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SMS Based Automatic Vehicle Accident Information System

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Abstract: **In highly populated Countries like India, during accidents, people lose their lives due to unavailability of proper medical facilities at the right time. This project senses any accident in the vehicle and intimates pre-programmed numbers like the owner of the vehicle, ambulance, police etc.Whenever any accident takes place, the vehicle will experience a huge amount of impulse, this impulse is then been measured with the help of the force sensor which is connected to the vehicle. The impulse that is measured is then converted to electrical voltage unit which helps the microcontroller as it is interfaced with GSM .This change in digital signal will activate the GSM module installed in the vehicle and it will automatically send the saved SMS to the required numbers so that the proper medical aid can be provided to the person.**

Keywords: **AT commands, Force sensor, GSM module, L293D IC, LM358 IC**

I. INTRODUCTION

There is a drastic increase in the number of vehicles in these days which also cause a steep rise in the number of accidents with a lot of people losing their lives. According to the World Health Organization, an estimated 1.2 million people lose their lives every year due to car accidents. India's road accident records 16 % of the world's road accident deaths, whereas India has only 1 % of the world's road vehicles.

Many times proper medical facilities are not provided due to lack of communication and so lead to severe injuries. Our system help common people as a safety measure in harsh condition scope. This project is mainly used to provide help to the owner or victim of the accident of the Vehicle. In case of any accident, the system sends automated messages to the pre-programmed numbers. We can send messages to maximum of three mobiles including the owner of the vehicle, Police to clear the traffic and Ambulance. GSM is used to send the SMS of the accident. We can also send the vehicle registration number through the SMS by which we can track the position of that vehicle using special number plates being issued by the Regional transport office.

As per the design schedule the SMS will be sent to the registered number by the user when the accident takes place. This design has many scopes in future because as the population is increasing the numbers of vehicles are also increasing as well the number of accident and death due to it. In order to control the number of accident victims' deaths the system is useful, as the accident occurs the proper medical aid can be provided in time.

II. CIRCUIT ANALYSIS

a) Power Supply Circuit: In this block, transformers are used to convert domestic AC voltage to 9V AC. Then using diode rectifiers it is converted into suitable DC supply and given as input to the microprocessor and all other circuits in the equipment. Power Supply is the device that transfers electric power from a source to a load using electronic circuits.

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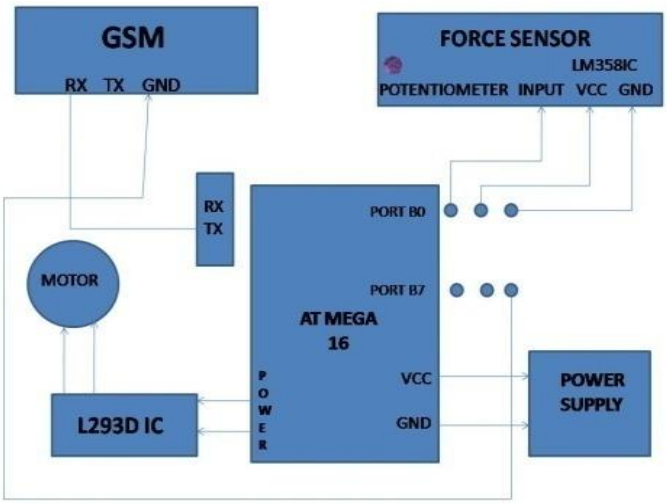

Fig. 2.1 Circuit Block Diagram

b) Regulator: Voltage regulators ICs are available with fixed or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection').

c) Microcontroller: Microcontroller used here is at mega 16 developed by Atmel. The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. At mega 16 provides us with two-wire interface, A/D Converter, SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning.

d) GSM Modem: 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. A wireless modem behaves like a dial-up modem. SIM 900 can communicate with controllers via AT commands (GSM 07.07 ,07.05 and SIMCOM enhanced AT Commands). This module supports software power on and reset.

e) AT commands: GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards. With the extended AT commands, we can do things like:

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries.
- SIM Phonebook management
- Fixed Dialling Number (FDN)
- Real time clock

f) Force sensor: A force-sensing resistor is a material whose resistance changes when a force or pressure is applied. They are also known as "force-sensitive resistor". Force-sensing resistors consist of a conductive polymer, which changes resistance in a predictable manner following application of force to its surface. The sensing film consists of both electrically conducting and non-conducting particles suspended in matrix.

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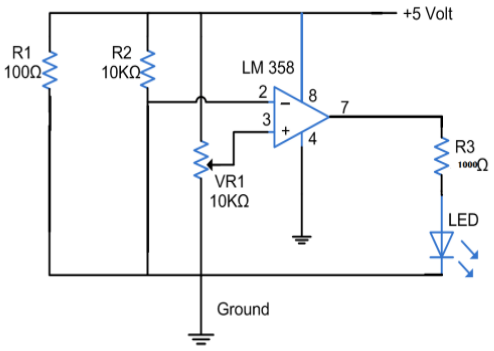

Fig. 2.2 Circuit diagram of Force Sensor

g) LM358: These amplifiers have several distinct advantages over standard operational amplifier types in single supply applications. They can operate at supply voltages as low as 3.0 V or as high as 32 V, with quiescent currents about one-fifth of those associated with the MC1741. Features of LM358 IC are as follows:

- Short Circuit Protected Outputs
- True Differential Input Stage
- Single Supply Operation: 3.0 V to 32 V
- Low Input Bias Currents
- Internally Compensated
- Common Mode Range Extends to Negative Supply
- Single and Split Supply Operation
- ESD Clamps on the Inputs Increase Ruggedness of the Device without Affecting Operation
- Pb-Free Packages are Available

III. PARAMETERS TESTED

For this test we considered various parameters according to the requirement. Parameters tested are explained below.

Voltage: Force sensor circuit is designed on the basic principal of change in resistance with force applied. The output voltage varies inversely with resistance.

$V_{out} = V_1R_2 / (R_1+R_2)$

where, V_1= input voltage

R_1= variable resistance

R_2= Fixed resistance

Initially, the resistance of force sensor is very high. As the vehicle collides with the object, the sensor senses the force and in return changes the resistance (R_1) to a very low value. Hence, the V_{out} voltage increases which stops the vehicle and message is received in mobile phone.

Range: Ultra thin force sensor has the actuation force as low as 0.1N and sensitivity range to 20N. It can robust upto 10 million actuations.

IV. PROCEDURE

Model consists of a mechanical structure, driven using two motors, L293D IC used to run the motor, force sensor circuit, at mega 16 microcontroller, a GSM module and a power supply circuit of 12V to run the motor and 5V power supply for GSM module.

The microcontroller circuit board is assembled in the vehicle itself .The interfacing of GSM is done with at mega 16 microcontroller. Two contact pins are used i.e. ground (GND) to ground (GND) connection between GSM and At mega 16. The TX(transmitter) pin of At mega 16 is connected to RX(receiver) pin of GSM which receives the signal.

Force sensor circuit is designed using LM358 IC and a potentiometer to alter the sensitivity of resultant signal.

When the accident occurs the force sensor receives an impact which decreases the resistance of force sensor which changes inversely with voltage. Signal sent by force sensor is detected by PORT B of at mega 16 control board. The signal is now transmitted to GSM module connected through RX and TX pins and the message is sent to the desired numbers

The programming of microcontroller is done using AVR studio 4.0. AT commands are used to send and receive messages. Message to be sent is already programmed. Program is burned in the microcontroller through a burner using suitable software.

As the vehicle will go through the accident the force sensor will activate and the motors will shut and simultaneously the message will be send to the desired numbers.

V. FUTURE SCOPE AND APPLICATION

In this project we can even implement a GPS system for locating the vehicle with proper direction value.

By doing certain modifications and using few more devices, this project can even be used for detecting the position and location of any lost/stolen vehicle.

Most of the companies want to keep track of their vehicles, with this equipment we can keep track of the vehicle by periodically sending SMS and the position of the vehicle is sent by the GSM modem as a SMS to the user.

As there is a scope for improvement and as a future implementation we can add a wireless webcam for capturing the images of the vehicle for driver's assistance, significantly less time and sends the basic information to first aid, together with the transmission of SMS.

VI. RESULTS AND DISCUSSIONS

This version of our project will send a SMS when the vehicle meets with an accident .It doesn't tell the exact nature of the accident, whether it is severe or just a mild one. With the help of accelerometer sensor, we can tell the exact position of the vehicle. We can predict whether the vehicle is in normal position or upside down. This project can be enhanced in future by modifying in the program to find out the actual position of the vehicle and also in accident prevention. This can also be enhanced by automatically locking all the brakes in case of accident. In many accidents, it becomes severe as the drivers lose control and can't stop the vehicle. During the accident, the accelerometer sensor will triggered due to vibrations which is received and processed by the At mega 16 microcontroller. The microcontroller should be connected to devices which can lock the brakes when triggered. By this enhancement, we can stop the vehicle and can reduce the impact of the accident. This can be used to prevent vehicle theft. In case of any theft, the owner can track the location of the vehicle.

In public transport system, the implementation of this equipment will ease the people. When public transport systems like bus, trains these are installed with this equipment, People can know the location of the vehicle and arrive in the stop in time. Modifying the code, we can make it to send the position of the vehicle periodically to a subscribed mobile number so that companies can keep an eye on their vehicles.

Thus we can make use of the available technology to the benefit of the people by saving the lives of the people and helping the owners of the vehicle to keep track of their vehicles.

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