

# Low Cost AirBag Deployment and Accident Alert System for Budget Vehicles

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**Abstract:** In the today's world, road accidents are leading problem. Number of probability of death increases after an accident due to there is no any notification system available to show actual position of accident. And lack of communication between relatives and injured person after accident. There is increase of rate of survival after accident only when medical services reaches to the place of accident immediately after an accident occurs. It is achieved by making an automatic indicator which automatically detects traffic accidents.

In this paper such system is designed which automatically detects accident and call a family member of injured person, send coordinates of actual position of accident spot. All this job done by ARM7 controller.

**Keywords**—ARM, Shock Sensor, GPS transmitter, GPS receiver, GSM, Buzzer Airbag deployment system, LPC2129, CAN bus.

## I. INTRODUCTION

When a car crashes suddenly need to provide some help for the injured persons. Today's, wireless innovation has more succeed like never before. In today's high cost vehicles some survival technologies available for the survival from an accident includes the Air bag deployment system which protects person from accident. In some vehicles also there is accident alert system is available which produces an alert message to patrolling department. But these facilities are only available to the luxurious vehicles like BMW & MERCEDES BENZ.

In this paper includes the details about accident of automobile emergency alert situation for the economically low cost or old vehicle. In this paper an Air bag deployment system is provided with GPS and GSM module incorporating a shock sensor to report occurrences of accident automatically via the GSM communication platform (using SMS messaging or recorded voice call) to the owner of car or its relatives. GPS module gave the exact position of the spot where the crash had occurred. These type of technologies require number of components are as follows ARM LPC2129 controller, shock sensor, temperature sensor, GPS transceiver module(MR87), GSM module(SIM900), buzzer, Airbag deployment system etc. These technology provides a fast rescue of accident victim [3].

## II. DETAILED DESCRIPTION OF SYSTEM

The shock sensor used to detect the vibrations during accident. It is the main sensor which will detect accident and send signal to the ARM LPC2129 using GPIO port. In this work two ARM processors are used. 1<sup>st</sup> ARM is interfaced with Car's Engine Control unit and it uses CAN protocol for communication between two ARM cores. 2<sup>nd</sup> ARM used to receive signal from ARM1 and deployed the Air Bag.

1<sup>st</sup> ARM i.e. Node-I is situated in car's bonnet or near to the Engine Control Unit, two sensors interfaced with Node-I (Shock Sensor 801S and Temperature Sensor LM35). 2<sup>nd</sup> ARM is connected with Air bag release system, GPS Module MR-87,

GSM Module SIM-900, and LCD Module. All circuitry of Node-II is situated inside the dash board of car [1].

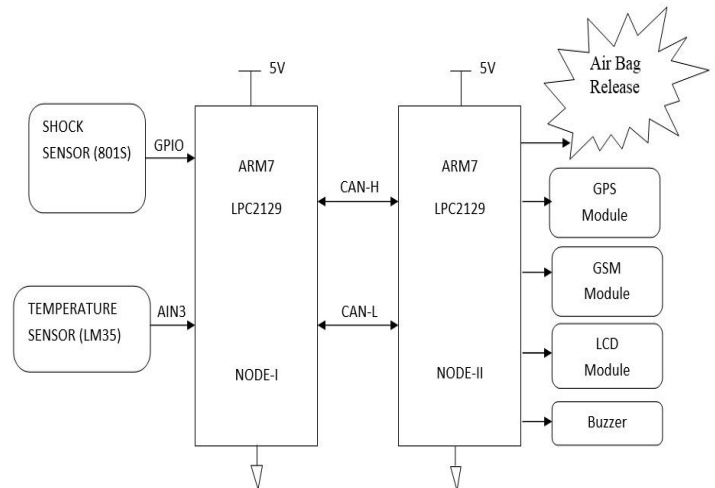


Figure 1. Block Diagram of whole system.

Whenever accident happens shock sensor will sense shock waves or vibrations and produce electrical response to Node-I through GPIO port. On-chip ADC convert signal in the digital form and provide to ARM core it will transmit information to Node-II using MCP2551 CAN Controller which is high speed, fault tolerant. As the signal received from Node-I, Node-II activate Air Bag Release System. Simultaneously GSM module activated and produce a calls to the relatives. And GPS module sends the co-ordinates of position to Police Patrolling department automatically. After an accident sometimes temperature of main engine increases and it is possible to catch fire. If temperature exceeds its required level temperature sensor LM35 produce such electrical signal and this information shows the warning on LCD screen. Buzzer is situated at Node -II will be activated simultaneously with Air Bag Release system. And active still user cannot press reset button to disable it.

This system is mainly based on the CAN bus. It will used as the transmitting media between two ARM core. UART ports are used for the connection between ARM core and GPS / GSM module. Whole system is worked on the +5V to +12V supply voltage which is available from the battery supply of car.

## III. MATERIAL REQUIREMENTS AND METHODOLOGY

Requirement of system development or the material requirement is as follows,

The advantage of LPC2129 used here is, having inbuilt CAN controller. There is no need to use separate CAN controller for CAN bus interface. [6]. Shock sensor serves the purpose of detecting the collision between two vehicles. The basic principle of operation of Shock sensor is that it will detect vibration if there is any collision. In this paper a GPS MODEM of analog devices is used. Whichever the modem is used, it works based upon the NMEA 0183 protocol. [2] The data can be taken into the controller by using UART protocol.

Then this data can be analysed and find out the longitude and latitude of the current location. SIM900 used for physical interface to the mobile application is done as a 68-pin SMT pad, which can provide all hardware interfaces between the modules to customer's board. [5]

The Control Area Network supports distributed area network with very high level of security. Its applications ranges from high speed networks to low cost multiplex wiring. In this paper two ARM'S are connected using CAN with bitrates up to 1 Mbps [8]. At the same time it is cost effective to build into vehicle body. In this paper the LM35 series Integrated Circuit sensor is used which is actually proportional to the Celsius (Centigrade) of temperature. LM35 thus has an advantage temperature sensors calibrated in Kelvin, as the users didn't required to subtract a large constant voltage from its output voltage for obtaining convenient Centigrade scale.

The software flow of required system is shown in figure below. There are two parts of flow chart one is transmitter side and another receiver side. Working of transmitter side is, initially initialize the CAN controller. Prepare the data frame for send. Read the data frame and then send data frame through CAN protocol and stop the transmitter. If in any case collision occurs again read the data frame from Analog to Digital Converter and repeat the procedure till data frame is send.

The receiver side start with initialize CAN controller for reception. Check if buffer is empty and ready to receive the message then receive the message and stop. If buffer is not ready then repeat the stage till buffer is not empty and ready then stops procedure.

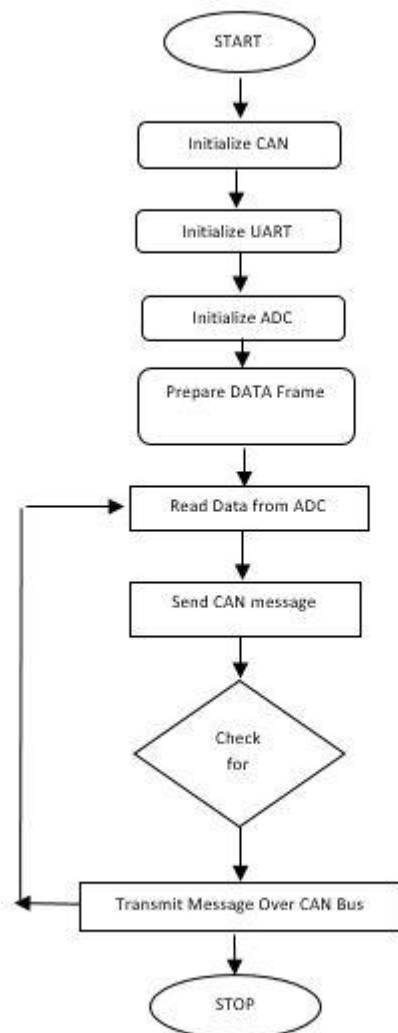


Figure 2. Software flow of transmitter side of system.

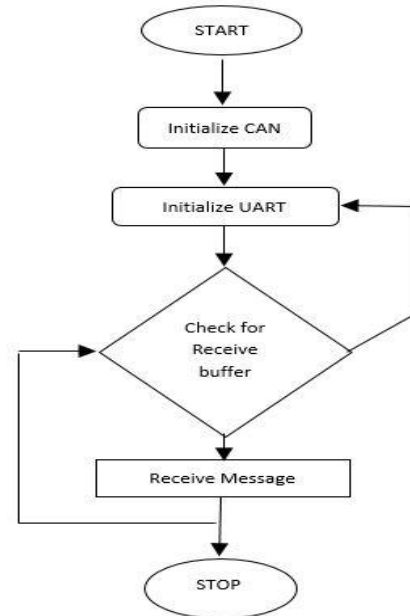


Figure 3. Software flow of receiver side of system.

#### IV. RESULT AND ANALYSIS

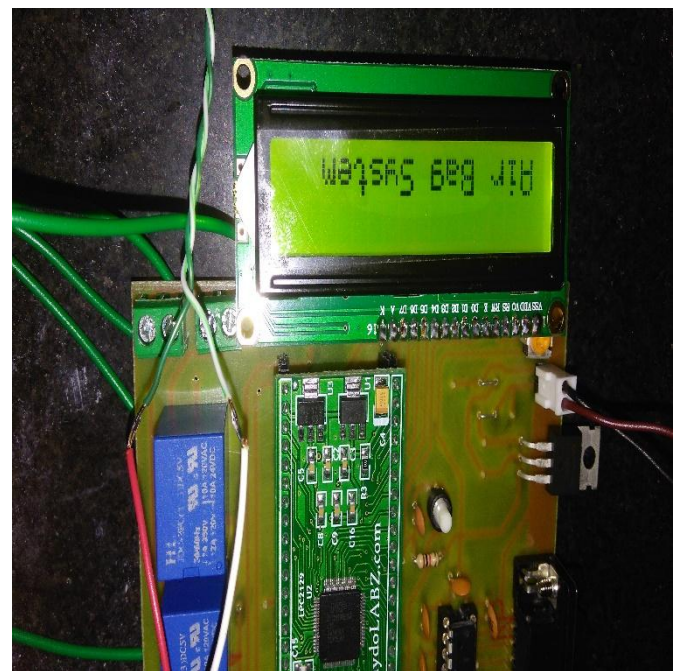


Figure 4. Photo of Air Bag System.

In above figure 4 shows the actual photo graph of the give system. The system includes ARM LPC2129 development board. LDC display which shows the current position of the system in this figure shows the initial or starting position of the given system. And it displays a message on screen "Air Bag System".

In figure 5 shows the actual photograph of the system after the temperature is exceeded the value 240 degree celsius, Then LCD display shows a message "Accident Happen". It will notify the current position of the system after an accident. If there is any strike on impact sensor then air bag deployed and it will show message on LCD screen is, "Airbag Deployed".

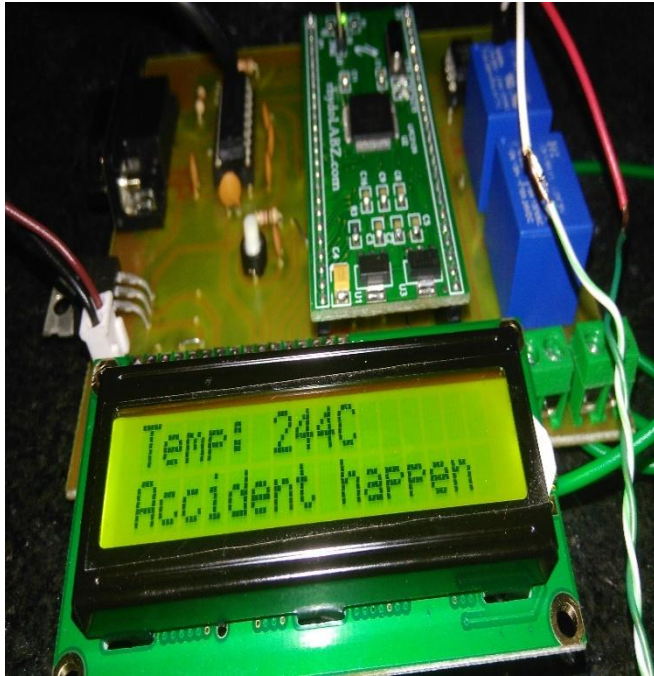


Figure 5. Software flow of required system.

#### CONCLUSION AND FUTURE WORK

This Low Cost Airbag Deployment and Accident Alert System for Budget Vehicles, is simply accident alert system for cost effective vehicles or old vehicles. After an accident, responder immediately detects the accident spot, it can reduce mortality rates. This is in-vehicle accident detection & notification systems, which more effects to reduce the time gap of responders reach to scene. These systems, however, are cheap and may be suitable in all type of vehicles. This system can be used to indirectly detect accidents through sensors, such as shock sensors.

This system can be enhanced by adding few more sensors in future such as- alcohol detector, drowsiness detector, heart rate detector, etc. Security sensors to identify theft can also be added. It can be reprogrammed to switch off vehicle and track the vehicle in theft. Ultimately with the aid of technology, ease and protection to human life will increase.

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