Special Issue - 2016

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
COCODANTR - 2016 Conference Proceedings

A Certain Investigation on Smart Vehicle Theft Detection and Position Tracking System

B. Srinithi[1], E. Savitha[2], R. Sasikumar[3],

K. Sathyamoorthy[4],
Electronics and Communication Engineering
Nandha College of Technology

P. Vinoth Kumar,
Assistant Professor,
Electronics and Communication Engineering
Nandha College of Technology

***Abstract*:- The present condition of insecure environment causes increase in the ratio of vehicle theft, which creates a major responsibility towards manufacturers as well as owners of luxury automobile to inbuilt the antitheft system which prevent the car from theft. This system makes use of an embedded chip that has an vibration sensor, which senses the vibration change in the system. This is followed by the system present in the car asking the user to enter a unique password. The password consists of few texts or numbers. The system sends a text message to the owner's mobile stating that the car is being accessed. If the user fails to enter the correct password, a text message is sent to the owner about the unauthorized usage and simultaneously it will also block the vehicle ignition system. This system also consists of ultrasonic sensor to detect vehicle when there is lift in vehicle position. The position of the theft vehicle can be tracked by using GPS position system.**

INTRODUCTION

Now a day's everywhere in the world automobile theft is increasing day by day . The automobile manufacturers are attempting to improve the security features of their products by introducing advanced technologies to avoid the thefts particularly in the case of cars. Despite the various technologies that have been introduced in recent years to deter car thefts and tracking it, It was reported that as many as cars were stolen yearly in the world. According to National Crime Information Centre (NCIC), in 2006, 1,192,809 motor vehicles were reported stolen, the losses were 7.9$ billion.

Several security and tracking systems are designed to assist corporations with large number of vehicles and several usage purposes. A fleet management system can minimize the cost and effort of employees to finish road assignments within a minimal time. Besides, assignments can be scheduled in advanced based on current vehicles location. Therefore, central fleet management is essential to large enterprises to meet the varying requirements of customers and to improve the productivity. However, there are still some security gaps where these technologies don't prevent a vehicle from theft, don't assist to recover it and don't allow the users to know the status of their vehicles. They can't permit the owner to communicate with the vehicle online, even if the owner is certain that his vehicle was stolen. In wireless data transporting, is a common feature with all mobile network service providers. Utilization of WIFI technology has become popular because it is an inexpensive, convenient and accessible way of transferring and receiving data with high reliability.

This project can be used to control the thefting of vehicles, track the thefted vehicles and finding the location of vehicle and also implement the scene of accident alarm system. In this we are trying to program a GPS/GSM module incorporating an accelerometer to report occurrences of accident automatically via the GSM communication platform (using SMS messaging) to the nearest agencies such as hospitals, police stations, fire services and so on, giving the exact position of the point where the crash had occurred.

PROBLEM DEFINITION

Today vehicle security is one of the challenging issues in our society. Initially passive system were developed to support in tracking and navigation for location based application that requires real time location information of vehicle, these system cannot be employed, because they store the location information in the internal storage that can only be accessed when vehicle is available. The occurrence of accident due to over speed and drunk and drive can be increased drastically.

TRANSMITTER
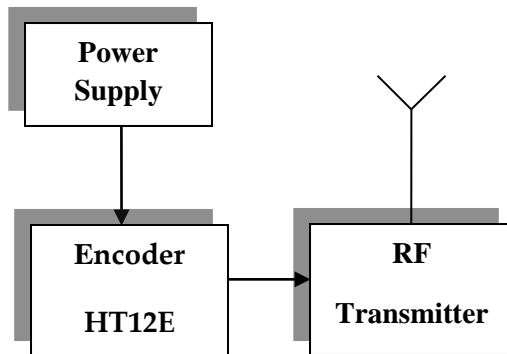
GSM Modem:

GSM (Global System for Mobile Communications, originally Groupe Spécial Mobile), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones.

The module is managed by a microcontroller and has a TTL serial interface that allows it to communicate with the device that uses the cell phone (our circuit's PIC) as well as to receive commands – standard AT commands, in the case of data phone connection. Aside from its own microphone, this module integrates a Flash and a SRAM, a UART, as well as interfaces needed for LCD display, audio, keyboard, and external SIM. The module is encapsulated in a package measuring just 1.14 inches x 1.14 inches x 0.14 inches, for SMD with 64 pins placed laterally, and reaching underneath the sides; it consumes $3,4 \div 4.5$ V but, when idle, absorbs only 1,1 mA.

Advantage:

- It can be used to operated device even from a long range
- GSM network is its high security infrastructure, which provides maximum reliability whereby other people cannot monitor the information sent or received.

MICROCONTROLLER

4.1.1 Introduction

Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip

- The CPU core
- Memory(both ROM and RAM)
- Some parallel digital i/o Microcontrollers will combine other devices such as:

- A timer module to allow the microcontroller to perform tasks for certain time periods.
- A serial I/O port to allow data to flow between the controller and other devices such as a PIC or another microcontroller.
- An ADC to allow the microcontroller to accept analogue input data for processing.
- Microcontrollers are:

- Smaller in size
- Consumes less power
- Inexpensive

4.1.2 PIC (16F877):

Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.The PIC start plus development system from microchip technology provides the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The picstart plus development system includes PIC start plus development programmer The PIC start plus programmer gives the product developer ability to program user software in to any of the supported microcontrollers.

4.1.3 Features of PIC:

- High-performance RISC CPU
- Only 35 single word instructions to learn
- All single cycle instructions except for program branches which are two cycle
- Operating speed:
- DC - 20 MHz clock input
- DC - 200 ns instruction cycle
- Power-on Reset (POR)
- Power-up Timer (PWRT) and Oscillator Start-up Timer (OST)
- Watchdog Timer (WDT) with its own on-chip RC Oscillator for reliable operation
- Programmable code-protection
- Selectable oscillator options
- In-Circuit Serial Programming (ICSP) via two pins
- Only single 5V source needed for programming capability
- Wide operating voltage range: 2.5V to 5.5V
- High Sink/Source Current: 25 mA
- Low-power consumption:

4. 2 Power Supply

This power supply block consists of a step- down transformer, a bridge rectifier, a capacitor and a voltage regulator. Single-phase Active Current power supply from the mains is step down to a lower voltage range which is again rectified to Direct Current by using a bridge rectifier. This rectified Direct Current is filtered and regulated to the whole circuit operating range with a capacitor and voltage regulator IC, respectively.

4.2.1 Power supply unit

All electronic circuits work only in low DC voltage, so there is a need for an appropriate voltage supply for their proper functioning. The power supply unit consists of a transformer, rectifier, filter and regulator.

AC voltage of typically 230v rms is connected to a transformer voltage down to the level to the desired ac voltage. A diode rectifier provides the full wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage

The resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit can use this dc input to provide dc voltage that not only has much less ripple voltage but also remains the same dc value even the dc voltage varies somewhat, or the load connected to the output dc voltage changes.
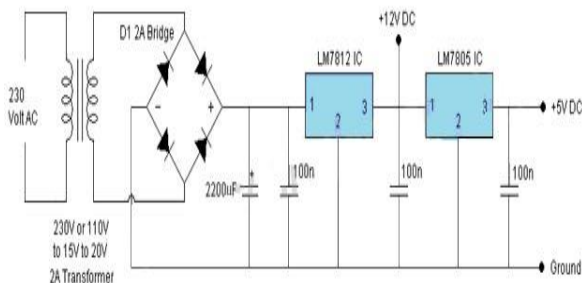

Fig 8 Power Supply Unit

4.2.2 Step Down Transformer

When AC is applied to the primary winding of the power transformer it can either be stepped down or up depending on the value of DC needed. In our circuit the transformer of 230v/0-12v is used to perform the step down operation where a 230V AC appears as 12V AC across the secondary winding. One alteration of input causes the top of the transformer to be positive and the bottom negative. The next alteration will temporarily cause the reverse. The current rating of the transformer used in our project is 1A. Apart from stepping down AC

voltages, it gives isolation between the power source and power supply circuitries.

4.2.3 Voltage Regulators

The voltage regulators play an important role in any power supply unit. The primary purpose of a regulator is to aid the rectifier and filter circuit in providing a constant DC voltage to the device. Power supplies without regulators have an inherent problem of changing DC voltage values due to variations in the load or due to fluctuations in the AC linear voltage. The output voltage from the capacitor is filtered and finally regulated. The voltage regulator is a device, which maintains the output voltage constant irrespective of the change in supply variations, load variations and temperature changes. In the power supply unit a fixed voltage regulator namely LM7805 is used. The IC LM7805 is a +5v regulator which is used for microcontroller.

Features and Description of Regulators

- Output Current up to 1A.
- Output Voltages of 12V.
- Thermal Overload Protection.
- Short Circuit Protection.
- Output Transistor Safe Operating Area Protection.

4.2.4 Filtering Unit

Filter circuits which are usually capacitors acting as a surge arrester always follow the rectifier unit. This capacitor is also called as a decoupling capacitor or a bypassing capacitor, is used not only to _short' the ripple with frequency of 120Hz to ground but also to leave the frequency of the DC to
appear at the output. A load resistor R1 is connected so that a reference to the ground is maintained. C1R1 is for bypassing ripples. C2R2 is used as a low pass filter, i.e. it passes only low frequency signals and bypasses high frequency signals. The load resistor should be 1% to 2.5% of the load.

1000f/25v: for the reduction of ripples from the pulsating.

10f/25v : for maintaining the stability of the voltage at the load side.

0,1f : for bypassing the high frequency disturbances

The output voltage of the rectifier is in rippled form, the ripples from the obtained DC voltage are removed using other circuits available. The circuit used for removing the ripples is called Filter circuit.

Circuit Diagram
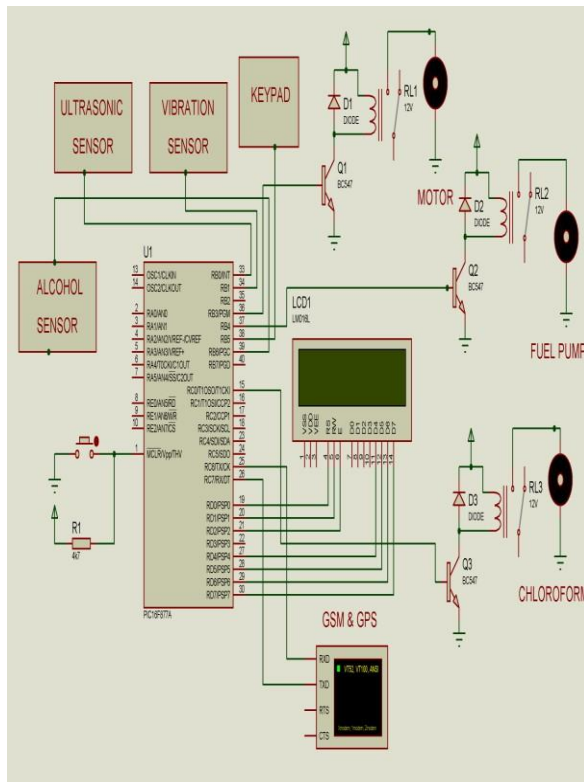
Circuit Description

In this proposed system the vibration sensor is used to detect any vibration change occurs to the system. Once if the user enters into the car they have to enter the password and if the password entered is wrong then the fuel ignition will be stopped and the engine will get stopped then the cholorform will get sprayed The GPS mounted in the vehicle will be helpful to track the current position of the theft vehicle. The ultrasonic sensor will be mounted underneath the car and once if the car has been lifted then the alert message will be given to the user through GSM Modem.

Ultrasonic sensor

Ultrasonic sensors (also known as **tranceivers** when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms, and non-destructive testing.

Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

The technology is limited by the shapes of surfaces and the density or consistency of the material. For example foam on the surface of a fluid in a tank could distort a reading.

Transducers

Sound field of a non focusing 4MHz ultrasonic transducer with a near field length of N=67mm in water. The plot shows the sound pressure at a logarithmic db-scale.

Sound pressure field of the same ultrasonic transducer (4MHz, N=67mm) with the transducer surface having a spherical curvature with the curvature radius R=30mm

An ultrasonic transducer is a device that converts energy into ultrasound, or sound waves above the normal range of human hearing. While technically a dog whistle is an ultrasonic transducer that converts mechanical energy in the form of air pressure into ultrasonic sound waves, the term is more apt to be used to refer to piezoelectric transducers that convert electrical energy into sound. Piezoelectric crystals have the property of changing size when a voltage is applied, thus applying an alternating current (AC) across them causes them to oscillate at very high frequencies, thus producing very high frequency sound waves.

The location at which a transducer focuses the sound, can be determined by the active transducer area and shape, the ultrasound frequency and the sound velocity of the propagation medium.

The example shows the sound fields of an unfocused and a focusing ultrasonic transducer in water.

Detectors

Since piezoelectric crystal generate a voltage when force is applied to them, the same crystal can be used as an ultrasonic detector. Some systems use separate transmitter and receiver components while others combine both in a single piezoelectric transceiver. Alternative methods for creating and detecting ultrasound include magnetostriction and capacitive actuation.

GPS MODEM

The **Global Positioning System** (**GPS**) is a U.S. space-based global navigation satellite system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth.

GPS is made up of three parts: between 24 and 32 satellites orbiting the Earth, four control and monitoring stations on Earth, and the GPS receivers owned by users. GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time.

SOFTWARE DESCRIPTION

5.1 EMBEDDEB C

5.1.1 Introduction

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware addressing.

Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, data type declaration, conditional statements (if, switch, case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

REFERENCE

[1] A. Saad and U. Weinmann, ―Automotive software engineering and concepts,‖ GI. Jahrestagung., vol. 34, pp. 318–319, 2003.

[2] E. Nickel, ―IBM automotive software foundry,‖ in Proc. Conf. Comput. Sci. Autom. Ind., Frankfurt, Germany, 2003.

[3] M.Wolf,A.Weimerskirch,andT.Wollinger,―Stateof theart:Embedding security in vehicles,‖ EURASIP J. Embedded Syst., vol. 2007, no. 5, p. 1, 2007.

[4] R. Charette, This Car Runs on Code. [Online]. Available: http://www. spectrum.ieee.org/feb09/7649

[5] T.Nolte,H.Hansson,andL.L.Bello,―Automotiveco mmunications-past, current and future,‖ in Proc. IEEE Int. Conf. Emerging Technol. Factory Autom., 2005, vol. 1, pp. 992–999.

[6] K. H. Johansson, M. Torngren, and L. Nielsen, ―Vehicle applications of controller area network,‖ in Handbook of Networked and Embedded Con- trolSystems. NewYork,NY,USA:Springer-Verlag,2005,pp.741–765.

[7] T. Hoppe and J. Dittman, ―Sniffing/replay attacks on CAN buses: A simulated attack on the electric window lift classified using an adapted CERT taxonomy,‖ in Proc. Conf. Embedded Syst. Security, 2007, pp. 1–6.

[8] T. Hoppe, S. Kiltz, and J. Dittmann, ―Security threats to automotive CAN networks—Practical examples and selected short-term countermeasures,‖ Rel. Eng. Syst. Safety, vol. 96, no. 1, pp. 11–25, Jan. 2011.

[9] K. Koscher et al., ―Experimental security analysis of a modern automo- bile,‖ in Proc. IEEE Security Privacy. Symp., Oakland, CA, USA, 2010, pp. 447–462.

[10] The EVITA project, 2008, Webpage. [Online]. Available: http:// evita-project.org