

INTELLIGENT SECURITY AND MONITORING SYSTEM FOR VEHICLE

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Abstract - Transportation is a basic need of society. It's make human life more easy and comfortable. As far as increasing transportation, accident is also increasing. It cause death of human and damages any part of body. To prevent the particular action, We try to implement a system is Accident detection and messaging system using GPS and GSM. In this system, the vibration sensor is used as an input to the system and corresponding response is analyzing by the Arduino. If accident occurs, sensors reading exceed the threshold and it takes the appropriate action. The SMS is send to the authorities and provide the immediate help to the people who met in an accident. The proposed embedded approach provides the promising result.

Key Words: ATMEGA16A, RF receiver, RF Transmitter, GPS, GSM, Emergency Switch.

1. INTRODUCTION

Now a day automobile thefts are increasing at very high rate everywhere. To avoid this there is a need of security system in the vehicles. For designing of security system various techniques are available which are dependent on level of security. As level of security increases, the cost and complexity of system is also increases. Historically it is seen that there are so many wireless technologies used in vehicle security system design. The wireless communication technologies such as Bluetooth, ZigBee, RFID and GSM can be used to control security system from remote places. Out of these wireless technologies Bluetooth, ZigBee and RFID have communication distance limit, whereas vehicle security system using GSM has no distance limit. The proposed system "Intelligent Security and Monitoring System for Vehicle" is based on GSM (Global System for Mobile Communication) and GPS (Global Positioning System) technology which is used to protect vehicle from thieves, through entering a protected password and intimate the status and location of the same vehicle to the vehicle owner. Not only this system is used for theft prevention but, can be used to monitor and control vehicle from remote place. To design this system ARM7 LPC2148 along with Atmega8 microcontrollers are used. Due to this system vehicle remains in off state on every Sunday to minimise air pollution caused by fuel consumption. To provide day and time information, internal RTC of LPC2148 microcontroller is initialized. Except Sunday, system asks for correct password from user to start vehicle. When correct password is entered then vehicle ignition system control relay is turned on which starts the vehicle. When vehicle is started

immediately a text message is sent to the vehicle owner regarding start of vehicle. If entered password is wrong, vehicle remains in off state and immediately buzzer is on. There are two ways by which vehicle is can be locked, the first one is by sending SMS manually and second one is automatically in case of overload within the vehicle. If any unsecure condition arises then vehicle can be locked completely, by sending "voff" SMS from remote place. Once vehicle is locked the only way to unlock it is, send a SMS "von".

2. METHODOLOGY

The block diagram and circuit diagram for that project is as follow:

2.1 BLOCK-DIAGRAM

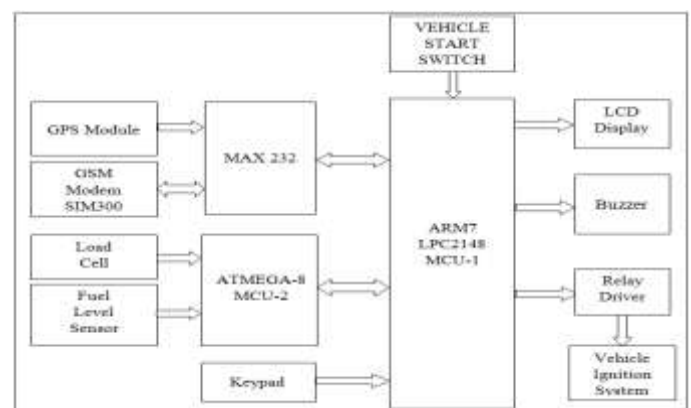


Fig.1: Block diagram of Main Vehicle Security Unit.

The whole system is divided into two units, a main vehicle security unit and a recipient unit. The main vehicle security unit needs to be installed in safe area of vehicle so that no one can find it easily. The owner of the vehicle carries second unit i.e. recipient unit. Cell phone is used as recipient unit. Here LPC2148 is responsible for the controlling the whole system. It combines microcontroller with embedded high speed flash memory of 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32 bit code execution at the maximum clock rate. One another microcontroller Atmega8 is used to provide additional serial port. It is because; LPC2148 has only two serial communication ports, out of two one is used for GSM modem and another for GPS module. The additional serial port is

required to interface Load Cell. In this system rhydolabz GPS module is used. It is a high gain GPS Receiver made with ultra small high gain third generation POT (Patch Antenna on Top). This is a standalone GPS module and requires no external components. A GSM 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. 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. A Load Cell is a transducer that is used to convert a force into electrical signal. The most common use of this sensor is in weighing machine. Every weighing machine which shows weight has a Load Cell as sensing element. This conversion is indirect and happens in two stages. Through a mechanical arrangement, the force being sensed deforms a strain gauge. The strain gauge measures the deformation (strain) as an electrical signal, because the strain changes the effective electrical resistance of the wire. The purpose of a Float Switch is to open or close a circuit as the level of a fuel rises or falls. The float switch used in proposed system is "normally opened," meaning the two wires coming from the top of the switch opens a circuit when the float is at its bottom clip. 16x2 LCD module is a very common type of LCD module that is used in many embedded projects to display the messages. It consists of 16 rows and 2 columns of 5x7 or 5x8 LCD dot matrices. This system is designed to work on +12 V of DC power supply provided by external adaptor or DC battery. For proper functioning of this system, different modules need different working voltages which are archived by using different regulator ICs. Here GSM module and relay requires +12 V which is directly taken through adaptor. This board is highly integrated in the sense it contains instrumentation amplifier, analog to digital convertor and digitizer which outputs serial data of 9600 baud rate for direct reading in kilograms. The output can be used to connect to microcontroller for further display and processing or can be fed to PC serial port to view on terminal.

2.2 CIRCUIT DIAGRAM

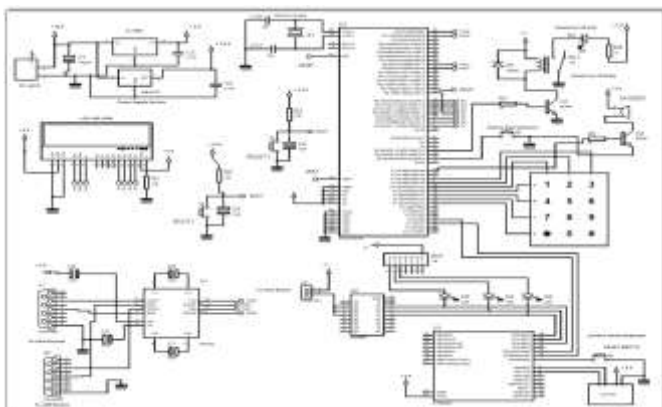


Fig. 2 Circuit diagram of Main Vehicle Security Unit

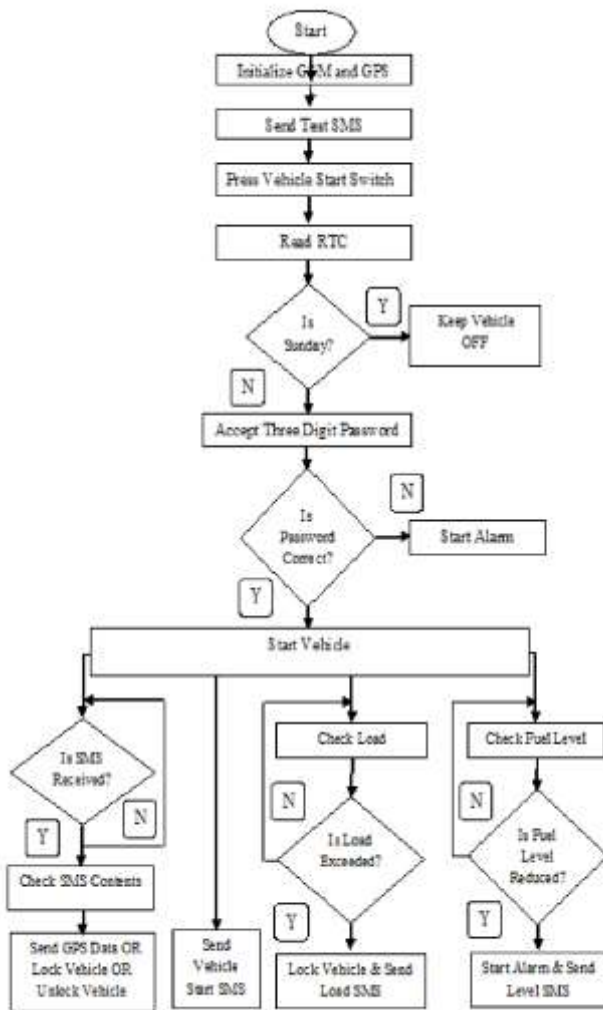
Above diagram shows the circuit implementation and interfacing of all the devices with the microcontroller in transmitter as well as receiver unit of the system. Here GPS and GSM modules are interfaced to LPC2148 through UART0 and UART1 respectively. LPC2148 is the 64 pin IC in which pin no 19 and 21 are used for GPS. As pin no 19 is P0.0/TXD0/PWM1 means, P0.0 (General Purpose digital input/output pin), TXD0 (Transmitter output for UART0) and PWM1 (pulse width modulator output 1) which is connected to pin no 11 (T1IN) of MAX232. Pin no 21 is P0.1/RxD0 which is connected to pin no 9 (R2OUT) of MAX232. Pin no 33 and 34 are used for GSM in which pin no 33 is P0.8/TxD1 (P0.8 General purpose digital input/output pin, TXD1 Transmitter output for UART1) connected to pin no 12 (R1OUT) of MAX232 whereas pin no 34 is P0.9/RxD1/PWM6/EINT3 which is connected to pin no 10 (T2IN) of MAX232.

There are only two UART available in LPC2148 which is UART0 and UART1. All the information can be shown with the help of LCD display which is connected to pin no 45, 46, 47, 53, 55, 1 and 2. Pin no 46 is P0.16, Pin no 47 is P0.17, Pin no 53 is P0.18, Pin no 54 is P0.19, 55 is P0.20, Pin no 1 is P0.21, Pin no 2 is P0.20. Relay driver transistor is connected to pin no 13 which is, P0.28 which is General Purpose digital input/output pin.

Reset pin no 57 is external reset input, a LOW on this pin resets the device, causing I/O ports and peripherals to take on their default states, and processor execution to begin at address 0. VSS pins 6, 18, 25, 42, 50 are connected to ground (0 V reference) and VSSA 59 is Analog Ground which is connected to 0 V reference. This should nominally be the same voltage as VSS, but should be isolated to minimize noise and error. VDD 23, 43, 51, 63, 7 is 3.3 V Power Supply: This is the power supply voltage for the core and I/O ports VDDA 7 analog 3.3 V Power Supply. This should be nominally the same voltage as VDD but should be isolated to minimize noise and error. RTC Power Supply: 3.3 V on this pin supplies the power to the RTC.

Keypad is connected to pin no 4, 8, 48, 44, 40, 36 and 32 to enter password. Pin no 4 is P1.19 which is General Purpose digital input/output pin. It is standard I/O port with internal pull-up. Vehicle start switch is connected through pin no 15 P0.30 Pin no 60 is connected to pin no 27 of Atmega-8 for sensing the weight through Load Cell. Pin no 56 is connected to pin no 26 of Atmega-8 to sense the fuel level through Float Switch.

2.3 FLOW CHART



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