WIRELESS BLACKBOX FOR CARS USING SENSORS AND GPS MODULE

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Abstract - The main purpose of this wireless black box project is to develop a vehicle black box system that can be installed into any vehicle all over the world. This paradigm is often designed with minimum range of circuits. Wireless black box is basically a device that will indicate all the parameters of a vehicle crash and will also store and display its parameters such as temperature, location, vibration, alcohol limit etc. At the time of accident, the message will be sent from the system built inside the car to the registered mobile numbers such as emergency numbers of police stations, hospitals, family members, owner etc. We have used various types of sensors like temperature sensor, which is used to measure temperature. Vibration sensor measures vibrations felt by the car during accident. Alcohol sensor is located on the steering wheel which will indicate whether the driver is drunk. Gyroscope sensor is used to indicate tilt during the accident. GSM module, GPS module are some of the devices used in this project which helps in accomplishing the output.

Keywords- Arduino, Gas sensor, Temperature sensor, Vibration sensor, Accelerometer, GSM, GPS, SMS.

I. INTRODUCTION

In today’s world as the population increases day by day the numbers of vehicle also increases on the road and highways. This results in accident that leads to the traffic jams and people do not get the help instantaneously. Road accidents constitute the major part of the accident deaths all over the world. This takes a toll on the property as well as causes human life loss because of unavailability of immediate safety facilities.

Complete accident prevention is unavoidable but atleast repercussions can be reduced. In highly populated Countries like India, everyday people lose their lives because of accidents and poor emergency facilities. These lives could have been saved if medical facilities are provided at the right time. In many situations the family members or the ambulance and police authority is not informed in time. This result in delaying the help reached to the person suffered due to accident. In order to give treatment for injured people, first we need to know where the accident happened through location tracking and then send a message to your related one or to the emergency services.

II. DESIGNOF SYSTEM

Four sensors that are temperature sensorLM35, vibration sensor, gas sensor MQ3, accelerometer ADXL345 are the primary inputs. LCD display,GPS6MV2,GSM SIM800L are the primary outputs. To indicate motion of car we are using a motor.

Initially the threshold detection level of sensors value is predefined. When the device is switched on, it displays “Wireless Blackbox”. Now the user is prompted to give an input such that it exceeds the threshold of the sensors. Once this happens the SMS is sent to registered mobile number with the location of the accident place.
III. LITERATURE REVIEW

The BlackBox concept is derived from the aviation industry, a flight recorder, colloquially known as a blackbox; although it is now orange-colored for easy search, is an electronic recording device placed in an aircraft for the purpose of facilitating the investigation of aviation accidents and incidents.

Existing system is a device installed to record vehicle crashes or accidents. Electronically sensed problems in the engine or a sudden change in wheel speed trigger's this device. It do not track the vehicle movement or the driver’s action and do record several types of important data only few seconds before the collision, due to the existing system is designed to monitor activation of airbags.

IV. METHODOLOGY

The proposal and “expansions of this project are separated into two key parts which are hardware architecture and software details”. “In the hardware architecture, the design of the circuit was constructed and the prototype of the project was built. While in the software development, the whole complete prototype was operated via programming codes”.

1. Hardware Architecture:

1.1 “Arduino” is the key board; microcontroller on it which is ATmega328 is used as the main controller to manage the circuit accordingly”. “It is a well-known open-source microcontroller-based kit for creating digital devices and interactive tool that can interact with LEDs, LCD display, switches, GSM, flame sensor, buzzer, and many more”.

1.2 “Alcohol sensor MQ-3 detects the presence of alcohol gas at concentrations from 0.04 mg/L to 4 mg/L, provides an analog resistive output based on alcohol concentration”.

1.3 “Temperature sensor LM35 rated to operate over a −55°C to 150°C temperature range, output voltage linearly-proportional to the Centigrade temperature”.

1.4 “Accelerometer ADXL345 small, thin, ultralow power, 3-axis accelerometer with high resolution (13-bit), measures the static acceleration of gravity in tilt-sensing applications”.

1.5 “Vibration sensor” measures the amount and frequency of vibration in a given system, machine, or piece of equipment.

1.6 “GPS Module NEO-6MV2 is used for navigation. The module simply checks its location on earth and provides output data which is longitude and latitude of its position. It is from a family of stand-alone GPS receivers featuring the high-performance box 6 positioning engine. These flexible and cost-effective receivers offer numerous connectivity options in a miniature (16 x 12.2 x 2.4 mm) package. The compact architecture, power and memory optimization make NEO-6 modules ideal for battery-operated mobile devices with very strict cost and space constraints. Its innovative design gives NEO-6MV2 excellent navigation performance even in the most challenging environments.”
1.7 “GSM Module”, “GSMSIM800C type is selected to carry the task in communication part. SIM800C is a quad-band GSM/GPRS module that works on frequencies GSM850 MHz, EGSM900 MHz, DCS1800 MHz, and PCS1900 MHz. It has an recognized presentation, industrial grade interface Typical plus embedded TCP/IP protocol which makes it to be presentable and suitable for the electronics project. Since it consumes small amount of power in its operation, thus it is said able to communicate with any low power consumption microcontroller interface”.

Figure 8: GSM Module interfacing with Arduino

2. Software Development:
The software of the project is based on the flow chart in Figure 9. When input is exceeded threshold are values of the sensors, microcontroller on the Arduino Uno board will notify GSM module to send an alert message to the pre-coded mobile numbers. By referring to both figures, the complete program can be constructed later in Arduino IDE software with vibration sensor, temperature sensor, accelerometer, alcohol sensor, GPS module, GSM module, LCD display screen.

V. SCHEMATIC DIAGRAM
Schematic diagram shows the connection and interfacing of Arduino Uno board:

START
IF INPUT VALUES EXCEED
THRESHOLD
ARDUINO ALERTS GPS AND
GSM LOCATION TRACKED USING GPS
SMACTIVATED
SEND SMS TO REGISTERED NUMBER
ELSE
CHECK FOR INPUT VALUES AGAIN

Figure 10: Pseudocode for the project

This pseudo code gives a brief idea as to how the project “Wireless Blackbox for cars using sensors and GPS module” works.

Initially the threshold detection level of sensors value is predefined. When the device is switched on, it displays “Wireless Blackbox”. Now the user is prompted to give an input such that it exceeds the threshold of the sensors. Once this happens the SMS is sent to registered mobile number with the location of the accident place. The GPS receiver helps to collect the location of the place. The GSM module sends the SMS.

Figure 9: Flowchart blackbox system.

Figure 11: Schematic diagram
VI. RESULT

Figure 12: Hardware Setup

VII. CONCLUSION

The sole purpose of this project was to develop a blackbox system for car accidental monitoring and alerting. The system has successfully overcome the drawbacks of the existing system by introducing alert messages.

Finally, we conclude that system wireless black box using sensors, GSM and GPS tracking has been developed for car accidental monitoring and alerting which gives an intelligent solution to the problem.

In future, by applying ultrasonic sensors features we can detect the distance of a vehicle moving nearby our vehicles. This system can be interfaced with vehicle airbag system that prevents vehicle occupants from striking interior objects such as steering wheel or window.

REFERENCES


