them into electrical charges which serves as an output response of this sensor that is converting shocks and vibrations into electric charges.

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8. MAX232

It's an IC designed by Maxim integrated products that converts signals from TIA-232 or RS-232 to signals compatible with TTL logic circuits which is a dual transmitter dual receiver, i.e. it can work on both sides. Works on 5V DC supply.

9. DC Motor

Which represents the ignition engine system of the automobile which is to be controlled using a wireless command over GSM

10.Immobilizer

This section adds up to an additional layer of security, is an advanced security passkey interface which only allows the vehicle to start on a correct passkey in case the passkey entered is incorrect it will inform the owner about the theft and also will turn on the buzzer to alert through sound and will lock the ignition system.

Figure: Developed structure top view

4. RESULTS

Whenever accident or theft of the vehicle is occurred then the device sends message to given registered mobile device informing about vehicle theft or accident. The owner can also track the location as well as remotely stop the engine of the car via a SMS . Following are the messages for theft and accident which comes automatically in case of theft or an accident as these are automatically detected by the sensors units which sends an interrupt to microcontroller which follows a routine and sends the SMS stating the response recorded.

Message for theft :
 "Vehicle theft alert Invalid access at car
www.google.co.in/maps?q=22.5895358,71.869248 "
 Message for accident :
 "Accident alert of car
www.google.co.in/maps?q=28.7963867,77.537687 "

5. CONCLUSION

In this paper we have represented secured low cost and easy to use vehicle theft intimation system which enables a vehicle owner to track monitor or lock the vehicle in case of theft also if the system used on a broad scale with one single head monitoring can provide an excellent fleet monitoring timely scheduling of consignment better route planning and delivery estimations. this system both in the consumer use and for the business purpose provide an improved safety and security to the vehicles. also, the accident detection feature aids in the arrival of rescues in minimal time which helps in saving lives of travellers .the additional layer of security of immobilizer section proves to be an advantage in theft prevention. these systems can also be used for data collection and other applications which helps in providing information about accident-prone zones or traffic congestion zones and many other.

6. FUTURE SCOPE

The system can be used for collecting data which helps in identifying accident prone zones as well as congestion zones. This system can also be used by commercial fleet operators and consignment or asset tracking in import and export of goods, can also be used in tracking of trains or buses by the travellers for better time scheduling, the system also serves advantageous to route monitoring purposes along with accident monitoring. Application of this project are mainly in the field of navigation, monitoring, remote operation, security systems and military operations in missile technologies etc.

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