AUTOMATIC WARNING AND ACCIDENT EMERGENCY ALERT SYSTEM

*DR.M.YUVARAJU [1] | BYNA ANUROOP [2]

[1] Asst.professor, Department of EEE, Anna university regional campus, Coimbatore, India - 641046

[2] PG Scholar, Department of EEE, Anna university regional campus, Coimbatore, India - 641046

ABSTRACT

Now a days, due to demand of rising automobiles. The accidents have been occurring frequently. The lack of rapid emergency services after accident has occurred. The survival rates of life are determined when emergency medical personnel are arrived as soon as accident has occurred. This proposed system provides a solution for this drawback. The proposed system shows that whenever accident, fire is detected .An accelerometer, vibration sensor and fire detector sensor which will detect send to the microcontroller correspondingly warning will be produced. Microcontroller which was to get the location of the vehicle using GPS (Global positioning system) receiver and send SMS to the emergency services using GSM (Global system for Mobile Communication). Temperature sensor which is used to measure the engine temperature. If the temperature of the engine reaches the above threshold then automatically the warning will be issued.

Keywords: GSM module, Accelerometer, Arduino microcontroller, GPS, Temperature sensor, fire detector sensor.

Introduction

Now a days embedded system plays a crucial role in the automobile technologies. Embedded systems is nothing but a software embedded into hardware.In this project it deals with many real-time applications like automatic fire detection, engine temperature detection and accident detection & emergency alert services. This project helps to the many transportation companies and emergency services. This proposed system deals with fire detection sensor, temperature sensor, vibration sensor, accelerometer, arduino microcontroller, GPS (global positioning system) and GSM (global system for the mobile communication).This paper deals with three types of the applications such as when engine temperature reached particular threshold, fire is detected inside the vehicle and accident is detected when vehicle is hit & also when vehicle position was tilted. In the case of the accident, fire has detected automatically warning will be issued and correspondingly GPS receiver track the location coordinates and send SMS to emergency services through GSM in the form of the latitude and longitude coordinates using the coordinates ,emergency services can identify the location using google maps applications and by using LAB view simulation software.

Related Works

Much advancement in technology was proposed to find automatic emergency alert system. In 2012 Montaser n. ramadan, proposes anti-theft detection and tracking the vehicles using the GPS receiver and GSM .when vehicle starts the SMS will be sent to the owner .owner can send code in the form to stop the intruder.

In 2014, SeokJu Lee proposes a method the efficient tracking of vehicles using GPS and GSM. The GPS along with GSM was embedded inside the vehicle.GSM and GPS was controlled by the microcontroller.GPS which is used to get coordinates of the position of the vehicle at regular intervals by using the coordinates we get the position of the vehicle in google maps API.

In 2014, rajeswari proposes a system for traffic congestion control, ambulance clearance and stolen vehicle using RFID tag which was placed inside the vehicle. RFID Reader and PIC16F877A system on chip to read the RFID tags which was attached to vehicle. In this way they count the number of the vehicles and monitor traffic congestion and communicate to traffic controller to turn on green light on the signal when ambulance comes. The communication between traffic controller and ambulance using zigbee. If RFID-Tag reads that belong to the vehicle that was stolen immediately sends SMS to the police station using GSM.

In 2015, Prashant A. Shinde proposes a method of advance vehicle monitoring of school vehicles. In this system they used SIM908 module which contains GPRS, GSM and GPS. Specified path which was programmed in the raspberry pi microcontroller. The current vehicle path was compared with specified path. If vehicle is going in the wrong path and speed automatically it send SMS to the owner mobile using GSM.

Proposed System

The proposed system was used for applications of the real-time embedded systems. Three applications of the real time embedded systems were proposed here are 1.automatic accident detection and emergency alert.

2. Engine temperature detection

3. Fire detection and warning.

The figure 1 shows Arduino uno Microcontroller which is

interfaced to accelerometer sensor, vibration sensor, temperature sensor, fire detector circuit, GSM (global system for mobile communications) Modem and GPS (Global Positioning System). GSM used to send the position of Vehicles in latitude and longitude from any place such as in traffic, remote and isolated places to the intended receiver. The GPS receiver which gives parameters in output form and corresponding data was displayed on the LCD screen that same data also send to mobile where the Position of vehicle demanded. The data which was received by the GPS receiver was stored in any memory storage. The hardware which was interfaced to microcontroller are LCD display, GSM modem and GPS Receiver, sensors such as accelerometer sensor, fire detector sensor. Different types of sensors such as accelerometer, vibration, and temperature and fire detector are used for detecting different types of problem encountered in the vehicle such as accident, engine heat monitoring, fire warning etc. An accelerometer sensor which senses the vehicle tilt position and orientation, if the vehicle tilts and orientation crosses that particular threshold value, vibration sensor which senses the vibration, automatically buzzer which provides warning will be on, motor will be in off condition.

GPS continuously monitors the vehicle position and send message to emergency services and relatives through GSM. Temperature sensor which senses the temperature of the engine if it reaches the particular threshold value, automatically buzzer will be in on condition. Fire detector circuit detects the fire in the vehicle, automatically warning will be produced and corresponding GPS coordinates will be send to the fire rescue team, vehicle owners through GSM. Authorities, relatives and owners can track the vehicle location using the received GPS coordinates .In this project the vehicle location was determined in the lab VIEW by interfacing through the serial communication with arduino board.
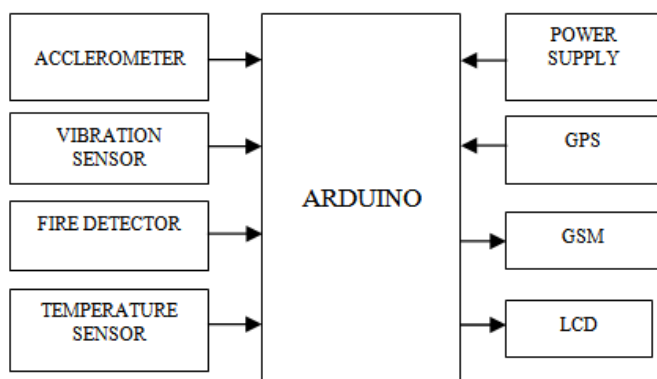

Fig.1: Block diagram of Automatic Accident Alert System and Fire Detection System

Arduino Uno

Arduino Uno is a microcontroller based on the datasheet. It has 14 digital input or output pins of which 6 can be used as Pulse Width Modulation (PWM) as output, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, an ICSP header and a reset button. The Microcontroller simply connected to the computer with a USB cable or a power with an AC to DC adapter or battery to get started. Here the purpose of arduino is used to transmit the command through the signal. It can be powered using power supply or by using USB cable.

The supply voltage is 6 to 20 volts either it is an AC or DC supply. The Arduino can be able to communicate with the other arduino or with other microcontroller or with other computer. It supports Inter Integrated circuit and SPI Communication.

Fig2 Arduino uno

GPS Module

A GPS navigation device that accurately calculates geographical location by receiving information from GPS satellites.GPS receiver which we are using is SKYLAB. The SKYLAB 13BL is a complete GPS receiver module that features super sensitivity -165dbm, ultra low power 22mA .it has input operating voltage is   3.0v to 4.2v. GPS antenna has operating frequency 1572.42 MHz's the GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol. The GPS receiver continuously receives the position of the vehicle in the form of latitude and longitude coordinates periodically.

3.3 GSM Module

Global System for Mobile Communication provides wireless communication as well the authentication. The GSM is interfaced with the arduino board and allows GSM to communicate over the network. GSM allows the user to send and receive the messages. It consumes low power, high performance, small size and less weight. In this project we are using the SIM 800C.SIM800C with a tiny configuration of 17.6x15.7x2.3mm, is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 features. It needs the power supply of 3.3 to 4.4 volts.

LM35 Temperature Sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature. You can measure temperature more accurately than a using a thermistor. The LM35 generates a higher output voltage than thermocouples and may not require that the output

voltage be amplified. Pin 1 of the LM35 goes into +5V of the arduino.Pin 2 of the LM35 goes into analog pin A0 of the arduino. Pin 3 of the LM35 goes into ground (GND) of the arduino.

Accelerometer Sensor

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. It is uses the low power 350µA. It operating voltage was 1.8 v to 3.6 v.

Work Flow

1. Initialize the GSM module and GPS Module

2. Slightly tilt the position of the accelerometer sensor

3. If the tilt position and orientation was greater than threshold, then automatically the buzzer will be on and motor will be off.

4. Latitude and longitude coordinates which was received by the GPS coordinates send message to the emergency .

5. Slightly hit the vibration sensor with fingers, immediately accident detected was displayed on the LCD.

6. Temperature sensor which was used to measure the temperature of the engine, if the temperature rises above threshold automatically warning will be issued.

7. Put some fire near the fire detector circuit automatically the fire detected will be displayed on the LCD .The corresponding GPS coordinates will be send to the fire emergency services.

8. We can trace the location of vehicle in the lab VIEW through serial communication connected to the GPS receiver.

9. We can track the location using GPS coordinates in the Google maps.
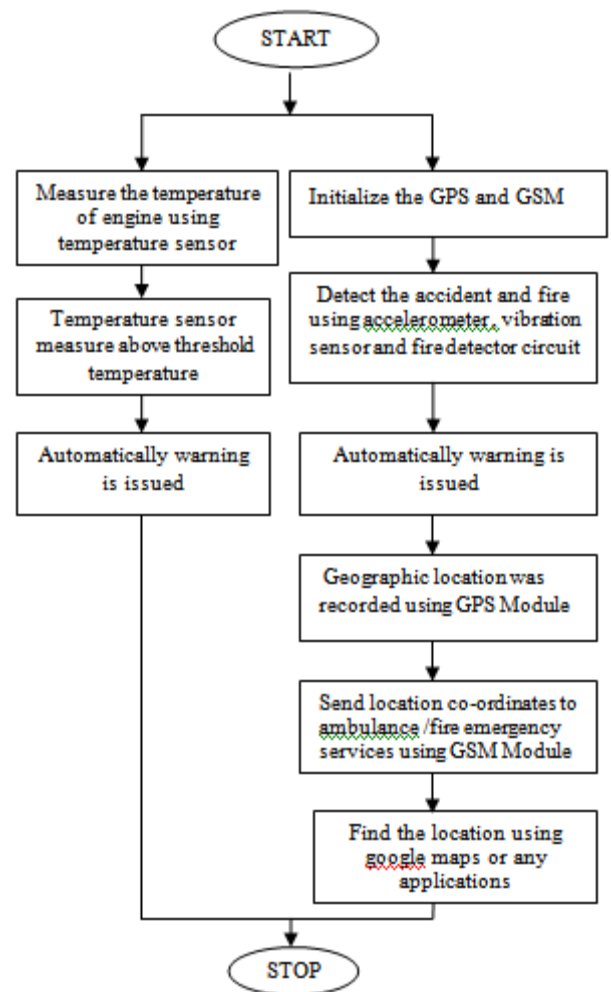

Fig3.the flow chart of automatic warning and accident emergency alert system

Modeling and Result

The hardware result shows that effective working of the automatic warning and accident emergency system using GPS and GSM. The accelerometer sensor, vibration sensor, temperature sensor and fire detection sensor are used in this project .the DC motor used between 7 volts to 24 volts. The range of the step down transformer used was between 0 volts to 15 volts. The ardiuno uno board was interfaced with these sensors, LCD Display GPS and GSM.
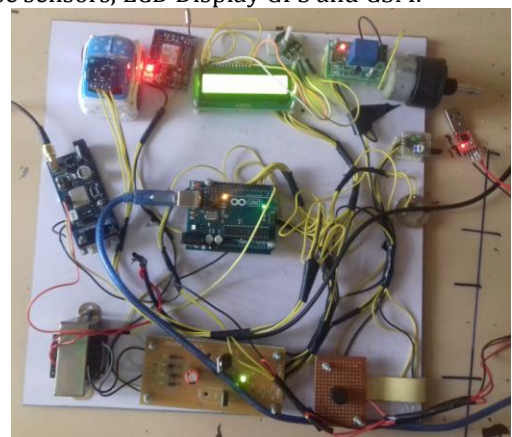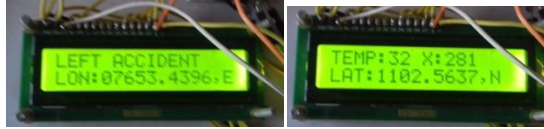
Fig 4 Full View of automatic warning and accident Alert system

Fig 5   LCD reading when left accident detected using accelerometer

The accelerometer sensor which was mounted on the vehicle is 3-axis acceleration measurement system sensor which was used to measure vehicle tilt position ,certain threshold was fixed for the right tilt and left tilt,if the vehicle tilt was greater than threshold ,coressponding left and right accidents were in the LCD ,then automatically warning will be produced and wheel rotations will be in off condition .The GPS receiver which was operating at a frequency of 1572.42 MHz and operating at a voltage of 3.3 to 4.4 v, periodically receives the GPS coordinates in form of the latitude and longitude and send SMS to the emergency services using GSM 800C.using the received coordinates the exact position of the vehicle was traced using google maps.

The vibration sensor which was mounted on the vehicle ,when ever when vehicle is met with accident it was experiences the vibration corresponding accident detect was displayed in the LCD .then automatically warning will be produced and wheel rotation will be in off condition. The GPS receiver periodically receives the GPS coordinates in form of the latitude and longitude and send SMS to the emergency services using GSM .using the received coordinates the exact position of the vehicle was traced using google maps.

The fire detection sensor here which was used as the infrared sensor transmitter and receiver. Whenever the sensor which was detected the fire, automatically fire detected will be displayed on the LCD .The GPS receiver periodically receives the GPS coordinates in form of the latitude and longitude and send SMS to the fire emergency services using GSM .using the received coordinates the exact position of the vehicle was traced using google maps.

Conclusion

The proposed automatic warning and accident alert system Arduino based vehicle tracking system using GPS and GSM technology was developed and tested successfully to track the exact location of a vehicle when vehicle is met with accident, fire accident occurs in the vehicle. Main purpose of the proposed system deals with to save the human life when accidents occur ,main theme behind this project is to provide the medical facilities to the accident victims as early as possible   to avoid the loss of the life .this proposed system mainly deals with GPS and GSM. GPS receiver which regularly receives the coordinates   send the   coordinates of accident location to the emergency services .it will be important to the transportation companies to monitor and track the location of the vehicle regularly.

REFERENCES

1. Al Rashed M.A, Oumar O.A. Singh D., "A real time GSM/GPS based tracking system based on GSM mobile phone,"Future Generation Communication Technology (FGCT), 2013 Second International Conference on , vol., no., pp.65,68, 12-14 Nov. 2013.

2. C. Bayilmis, I. Erturk, and C. Ceken,"Extending CAN Segments with IEEE 802.11 WLAN", The 3rd ACS/IEEE International Conference on Computer Systems and Applications, AICCSA-05, Egypt, 2005.

3. C. E. Lin and C. C. Li, "A Real Time GPRS Surveillance System using the Embedded System,"AIAA J. Aerosp. Comput., Inf. Commun., vol. 1, no.1, pp. 44-59, Jan. 2004.

4. Hoang Dat Pham, Drieberg, M. Chi Cuong Nguyen, "Development of vehicle tracking system using GPS and GSM modem,"Open Systems (ICOS), 2013 IEEE Conference on , vol., no., pp.89,94, 2-4 Dec. 2013.

5. Hu Jian-ming; Li Jie; Li Guang-Hui, "Automobile Anti-theft System Based on GSM and GPS Module," Intelligent Networks and Intelligent Systems (ICINIS), 2012 Fifth International Conference on , vol., no., pp.199,201, 1-3 Nov. 2012.

6. Kumar, R.; Kumar, H., "Availability and handling of data received through GPS device: In tracking a vehicle," Advance Computing Conference (IACC), 2014 IEEE International, vol., no., pp.245, 249, 21-22 Feb. 2014.

7. Melgard, T. E., G. Lachapelle, and H. Gehue. "GP S Signal Availability in an Urban Area-Receiver Performance Analysis". IEEE, 1994.

8. N. W. Wang, Y. M. Huang, W. M Chen. "A Novel Secure Communication Scheme in Vehicular and Hoc Networks" – Computer Communications, Volume 31, Issue 12, 30 July 2008, Pages 2827- 2837

9. Prof.M.Kamaraju "A Novel Design Of Low Cost Rea l Time Vehicle Navigation System" , International Journal of Engineering Science and Technology Vol. 2(8). 2010. 3707-3711

10. Sadagopan, V.K.; Rajendran, U. Francis, A.J., "Anti theft control system design using embedded system," Vehicular Electronics and Safety (ICVES), 2011 IEEE International Conference on, vol.,no., pp.1, 5, 10-12 July 2011

11. SeokJu Lee; Tewolde, G.; Jaerock Kwon, "Design and implementation of vehicle tracking system using GPS/GSM/GPRS   technology   and   smartphone

application," Internet of Things (WF-IoT), 2014 IEEE World Forum on , vol., no., pp.353,358, 6-8 March 2014

12. S. Misbahuddin, N. Al-Holou. "Efficient data communication techniques for Controller Area Network (CAN) protocol". ACS/IE EE International Conference on Computer Systems and Applications, 2003,Tunis, Tunisia, 2003.

13. T. K. Kishore, T. S. Vardhan, and N. L. Narayana, "Vehicle Tracking Using a Reliable Embedded Data Acquisition System With GPS and GSM", Int. Journal of Computer Science and Network Security, vol.10, no. 2, pp. 286-291, 2010.

14. V.Ramya, B. Palaniappan, K. Karthick, "Embedded Controller for Vehicle In-Front Obstacle Detection and Cabin Safety Alert System", International Journal of Computer Science & Information Technology (IJCSIT) Vol 4, No 2, April 2012.

15. Y. Cui, S. Sam "Autonomous vehicle positioning with GPS in urban canyon environments," IEEE Trans. Robotics and Automation, vol. 19, no. 2, pp. 15-25, Singapore, Feb. 2003.

16. Y. Musa, J. Wang," Vehicle Tracking and Anti-theft System using GPS GSM", International Journal of Engineering Research & Technology (IJERT) Vol. 1 Issue 10, December- 2012.