

## AUTOMATIC SENSOR BASED CAR

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**Abstract** - Automatic sensor based car is basically an integrated package of individual automated systems operating in concert. We have basically modified some manual services of a personal vehicle into automation. ARM7 LPC2148 is the base for interfacing of various sensors used such as Flex sensor, temperature sensors, ultrasonic sensor, MQ7 for CO detection. We have used GSM SIM900 for a medium to inform the concerned individual the whereabouts of his vehicle. Any abnormal condition detected by any of the sensor would automatically inform the individual about that which could be a step to ensure proper safety of the travellers inside the vehicle. The various modules used such as airbag for post-accident safety, Ultrasonic sensor HC-SR04 for detection of any obstacle within specified range, battery voltage monitoring system, rain sensors, temperature sensor for measuring temperature of battery and taking connective measures are the highlights of our project. By incorporating automation in these basic safety and necessity module, we have presented a car for the benefit of human society.

**Key Words:** Accelerometer, Limit switch, Ultrasonic sensor, Temperature and CO sensor, GPS & GSM System, Automatic rain sensing wiper.

### 1. INTRODUCTION

In this modern, fast moving and insecure world, it has become a basic necessity to be aware of one's safety and security. Here's a system that function as a monitoring and a security system. It's the automatic vehicle control for critical remote location application. We are designing our own vehicle unit which consists of 2 DC motor based wheels. These wheels are operated using 12v DC motor. The vehicle monitoring and security system is a GPS based vehicle tracking system that is used for security application as well. This project aims at monitoring the vehicle parameters such as the battery level, CO emission, Engine temperature, Accelerometer for theft & tilt detection, Battery Voltage Monitoring, Flex sensor to detect accident, Limit switch for seat belt intact detection, Ultrasonic sensor for obstacle detection, GPS and GSM SIM900 for location monitoring and

to send messages, Airbag for safety purpose, Rain detection and wiper automation, Motor drive IC for controlling speed of wheels. This will do help the user to get brief idea about the changes happening in the system and to take precautions accordingly. ARM7 LPC2148 is used in this system. The temperature is sensed by the sensor LM35 and given to the processor for processing and displaying on the LCD. As we are monitoring the CO gas which is hazardous to humans is detected inside the car cabin using CO emission sensor which monitors the level of CO inside the car cabin. The system is also able to monitor the battery level. Battery level when reached to a low threshold level would give an indication to the user that battery has to be charged. The advantages of this system are that we get an idea about things going wrong in the system and action can be taken against it.

### 2. LITERATURE SURVEY

Accidents caused in any area had no location being traced quickly to save the life of travellers. The GPS and GSM module is used for location detection and message is send on the pre-recorded numbers. The main blocks of this mode are Microcontroller, accident avoidance parameter, safety and security of the driver and passengers too. Car Engine getting heated can cause a major problem so our project works in a way to monitor engine temperature. If temperature of engine exceeds desire value then system alerts the driver [1]. Rate of accidents are increased from past few years ago, accidents were mainly dealing with car to car or any obstacle. In order to find out collision between vehicles we are using accelerometer connected to the ARM processor to prevent accidents. Accelerometer attached to the vehicle is what triggers airbag for safety purpose [2]. The traditional wiper system however requires driver's constant attention in adjusting the wiper speed which may directly lead to an accident, the better option for avoiding this distraction is automatic rain-sensing wiper systems which adjust the speed of the wiper automatically according to the amount of water on the windshield. [3]. Car battery getting low is a drastic problem so when battery level reached to a low

threshold level would give an indication to the driver that the battery has to be charged [4]. Whenever accidents are caused due to frontal crash the travellers get severely injured due to head strike. Airbags are safety devices which are designed to only inflate in moderate to severe frontal crashes for human safety purpose. CO gas entering the car cabin from the broken exhaust or from air conditioner etc. could cause sudden death of passengers. MQ-7 gas sensor is used to detect different gas concentrations; it is with low cost and suitable for different application. [5]. Seatbelt buckle status sensors are used to detect whether or not an occupant's seatbelt is buckled. Connecting seatbelts has reduced many injuries caused due to accidents.

### 3. THE WHOLE ARCHITECTURE OF THE SYSTEM

#### 3.1 Block Diagram

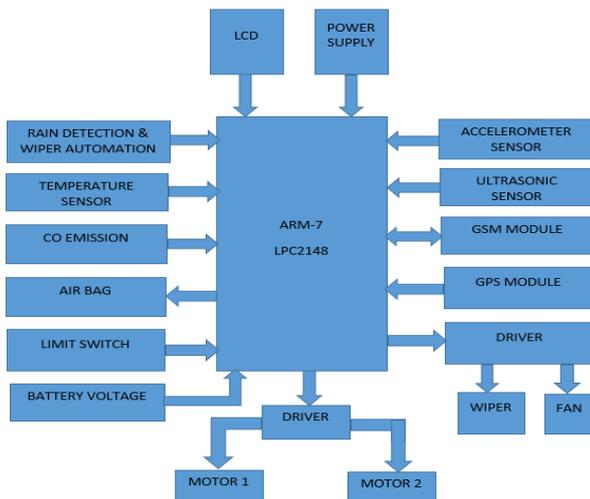


Fig -1: Block Diagram of System.

#### 3.2 System Operation

The operation starts with checking the seat belt connection by using limit switch. Until we connect seat belt car engine will not get ignited and car will not go ahead. After connection of seat belt car engine gets started. Various parameters are used for safety purpose. The ultrasonic sensor is used for unauthorized object detection. When any obstacle, steady or in movement comes in the range of 50cm the buzzer will come into picture and would alert the driver, eventually leading to halt of the car. As the flex sensor bends due to accident message is sent to the prerecorded number using GSM and GPS. The vehicle module has an automated wiper system that works when rain droplets fall which leads to short circuit turning on the wiper accordingly. As the temperature of engine exceeds beyond certain limit, there is

this fan system included which will start functioning to cool down the temperature and protect the engine from further damage due to heat.

### 4. ALGORITHM AND WORKFLOW OF THE SYSTEM

#### 4.1 Algorithm of System Work

- 1) Start
- 2) Sense the parameter from various parts of the vehicle.
- 3) Send the collected information to the ADC
- 4) Then ARM process the data.
- 5) If sensed parameters exceed their limit then ARM LPC2138 send command to relay to stop the ignition.
- 6) Send the data over GPS and GSM.
- 7) If the parameter does not exceeds the limit it will continued.
- 8) Exit.

#### 4.2 Work flow of the system

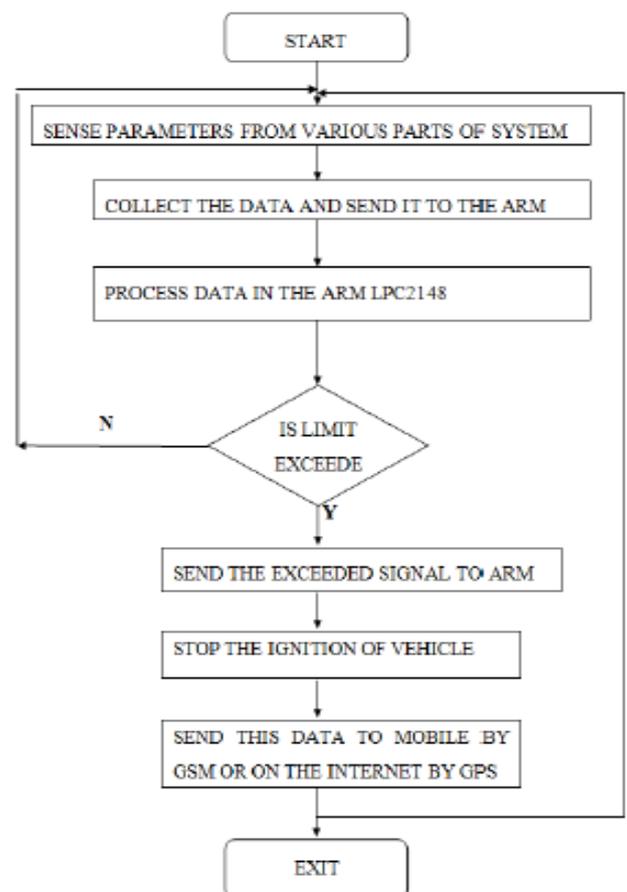


Fig-2: Flowchart of System Working.

## 5. RESULTS



**Fig-3:** This is the pop up on the LCD when we turn on our vehicle showing welcome to smart vehicle.



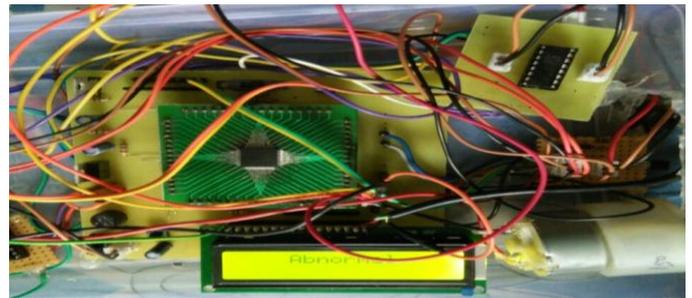
**Fig-4:** This is the image showing battery status. The battery used in here is of 9V. When the battery is full charge it will show 100% and it will show the decreasing status accordingly.



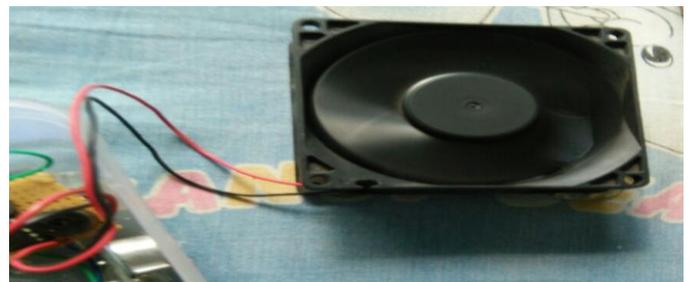
**Fig-5:** An image showing the working of seatbelt. Limit switch is used to represent seatbelt. Unless and until you connect seatbelt (press limit switch) the car engine will not start and car won't go ahead.



**Fig-6:** An image showing temperature of engine.



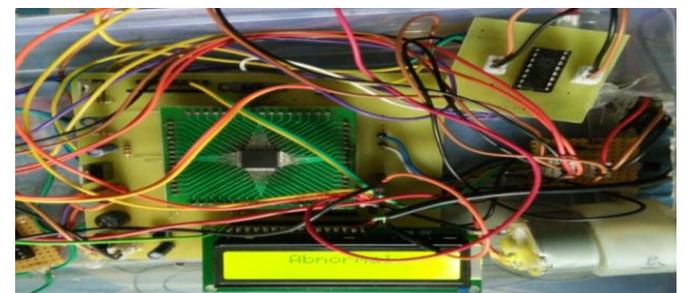
**Fig-7:** An image showing an "ABNORMAL" condition when temperature is exceeded beyond 40°C.



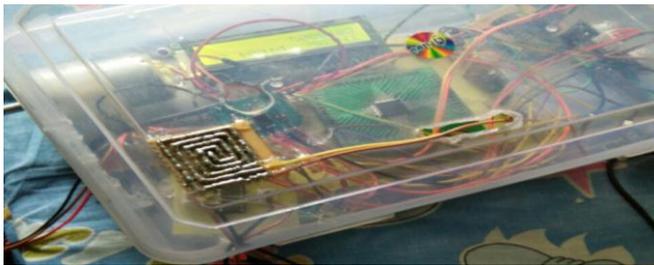
**Fig-8:** An image of fan which turns on automatically when temperature of engine exceeds 40°C to cool down the engine.



**Fig-9:** An image when level of CO exceeds.



**Fig-10:** An image showing "ABNORMAL" condition when CO is exceeded and engine will stop automatically.



**Fig-11:** An image of rain detecting sensor which will sense the rain drops.



**Fig-12:** An image of motor (wiper) which will start automatically without need of manual intervention as soon as rain is detected.



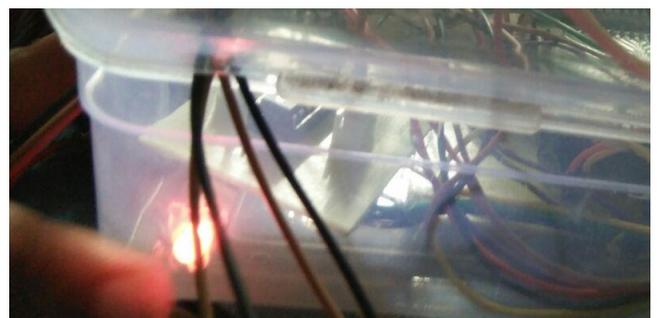
**Fig-13:** An image when ultrasonic sensor will detect the unauthorised object coming towards the car and is within range of 30cm .Buzzer will beep to alert the person inside the car and the vehicle engine will stop automatically.



**Fig-14:** An image when limit switch is pressed, that is attached on the front side of the vehicle. It is used to detect accident when any of the object hits on the front side of the car. The message will be sent to pre-recorded number on the accident detection using GPS and GSM along with the location of vehicle.



**Fig-15:** An image when car gets tilted in X or Y direction. The accident is detected if the car is tilted in X direction and theft is detected when car gets tilted in Y direction. The message is being sent to pre-recorded mobile number along with location of the vehicle.



**Fig-16:** An image of led glowing which is used to represent airbag. LED will glow (air bag will inflate) as accident is detected.

## 6. CONCLUSION

Our present world has developed a lot in every field, so we need some automation in our personal vehicle. We have included the major automated area for the smooth running of a vehicle. There is a lot to work on this field and it has a vast

exploring field extended for development in safety and convenience. Through research presented in this paper, we propose an intelligent car system for accident prevention and making the world a much better and safe place to live.

## 7. FUTURE SCOPE

- 1.) A Front Camera can be used for Lane Tracking purpose.
- 2.) Long range IR sensors can be used in front to avoid vehicle collision.
- 3.) A Camera can be used inside the car for vigilance purpose.
- 4.) Instead of a Microcontroller we can use a CPLD chip.

## 8. REFERENCES

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