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Vehicals Security Systems with Advanced Microcontroller and Tracking System

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ABSTRACT: In this paper we proposed a system which can improve the safety and security in vehicle. Automobile industry and automobile market is in a high speed development state for several years. Automobile's appearance impact and changes people's life, it's becoming the progressive symbol of modern society. However, as the sharp rise of the automobile quantity, vehicle thief case is increasing. Car theft has been a persisting problem around the world. Due to the insecure environment the ratio of vehicle theft increases rapidly. This study presents a new design for an anti-theft protection System as an inexpensive solution to protect cars from theft and from non-authorized users by using microcontroller-based system. An efficient automotive security system is anti-theft using an embedded system occupied with a Global Positioning System (GPS) and a Global System of Mobile (GSM). The client interacts through this system with vehicles and determines their current locations and status using Google Earth. The user can track the position of targeted vehicles on Google Earth. Using GPS locator, the target current location is determined and sent, along with various parameters received by vehicle's data port, via Short Message Service (SMS) through GSM networks to a GSM modem that is connected to PC or laptop. GSM positioning concept, this system has the potential to provide car location information to assist in stolen vehicle recovery therefore providing enhancement over the conventional car alarm system.

KEYWORDS: Vehicle tracker, Global positioning system (GPS), Global System for Mobile (GSM), Google earth, Microcontroller, Short Message Service (SMS).

I. INTRODUCTION

In present days crime rate is increasing day by day and car thefts are on the rise. The vehicle thefts involving mostly cars, which account nearly about a million cars, were reported in the United States of America alone in 2009. Stealing a car has become very simple for the criminals as owners do not bother to take necessary precautions.

Many car owners rely on a car alarm system to protect their vehicles from criminals. Most of the cars are still using the conventional alarm system which is easily handled by car thief. One major problem in those car alarms is tuning and adjustment. In recent days, even the most sophisticated car alarm systems are not enough to prevent auto theft. In addition, once the vehicle is stolen the alarm systems do not provide any means in assisting the recovery of stolen vehicle.

Vehicle focal locking framework guarantees the best ensure to secure your vehicle from various types of burglary cases. It is a vehicle security gadget that offers fantastic insurance to your vehicle. The basic need is to provide security & safety to the car. This will be accomplished with the help of fingerprint recognition module, alcohol detection sensors, fuel detection sensors, car accident detection. The main concept in this design is introducing the mobile communications into the embedded system. This will be accomplished with the help of Global System of Mobile wireless communication technology. We will use microprocessors based on ARM technology, which will greatly improve the overall performance of the system.

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II. EXISTING SYSTEM

Traditional car security systems rely on many sensors. Door sensor senses the locking and unlocking of the door. If any duplicate key is used, it sends the appropriate signal to the controller. But if the key is designed in similar to that of the original key, then the sensor fails to differentiate. Engine sensor senses the start and stop of the engine. Surveillance pad is carried by the owner to monitor the car which consists of RF receiver, processing unit, alarm and display. But, the surveillance pad should be carried by the owner wherever he goes.

The use of engine sensor and door sensor make the system more complicated which costs high. When one car is really lost, no more feedback could be valid to help people to find it back. Other existing technologies do not guarantee a 100% recovery rate. In the earlier systems alarms were used where if the intruder enters the car, the alarm produces sound but the car safety is not assured and also once the car is lost it cannot be assured that we can get back the car. The alarm made by the car remains unnoticed and this is major cause for the car theft.

III. SYSTEM OPERATION PROCESS

The figure 1 (a) and (b) represents the working of Vehicle Security system. Microcontroller and Gsm modem are the key necessities of the system. The microcontroller used in this schematic is AT mega 16 Microcontroller. The microcontroller controls the entire system. GSM modem is used for communication purpose. The microcontroller is connected to the ignition system of the car by using relay. Whenever the ignition system of the car starts the microcontroller detects it and gives the signal to the GSM modem to send the message to the owner of the vehicle. When the owner receives the message if he reply's with correct code word then only the vehicle ignition system will get turn on or off respectively. If owner replies with the code word for keeping the ignition system on then the ignition system will remain on and relay will now stop sending signal to microprocessor. If owner replies with the code word to turn off the ignition system the microcontroller will process the signal and turn off the ignition system of the vehicle will stop. In this system the GSM modem plays a vital role, it receives the message from the owner then processes it and then depending upon the code word send by the owner it gives the instruction to the microcontroller whether to keep the ignition system on or turn it off. For receiving and sending message from GSM modem it consists of Max232 IC. This IC is used for serial communication. It controls the communication between the system and the owner. As this system is based on wireless communication so it provides the highest level of safety than any other system.

MICROCONTROLLER AT MEGA 16: ATmega16 is an 8-bit high performance microcontroller with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz. ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively.

ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD. ATmega16 has various in-built peripherals like USART, ADC, ANALOG COMPARATOR, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals. The following table shows the pin description of ATmega16.

FINGERPRINT PROCESS: Fingerprint processing includes two parts: fingerprint enrolment and fingerprint matching (the matching can be 1:1 or 1: N). When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1: N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

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IV. GPS AND GSM TRACKING SYSTEM

GLOBAL POSITIONING SYSTEM: The Global Positioning System (GPS), is a navigation system which is space-based satellite that provides location and time information in all weather conditions, anywhere on or near the earth. The basis of the GPS is a constellation of satellites that are continuously orbiting the earth. These satellites, which are equipped with atomic clocks, transmit radio signals that contain their exact location, time, and other information. The radio signals from the satellites, which are monitored and corrected by control stations, are picked up by the GPS receiver. A Global Positioning System receiver needs only three satellites to plot a rough, 2D position, which will not be very accurate. Ideally, four or more satellites are needed to plot a 3D position, which is much more accurate.

GLOBAL SYSTEM FOR MOBILE: Global system for mobile communication is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz.

A GSM network is composed of several functional entities. The GSM network can be divided into three broad parts. Subscriber carries the Mobile Station. The Base Station Subsystem controls the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Center across the A interface

TRACKING SYSTEM: A hybrid GPS-GSM localization of vehicles Tracking System has been developed that portrays an incorporated GPS-GSM framework to track vehicles utilizing Google Earth application. The remote module has a GPS mounted on the moving vehicle to recognize its present position, and to be exchanged by GSM with different parameters procured by the car's information port as a SMS to a beneficiary station. The received GPS directions or coordinates are sifted utilizing a Kalman filter to upgrade the precision of measured position. After information processing, Google Earth application is utilized to view the current area and status of every vehicle. This objective of this framework is to oversee armada, police cars dissemination and auto burglar alarms.

An interfacing portable is additionally associated with the microcontroller, which is thus, joined with the engine. Once, the vehicle is being stolen, the data is being utilized by the vehicle manager for further handling. The data is passed onto the focal handling protection framework which is as the sms, the microcontroller unit peruses the sms and sends it to the Global Positioning System (GPS) module and utilizing the triangulation system, GPS module sustains the precise area as scope and longitude to the client's versatile.

V. APPLICATIONS AND ADVANTAGES

1. You can locate your stolen vehicles easily using your mobile without any extra cost.
2. It can be used for trucks carrying valuable goods, to keep track of the status of delivery and location of the truck at all times.
3. The device ensures vehicle security and smooth fleet management.
4. You can easily install it in any vehicles such as cars, boats and motorbikes. An SMS will inform you whether the vehicle is stationary or on the move.
5. You can also use it to keep tab on your driver. It reduces vehicles abuse and ultimately results in significant cost-savings for individuals, fleet owners and the like.

VI. EXPERIMENTATION RESULTS

Figures show the representations of system Operation Process and GPS and GSM Tracking System. Fig. 1 (a) shows the block diagram of the tracking unit microcontroller (b) shows the image of a Microcontroller AT MEGA 16 (c) shows the module of fingerprint detection. Fig 2 (a) shows the pictorial representation of the tracking system.

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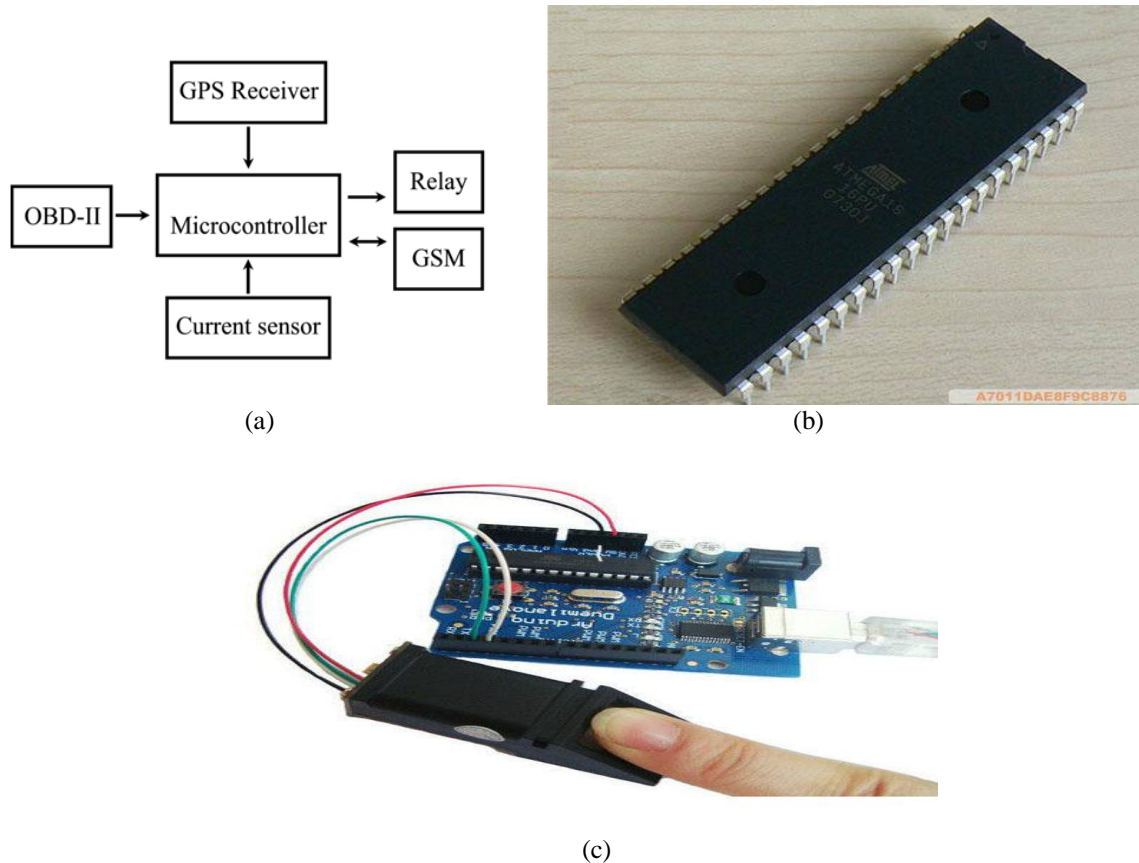


Fig. 1 System Operation Process (a) Block Diagram of Tracking Unit. (b) Microcontroller AT MEGA 16 (c) Fingerprint Module.

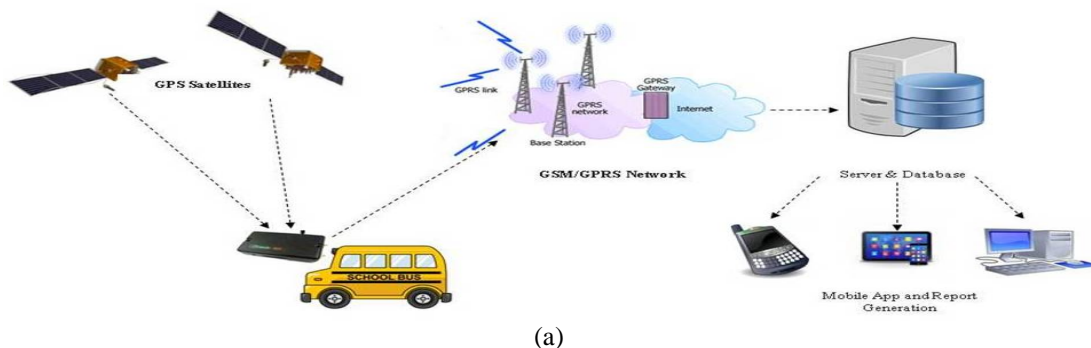


Fig. 2 GPS and GSM Tracking System (a) Pictorial representation of Tracking System.

VII. CONCLUSION

Vehicle security system is key requirement in large cities. Today vehicle thieving is increasing; with this system it can be controlled. The vehicle can be turned off, only with a simple SMS. This setup can be made more interactive by adding a display to show some basic information about the vehicle and also add emergency numbers which can be used

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in case of emergency. Tracking system is getting to be progressively vital in expansive urban areas and it is more secured than different frameworks.

The technologies of fingerprint recognition, the GSM / GPRS wireless transmission have good perspective in the auto safety domain's application. The advantage of the system is that the status of vehicle owner could be identified effectively which prevents the criminal from stealing. When the theft is identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors are locked. To open the doors or to restart the engine, an authorized person needs to enter the passwords. In this method, easily track the vehicle place and doors are locked.

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