

Intelligent Car Safety System Using Dual Security

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Abstract: As human is progressing various technological changes are being adopted in societies resulting in rapid industrialization. People are moving towards cities leaving behind countryside resulting in higher population there by large number of vehicles and hence number of theft and accidents is increasing. This project revolves around five main parameters. This project helps in detection of accident of the vehicle using accelerometer. It tracks the location of the place where accident took place. Location parameters such as longitude and latitude are obtained using GPS and sent via SMS using GSM.. It also deals with alcohol detection using an alcohol sensor. If the sensor detects an alcohol inside the car, the engine gets locked and the access is denied. The safety of our vehicle is highly essential in public places. If anyone tries to access the vehicle without password then the message will be sent to the registered mobiles using GSM. An automatic break lock system is also included which uses an ultrasonic sensor. When the vehicle theft is detected, the message is sent to the user and the user has the undue advantage of sending the message stating 'Stop the car' to the microcontroller through GSM. The advantage of dual security is that the car cannot be accessed without the message from the user stating 'Start the car'. This system is very safe and efficient to report emergency situations and is of moderate cost.

Keywords: GPS(Global Positioning System), GSM(Global System for Mobile communication),Microcontroller, Motor driver IC, 7805 voltage regulator Ic.

I. Introduction

Although 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 the national crime information centre (NCIC), motor vehicles were stolen. Several security and tracking system were designed to assist corporations with large number of vehicles and several usage purposes. Day by day scenario in cities is changing very fast and leveraged to worsen. Various companies and multinationals across the globe are working towards decreasing the accidents level and providing the advance level security to the vehicle and finding a better solution for the same. The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems have brought this technology to the day-to-day life of the common person. Today GPS used in cars, ambulances, fleets and police vehicles are common sites on the road of developed countries. All the existing technology support tracking the vehicle's place and status. Taking in action all these things we are developing a model based on AVR Microcontroller ATmega16, Consisting of GSM, GPS, MEMS and Ultrasonic sensors for Automatic brake Lock System. This project serves –

- To detect if the driver is drunk.
- To implement Accident intimation system.
- To prevent car thefts using dual security.
- To prevent logo thefts.
- Automatic break lock system.

II. Block diagram

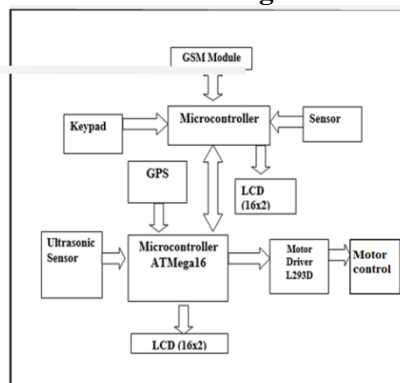


Fig 1:Block diagram of security system

III. Hardware components and design

a. Microcontroller.

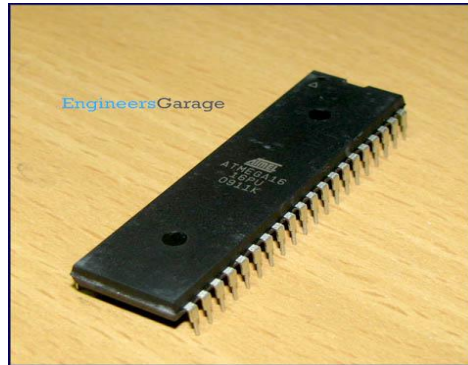


Fig 2:ATMega 16

ATmega16 is an 8-bit high performance microcontroller of Atmel’s Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about (RISC and CISC) 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 etc. Each I/O pin has an alternative task related to in-built peripherals.

b. 7805 Motor driver IC.

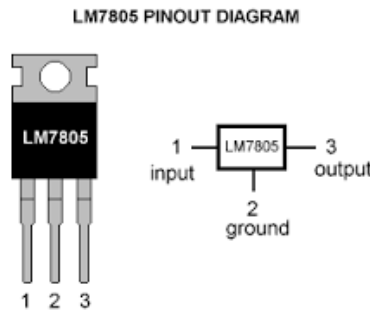


Fig 3: Regulator IC LM7805

IC 7805 is a 5V Voltage Regulator that restricts the voltage output to 5V and draws 5V regulated power supply. It comes with provision to add heatsink. The maximum value for input to the voltage regulator is 35V. If the voltage is near to 7.5V then it does not produce any heat and hence no need for heatsink. If the voltage input is more, then excess electricity is liberated as heat from 7805. It regulates a steady output of 5V if the input voltage is in range of 7.2V to 35V. Hence to avoid power loss try to maintain the input to 7.2V. Involuntary fluctuation is fatal, for such situation to ensure constant voltage IC 7805 voltage regulator is used.

c. GSM (Global system for mobile)

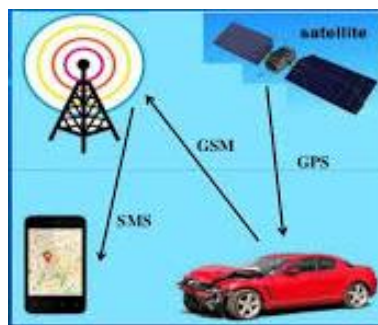


Fig 4: GSM Module

A GSM module 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. From the mobile operator perspective, a GSM modem looks 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.

d. Alcohol sensor



Fig5: Alcohol sensor

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC. Features:

- 5V DC or AC circuit
- Requires heater voltage
- Operation Temperature: -10 to 70 degrees C
- Heater consumption: less than 750mW

a. Ultrasonic sensor



Fig 6: Ultrasonic sensor

Ultrasonic ranging module HC - SR04 provides 2cm – 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of working is Using IO trigger for at least 10us high level signal, The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

$$\text{Test distance} = (\text{high level time} \times \text{velocity of sound}) / 2$$

(340M/S) / 2

b. Accelerometer

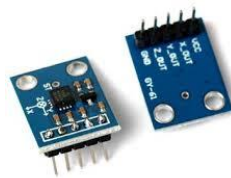


Fig 7: ADXL335

The ADXL335 is a small, thin, low power, complete 3-axis accel-erometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of $\pm 3g$. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and Cx capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis. The ADXL335 is available in a small, low profile, 4 mm \times 4 mm \times 1.45 mm, 16-lead, plastic lead frame chip scale package (LFCSP_LQ).

IV. Implementation

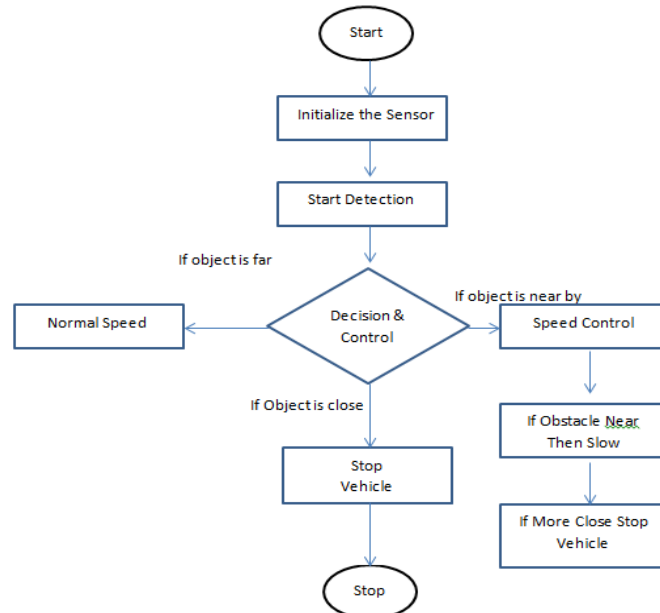


Fig 8: Flow chart

It is clear from the above block diagram that the ultrasonic sensor is used to detect the obstacle and send the signal to the microcontroller system for adjusting the speed, depending upon the distance. The Accelerometer is used to find the accident whereas sound sensor is used to detect the engine sound and keypad is used to enter the passkey before driving.

The GSM is used to send the alert signal as well receive the signal from the user for stopping the vehicle and also processing the GPS location of the vehicle to the user. The LCD is used to display the real time status of the vehicle.

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. During infancy years of microprocessor based system, programs were developed using assemblers and fused into the EPROMS. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check correct execution of the program. Some 'very fortunate' developer had in circuit stimulators (ICEs), but they were too costly and were not quite reliable as well.

PCB's are the backbone of any production level electronic device in today market, and therefore knowledge of PCB layout tools can be a vital skill. Both analog and digital circuits are used in PCBs depending on the application, and with different types of circuits, the designer must take into account certain design considerations. This guide will show you how to make a simple PCB layout with digital components, and the design considerations that come with it. More Advance circuits like RF circuits or Power circuits take more thought in the layout and design because the circuit is more sensitive to component placement and the lengths of the connections between them.

It is often believed that without target hardware it is difficult, if not impossible, to develop and test software for a microcontroller project. This is often not the case as many of the microcontroller manufacturers (or their partners) offer software simulators that exist for just this purpose. Not only does Atmel's free IDE (Integrated Development Environment), AVR Studio, provide the framework for compiling programs and downloading them to the microcontroller, but it also comes with the ability to simulate programs for most of their AVR microcontrollers.

V. Results

The suggested model consist three microcontroller for implementation as shown in the figure below.

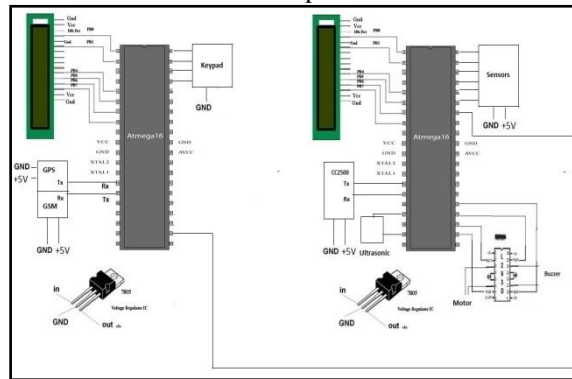


Fig 9:Microcontroller connections

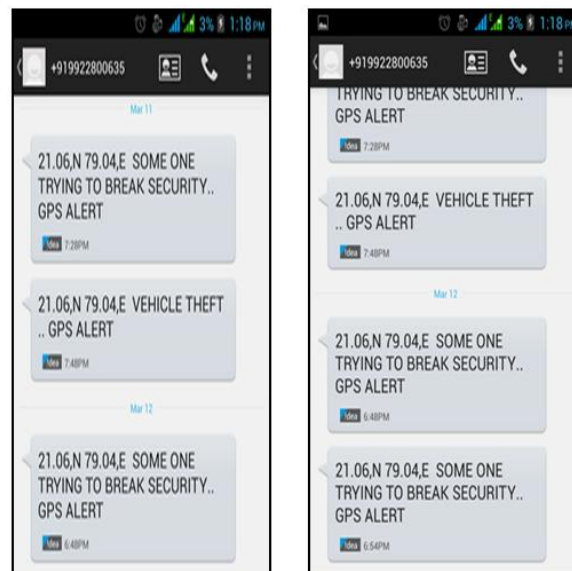


Fig 10:Messages display at two numbers (dual security)

Through GSM module the messages will be send to the owner and another one, suggested by owner as shown in the above figure.

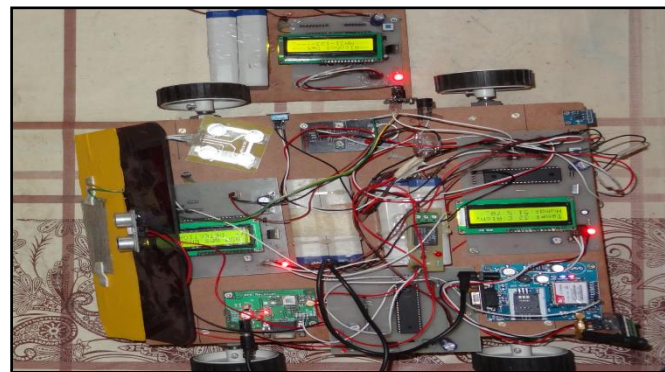


Fig 11:Implemented dual security model

The above figure give the total implemented security system which consist of GPS,GSM VANET. It will protect from logo theft, accidental case, location of vehicle and security also it will check alcohol detection sensor which is as methane sensor In case the logo get theft, it will sent a message to nearby vehicle through VANET as shown in figure below

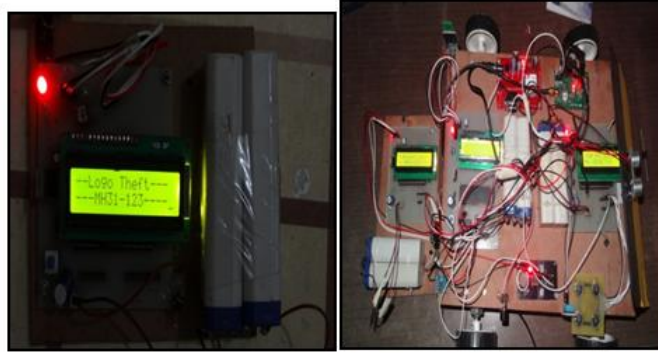


Fig 12: (a) Logo theft message, (b) light blinking with VANET

Thus our project “Intelligent Car Safety Using Dual Security System” will intimate the authorized person about the current status of the vehicle and it is being intruded by a third person or an accident using GSM and GPS based technology. The alert message to the mobile phone can easily reach the remote location . Thus the system provides better safety of the car.

VI. Conclusion

Thus our project “Intelligent Car Safety Using Dual Security System” will intimate the authorized person about the current status of the vehicle and it is being intruded by a third person or an accident using GSM and GPS based technology. The alert message to the mobile phone can easily reach the remote location. Thus the system provides better safety of the car.

VII. Future scope

We can also implement the Face Detection technique.The security system can be enhanced by providing the owner of the vehicle with the feature of starting and stopping the car with the help of sms.

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