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Emergency information systems for cars

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Abstract. The main objective of this work is to create a Health Care monitoring and Guidance system for persons who are travelling in outdoor environments like cars. GSM (Global System for Mobile Communications) and GPS (Global Positioning System) technologies are separately and combined today in many applications in our day to day life. The GSM module will send a message along with the GPS location to the end user through text, and a call is initiated to the user for further instructions. The Global Positioning System (GPS) will give the location of the interested vehicle. This system helps the doctor or anyone to monitor the accident who is outdoor and has less help. This will help the hospital to monitor the accident as well as guide the injured through difficult situations. Using a buzzer, the persons nearby will come to know that the person is in danger or in poor health conditions. This project provides a good two-way communication with the injured and the hospital to assist them to give first aid before an ambulance arrives. So, this paper devices a novel technique to assist the people who just met with accident through GPS and GSM.

1. Introduction

Prevention of accidents is what everyone focuses on. But accidents are not cent percent avoidable. So, whenever the car is met with an accident, there are places where there are loosely populated with no one to guide or assist them [1]. Even in crowded places people reject to help because of the fear of being involved in cases [2]. In those situations, the help the injured get is very low. So in this paper a device which will automatically detect the accident through Vibration sensor and send a message to end user is used [3]. Whenever the situation is bad the device will make a call to the hospital and first aid can be given instantly and wait for them to send an ambulance. So using this system the cars can be monitored 24 hours a day and if an anomaly is detected then the already coded message along with the patients geographic position are send to the hospital or relatives so that he can be assisted with an ambulance.

2. Modules used

The Components used are microprocessor LPC2148, GSM module, GPS module, Vibration sensors and power supply for all the components. The block diagram of the whole system is given in the fig 1.

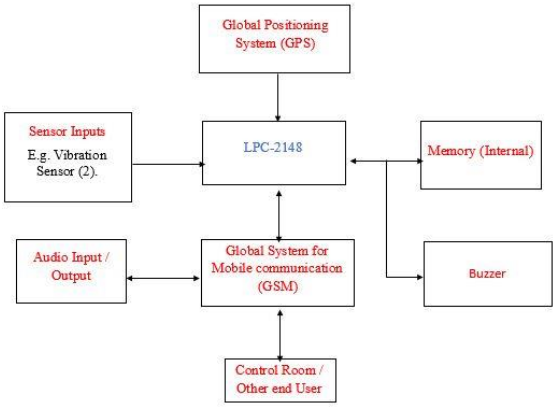

Figure 1. Block diagram of the entire system

2.1 GPS Module

GPS module is often used to obtain the geographic longitude and latitude locations from the satellite along with the time in international standard format. The output GPS module is in NMEA data format, so the latitude and longitude should be extracted separately from this format and given to the GSM to send the coordinates to the desired people [4].

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2.1.1 Technical Details

GPS module used in this project is L80 provided by Quectel Solutions which is shown in Fig2. GPGAA, GPGLL are some of the data given by this GPS module. Using GPGAA the time of the particular location is obtained from the satellite.

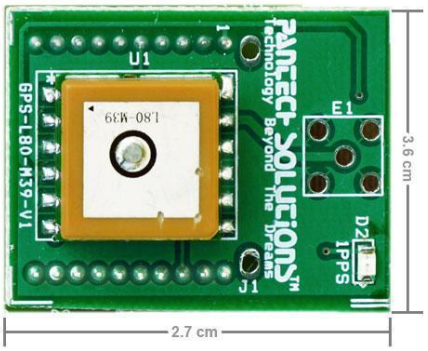

Figure 2. GPS Module

2.2 GSM Module

It is used to send the pre-coded data and the GPS location to the hospital or relatives to take necessary actions on the health condition of injured [5].

2.2.1 Technical details

The GSM module (SIM900A) is given in Fig 3. which uses quad band 850-1900 MHz AT commands are used to interact to the user using the GSM module.

Figure 3. GSM Module

2.3 Microprocessor (LPC2148)

It is a used as an intermediate communication device between the modules and to sense the anomalies in the sensor data [6].

Technical Specifications: The processor belongs to ARM-7 family. It has on board RAM of 32Kb and on board flash of 512 Kb. It also has 2 serial communication ports. It works on the operational frequency of 12 MHz.

The microprocessor LPC2148 used in the project is shown in Fig 4.

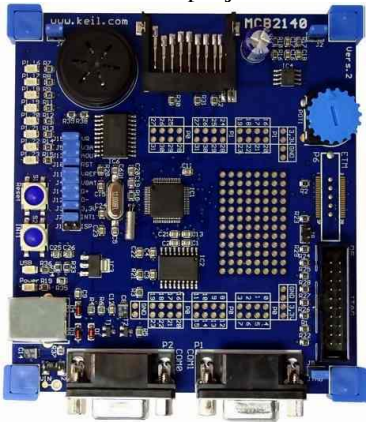

Figure 4. LPC2148

2.4 Sensors

There are many sensors to detect the impact of a car like vibration sensor, pressure sensor etc. Here vibration sensor is used [7].

2.4.1 Vibration sensor (SW420)

The sensor gives low output voltage (0) when there is not vibrations detected. If there is any vibration the sensor will give a high digital voltage (1).

3. Simulation Details

The hardware setup is first simulated in Keil simulator Microvision of version 4. The steps involved in developing the code is given below [8].

3.1 Algorithm

1. Connect the vibration sensor to the microcontroller to detect the anomaly, when it detects the vibration it will give high output.
2. Then extract the GPGAA and GPGLL data from GPS to get the latitude and longitude of the geographic position of the user.
3. Write the AT commands for GSM module to send text message, receive a call or make a call from the pre-coded number.
4. Merge all the codes in a way that when an anomaly is detected it must detect whether it is a low level anomaly or high level anomaly in the vibration sensor.
5. After detecting the specific type of anomaly, respective action should be taken. (Whether just to send a message or make a call and turn on the buzzer alarm).
6. Connect the hardware and load the code in the microprocessor using the tool Flash Magic.

4. System Integration

All these components and modules are integrated with the above mentioned microprocessor. Now, whenever there is any anomaly detected in the sensor data, the microprocessor will send the commands such that the pre written message along with the GPS location is sent to the doctor or user to inform about the accident and await for further instructions. When the conditions are severe the GPS location is sent to the helpline number and the buzzer connected to the microprocessor will go off indicating to the neighbours that the people is in dangerous conditions. A voice call is also initiated to the helpline or hospital so that the patient or the neighbours can get the instructions from the doctor and provide with necessary first aid and brought to the nearby hospital for treatment. This system has a dual way communication. Also the implementation of this project is also on two levels of severity (low anomaly and high anomaly).

5. Implementation and Working

Two Way Communications:

The hospital can also communicate to the injured by calling to the GSM number and the injured can also make a call to the doctor. But considering the circumstance that the injured cannot make the call manually, it is automated to make a call to the doctor when there is any high level anomaly is sensed and it is severe.
Two level Implementation:

The project is implemented on two levels of severity, Low level anomaly detection and High level anomaly detection.
Low level Anomaly:

When the anomaly is small but within the acceptable range the message is sent to the user or owner or relatives for his/her information and they can check in and provide any assistance if necessary.

High Level anomaly:

When the sensed anomaly is high the location is send to the helpline and a voice call is initiated with the injured for further instructions like first aid. If injured is not in a situation to speak then someone else in the surrounding or in the car might answer the call and necessary first aid can be given. Fig 5. shows the integrated image of the circuits.

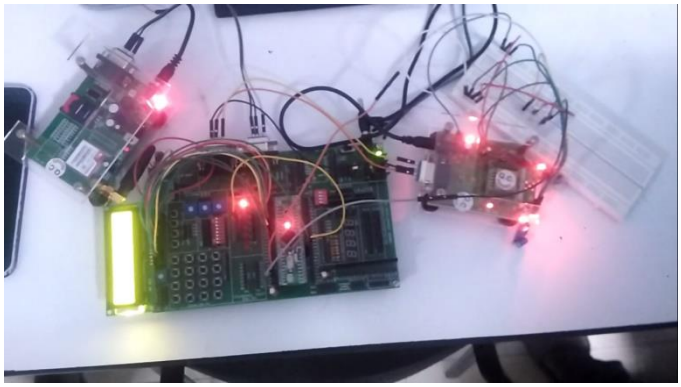

Figure 5. Integration of all Components and Modules

6. Results

A pre-written text message or a voice call is initiated from the GSM module whenever there is detection of anomaly in the sensor data. This project helps the people who are driving on road and if the vehicle is a taxi this message is sent to the company. So using this system many people who were in need of care can be monitored and be helped. At later part this message can also be used in claiming of insurance of the vehicle and the person Fig 6. Shows the Output obtained in the mobile of the end user or hospital help line.
Also, additionally the time can also be recorded and stored for future use. But it requires quite a large memory to store the data which cannot be stored within microprocessor ROM memory. So an external memory can be used to store the data.

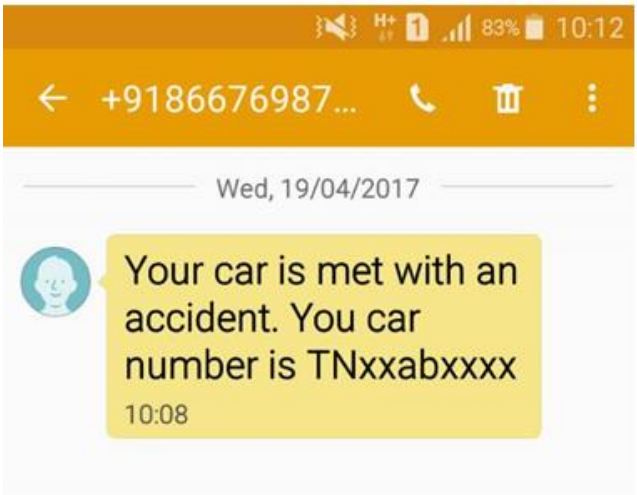

Figure 6. The received message.

7. Conclusion

In this paper, we have proposed a novel technique for car monitoring which allows to detect the impact of the car. When the car is met with an accident they will be given first aid and ambulance is dispatched to their location. This is possible by establishing a two-way communication between the

people in the car and the hospital helpline number. Using this, a doctor can give instructions to the injured or to the care takers so that the needy can be given medical first aid instantly to prevent any major loss to the lives of injured. In case of the taxi additionally the registration number of the vehicle is send to the company or owner to know which car and who is been injured. This system can be extended in a way to store the data externally in a database and used for insurance purposes.

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