

LIFE SAVING TRANSPORT SYSTEM

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Abstract - The paper is aimed at "Accident Prevention" using Microcontroller. It is basically a system that uses various sensors in order to prevent accidents. Looking at the present scenario there are not many systems available that guarantee the safety of the driver. The current system focuses on solutions after the accident has occurred and not before. To facilitate a feasible solution to this requirement, we have implemented a system which minimizes the chances of accidents. To enable this, various sensors are attached which detects the major causes of accidents.

Key Words: GSM (Global System for Mobile Communications); GPS (Global positioning system for location access); Gas Sensor MQ-3; Load cell; Humidity sensor; Ultrasonic sensor; LCD (Liquid Crystal Display); Bilateral Switch.

1. INTRODUCTION

Accidents are considered to be a natural disaster striking an individual's life which may lead them to the death path. Even though there are laws made by the Constitution about driving there are still many accidents in our country, not only in our country but all around the world also where there are different land terrains. For example ghats, slopes etc. At such places any unpredicted event may occur like an accident which is fatal no matter whatever the reason is, India is densely populated and thus transportation takes place all through the country. As we know about the land conditions in India it has many different terrains which makes it more difficult to understand for the driver. As said earlier due to population traffic in the country is also more. All these factors and situations are responsible for road accidents in India. Most of the accidents are of trucks and buses which have more capacity to accommodate people and hence more casualties after accidents. All the scenarios mentioned results only one thing 'Death'.

Thinking about this major problem we tried to build a system which itself tries to follow the rules and reduce accidents. This system tries to cope up with these problems. The system is designed to prevent from all the possible situations which may arise while driving. The systems have been configured to make driving safe and save lives. It has a system which gives precautionary warnings before accidents

and also prevents it. It also has a system which is made to save the drivers life after accidents.

1.1 Problems with the old system

- Manual wiper adjustment.
- No indication for overweight vehicles.
- No indication for drunken driving.
- No indication for over speeding
- No indication for overtaking vehicles.
- Response time after accidents is slow, which may lead to death of the driver and passengers.

1.2 Solutions in the new system

- It reduces the response time after accident.
- It indicates for drunken driver, overweight, over speed and overtaking vehicles.
- It is cost effective and rugged.
- All vehicle features are fully automatic.
- Reduces probability of human error.
- It can be implemented easily in the current vehicles without any modifications.

2. BLOCK DIAGRAM

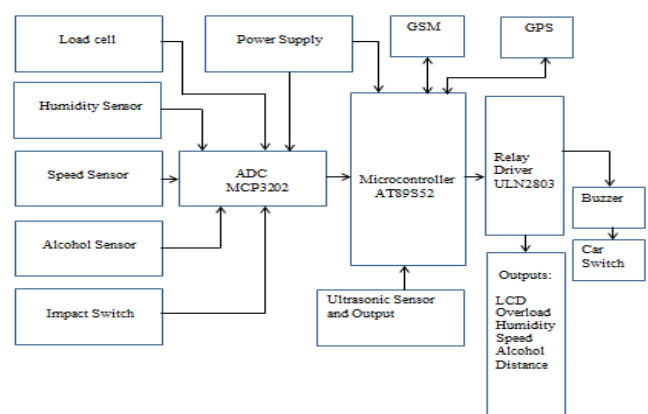


Fig -1: Block diagram of the proposed system

3. DESIGN PARAMETERS

3.1 Microcontroller-AT89S52

The 8952 microcontroller is upgraded version of 8051 family of microcontrollers. The 8051 microcontroller was introduced by Intel Corporation in the year 1981. It is an 8-bit microcontroller with Harvard Architecture manufactured by advanced CMOS processes. It has 128 bytes of on chip RAM, 4k bytes of on chip ROM, two 16-bit timers/counters, four 8-bit ports of which one is a serial port, etc. There are 6 interrupt sources also.

Since this is an 8-bit micro controller, the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken down to 8 bit pieces. Though it has an addressing capability of 64 Kbytes, only 4k bytes have been provided on chip.

3.2 GSM Module SIM300

For sending message a GSM Module named SIMCOM_300 is used. GSM Module SIM300 with sim-card holder, RS232 interface, power supply, buzzer and audio interface. We can connect this to PC using a USB to Serial Adaptor and use terminal programs such as Real term to send & receive data. We can also interface GSM Module with microcontroller directly through wires.

GSM Module works with AT COMMANDS. AT commands are used to control MODEMs. AT is the abbreviation for Attention.

3.3 Humidity sensor

The humidity sensor used in our project is sy-hs-220 which is the most commonly used humidity sensor. It is a basic hygrometer which senses humidity. This sensor module converts relative humidity into voltage form and provides it to the microcontroller for the after process

3.4 Load Cell

The single point load cells eliminate the need for flexures and levers thus greatly simplifying scale design and reducing cost. The single point load cell is suitable for use in a wide range of packaging machinery, low capacity scales, checks weights and general process weighing and of course standard weighing platforms. Full sealing ensures this product can be used in a variety of industrial applications. Load cell is a device that converts force into electrical signal. A strain gauge based load cell is made of a specially engineered mechanical component called as an element. Four strain gauges are positioned precisely and bonded on to the element using a special adhesive.

3.5 LCD Interface

The HD44780 dot-matrix liquid crystal display controller and driver LSI displays alphanumeric characters and

symbols. It can be configured to drive a dot-matrix liquid crystal display when interfaced with a processor.

A single HD44780 can display up to two 16 character lines. The HD44780 supports 8 dot character fonts and 32 5 ´ 10 dot character fonts for a total of 240 different character fonts.

3.6 Ultrasonic sensor

Ultrasonic Distance Sensor is a popular and low cost solution for non-contact distance measurement function. It is able to measure distances from 2cm to 400cm with an accuracy of about 3mm. This module includes ultrasonic transmitter, ultrasonic receiver and its control circuit

3.7 GPS Modem

A GPS module is a device that uses Global Positioning System to determine the location of a vehicle or person. GPS receivers are used to provide reliable navigation, positioning and timing services to the users at anytime and anywhere on the earth. This Global positioning system uses 24 to 32 satellites to provide the data to the receivers. GPS has become very important for worldwide navigation and it is useful for land surveying, way marking, map-making, tracking and surveillance commerce and scientific uses.

3.8 Bilateral switch

The 4066 contains 4 analogue bilateral switches, each with an active-high enable input (A) and two input/outputs (X and Y). When the enable input is set high, the X and Y terminals are connected by low impedance; this is the on condition. When the enable is low, there is a high impedance path between X and Y, and the switch is off.

3.9 Power Supply

Power supply for the complete unit can be derived from the mains using a step-down transformer of 230V AC primary to 0-12V, 500mA secondary. A full-wave rectifier followed by a capacitor filter is the output voltage and feeds it to the 5-volt regulator (LM7805) whose output is used to the power supply requirements of microcontroller circuit, other IC's.

4. WORKING

The supply Section of this circuit consists of a 12 volts transformer connected to a connector, and a power supply circuit using 7805 IC. The output of the regulator(IC 7805) is +5 volts, which is used for all other digital applications. The display section based on LCD uses the Port 2 of microcontroller. This port is in open drain configuration and as a result, pull up resistors should be provided for its

normal operation. The contrast of this LCD display is adjusted by changing the value of a resistor which is grounded at the other end.

Relay board is connected to Port 0 of the microcontroller. Relay board consists of ULN203 as current driver. ADC used is MCP3202 from Microchip. Analog Mux CD4051 is used for connecting five analog inputs viz. load cell, humidity, alcohol, speed and impact sensors.

Load cell signal conditioning is done using LT1014 which is single supply op-amp with very high precision. 1st stage is differential amplifier. Second stage is amplifier of required gain. Load cell output is 10mV for 6Kgs. Required output is 4.096V. $4096\text{mV}/10\text{mV}=410$, therefore total gain of 410 is adjusted in second stage.

Humidity, impact, speed and Alcohol sensors give output directly in range of 0 - 5000mV. So no signal conditioning is required. Calibration of these sensors is done by software in microcontroller.

Ultrasonic Sensor SR-04 is used to check distance. A pulse of 10ms is used to trigger start. When Echo (pulse) is received counter is started in dedicated AT89c2051 microcontroller. When pulse stops counter is stopped. Count value is compared with two counts for two distances that are set in microcontroller. If value is less than this value two outputs are made high or low. These outputs are detected by main microcontroller and buzzer output is made high or low.

Since we have two serial outputs these outputs are switched using CD4066 circuits. This circuit is controlled using control signals of CD4066 and MAX232C. GSM and GPS are connected. GSM is controlled using AT Commands. GPS data received is checked for required command.

5. CONCLUSION

The "LIFE SAVING TRANSPORT SYSTEM" was implemented satisfactorily. More knowledge and more experiences were gained and ultimately, it can be concluded with a great pleasure that the primary aim was achieved.

6. ADVANTAGES

1) Remote indication: With the use of GSM technology, the emergency contacts and the nearest hospital can be informed about the accident occurred.

2) This system is fully automated. So once this system is installed inside the vehicle, then it does not require any human interaction to operate. With the use of this system we can save the life of person inside the vehicle

3) It also detects alcohol so it is used as liquor tester which gives a provision for detection of alcohol content in the material.

4) In the long run the maintenance cost is very less when compared to the present systems. The life span of the sensor

is long and the probability of the circuit being damaged often is very less. Thus, the maintenance cost reduces substantially.

5) The system is highly reliable, tamper-proof and secure. The system being small in size it is possible to mount it inside a secure shield which makes it durable and secure.

7. FUTURE SCOPE

Though the main objective of this work is to prevent accidents in transport vehicles, we have made provisions to add these sensors in all transporting mediums and have done the programming accordingly. Using the respective sensors, we can then implement the same, if needed. The reason for making such a provision is that it could be beneficial in different industry applications.

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