GSM/GPS BASED REMOTE ACCIDENT ALERT SYSTEM USING ARDUINO

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ABSTRACT:

The system envisioned is an automatic accident alert system which is placed inside the helmet relying on GPS receiver and a GSM modem. A significant amount of motorcyclists wear protective gears while driving their bikes. There may be a situation when a person who rides a bike be met with an accident in a highway in remote area where there is nobody to take care of him. So that many persons lose their life's because they are not taken to hospital at the correct time.Hence we suggest a helmet that is made smart. When a rider meets with an accident the smart helmet sends an alert message to nearby hospital via GSM Modem which is fitted inside the helmet. The GPS receiver which is also fixed inside the helmet calculates the latitude and longitude of the accident location and transmits the information serially. The distance sensor senses whether the helmet is worn by the rider during the accident. The 3 axis accelerometer output is checked by the system whether the rider has fallen down flat on the road.

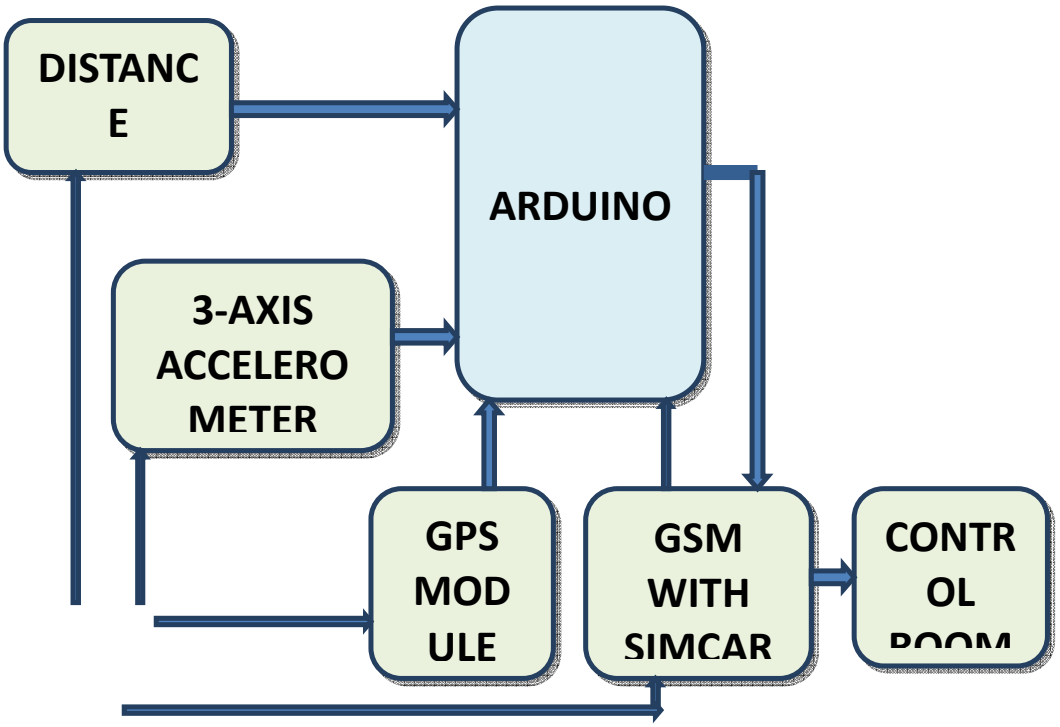
Keywords: Embedded, Arduino, Accelerometer sensor, GSM, GPS, Distance sensor.

1. INTRODUCTION:

Nowadays road accident is major problem all over the world. A recent report Says that an average of 7,00,000 road accidents occur every year all over the world and 10% in India. The latest annual statistics by the world health organization (WHO) in its first global status report on road safety reveals that 80,000 people have been killed on Indian roads due to speeding and less usage of helmets. In order to avoid this automatic alert system will provide a safety to bike riders.

A 3 axis accelerometer sensor used to detect the accident. When accident occurs, the axis coordinates will change and the data is picked by the Arduino. Through GPS the exact values of latitude and longitude of the location are obtained. The same data is sent to the contact numbers which are already stored in the system memory. Hence our system allows people to immediately to take care of the injured
Person, admit the person in hospital and save life.

Arduino is used as main prototyping platform. The whole system is to be fitted in the Helmet itself. The distance sensor is used to estimate the position of helmet. The 3-axis accelerometer is used to sense the orientation of the rider's body.



SYSTEM BLOCK DIAGRAM

2. LITERATURE SURVEY:

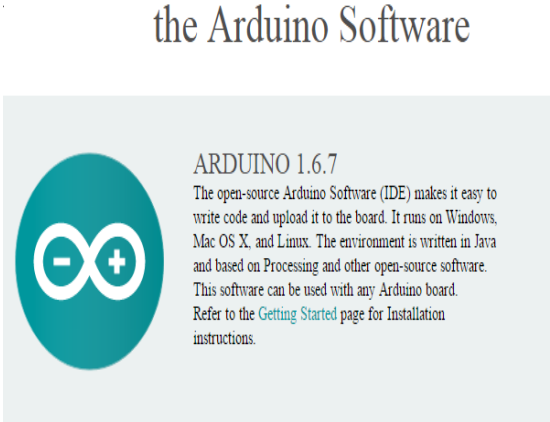
Accident alert system is being used for onlyfourwheelers.On Highway roads many motorcyclists wear protective gears while driving their bikes. Ifanyone has met with an accident, the person is not noticed most of the time or attended to after much delay which would be too late to save the person. An automated accident alert system is essential for bike riders who ride on highway areas.

3. ARDUINO:

Our project is an embedded system. The heart of this project ARDUINO.Arduino is an open-source prototyping platform based on easy-to-use hardware and software.

Figure 1: ARDUINO BOARD

3.1ARDUINO SOFTWARE:



Arduino IDE:-

Figure 2: ARDUINO SOFTWARE

3.2ARDUINO 1.5.7:

Figure 3: Simulation window

4. THE INFORMATION DETECTION MODULE:

The 3-axis accelerometer is ADXL 330 from Free scale semiconductors. This sensor is a 3 axis analog output accelerometer. The device consists of a surface micro machined capacitive sensing cell (g-cell) and a signal conditioning ASIC contained in a single package. The sensing element is sealed hermetically at the wafer level using a bulk micro-machined cap wafer. The g-cell is a mechanical structure formed from semiconductor materials (polysilicon) using semiconductor processes (masking and etching). It can be modelled as a set of beams attached to a movable central mass that move between fixed beams.

Figure 4: 3-Axis accelerometer sensor

The movable beams can be deflected from their rest position by subjecting the system to acceleration. As the beams attached to the central mass move, the distance from them to the fixed beams on one side will increase by

the same amount that the distance to the fixed beams on the other side decreases. The change in distance is a measure of acceleration. The sensor operates at very low voltages (2.2V to 3.6V). During active mode the sensor draws about 400μA and when in sleep mode it draws only 2μA current [6]. The g range is selectable between 1.5g and 6g. The 3 axis accelerometer contains an onboard single-pole switched capacitor filter. Because the filter is realized using switched capacitor techniques, there is no requirement for external passive components (resistors and capacitors) to set the cut-off frequency. Here the output along only one axis has been utilized (the axis along which the helmet is flat on the road).The analog output of the accelerometer is fed to the inputs of Arduino.

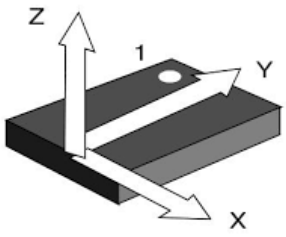


Figure 5: 3-Axis

5. GSM MODULE:

GSM module is used to establish communication between a computer and a system. It requires a SIM (Subscriber Identity Module) card just like mobile phone. It has IMEI (International Mobile Equipment Identity)number.GSM module consists of a GSM modem assembled together with power supply circuit and communication interfaces (like TTL, RS-232)for computer.The modem used here is SIM 900 readymade GSM module. This module accepts a single simcard and can send and receive messages (text messages) .It can be controlled by sending AT commands from any general purpose microcontroller UART. Here it has been connected to the ArduinoTxD and RxD pins. It is powered by +12V dc which is obtained from the power supply.

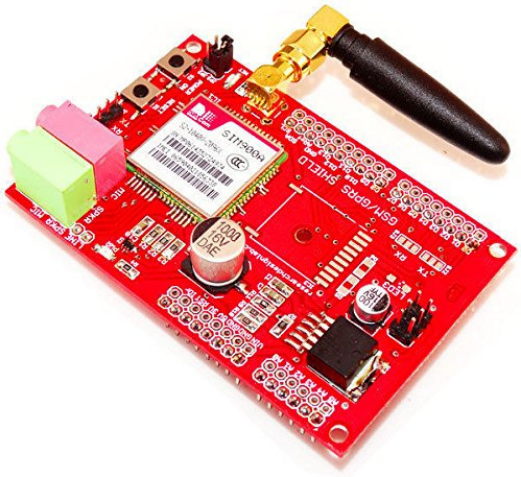


Figure 6: GSM MODULE

The modem works on a single supply voltage range of 3.5 to 4.5V with a sleep current of only 2.5 mA. The transmitting power of the modem is 2W on GSM900 band and 1W on 1800 and 1900 band. The modem also supports GPRS data transfers of uplink data @ 85.6 kbps max. And downlink transfers @ 42.8 kbps max. The modem is also capable of sending andreceiving SMSs but received SMSs are stored on the SIM card. The modem supports both 1.8V and 3V SIM cards in its SIM adaptor.

6. INTERFACING OF ARDUINO UNO AND GSM MODULE:

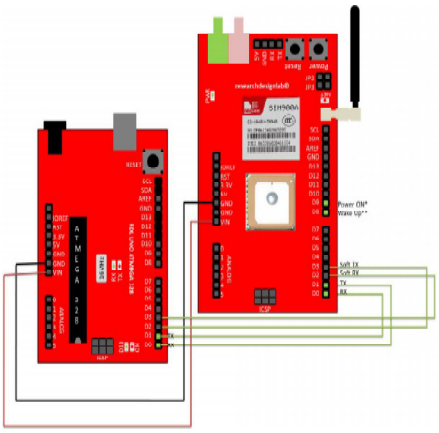


Figure 7: Interfacing of GSM and Arduino UNO

7. GPS MODULE:

The GPS module that this system has used is from manufactured by iWave. The module has a 20 channel receiver with a tracking sensitivity of -159dBm and an accuracy of 10m. This module has a startup first acquisition time of 2 seconds during normal temperatures and up to about 40 seconds under extreme cold conditions. Maximum working altitude for the module is 18000m and max. linear working speed is 514 m/sec. The output protocol is NMEA (National Marine Electronics Association) at data speeds of 4800 or 9600 bauds. The module works on 3.3Vdc which is provided from a regulator on board .

Figure8: GPS MODULE

8. DISTANCE SENSOR:

The distance sensor is used to estimate the position of the helmet.The distance sensor senses whether the helmet is worn by the rider during the accident.

Figure 7: Distance sensor

8. CONCLUSION:

Our System is most useful for Motor cyclists. It's a low cost, Power efficient system by which exact location of an accident can obtained from GPS receiver and the location information,person's identification can be sent to contact numbers of Police control room, Hospital and relatives. Over all this system is very much affordable to a common man and can be easily implemented.

9. FUTURE SCOPE:

This system can be improved by incorporatinga tiny camera to recordthe scene of the accident.

9. REFERENCES:

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