

SMART HELMET USING GSM AND GPS

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Abstract - Everyday around the world a large percentage of people die from road accident. An effective approach is made to solve the problem by using smart helmet band. Smart helmet band is an idea which make motorcycle driving safer than before. The working of this smart helmet band is very simple, Limit switch is placed inside the helmet, which will detect whether the rider has worn the helmet or not, if not then the bike will not start. Smart helmet band provides help in case of accident by using GSM and GPS technology.

Key Words: SIM808(GSM, GPS), Limit Switch, Bluetooth, Accelerometer, Microcontroller ATMEGA 16, Microcontroller ATMEGA8(SMD).

1. Introduction

Now a day bikers in our country are increasing and road mishaps are also increasing day by day. Many casualties occur due to the negligence of wearing helmet. The project makes compulsory to wear the helmet, if the person met with an accident then in such situation a message along with the location is sent to the ambulance or family member to rescue him. The project aims at intelligence security band providing awareness for wearing helmet and also provides prevention for human life safety.

2. Related Work

Many authors presented their work regarding safety against road accident. Some of them are described below:

Accident prevention and Reporting System Using GSM(sim900D) and GPS(NMEA 0183),has been described in [1].The presented system includes SONAR ranging modules, vibration sensor, three modules GPS receiver(NMEA), Microcontroller(AT89S51), GSM modem(SIM 900D) AND AN Alarm. It enables intelligent detection of an accident at any place and reports about the accident on predefined number. When the distance is too short between the vehicle and

obstacle then alarm will be "ON" as an indicator to move vehicle in other direction which is safer but when a vehicle faces accident despite of alarm, immediate vibration sensor will detect the signal and Microcontroller sends the alert message through the GSM model including the location to the predefined number. This provides an automatic accident prevention and reporting system.

The research paper [2] aims at finding the occurrence of any accident and reporting the location of accident to the previously coded numbers so that immediate help can be provided by ambulance or the relative concerned. GSM technology is used to intimate the vehicle position in the form of latitude and longitude coordinates through sms. The location spot is retrieved using GPS which is navigational system using a network of satellite orbiting the earth. Sensors such as vibration, alcohol and fire detectors detect signal in case of an accident occurrence and send a signal to the connected microcontroller. The controller in turn operates the relay to glow the airbag and automatically lock the brakes. This paper gives a design which have many benefits like low cost, small size.

Real Time Vehicle Detection and Tracking Using GPS and GSM [3]. This paper presents review on the accident detection techniques and some future possibilities in this field. The purpose of the project is to find the vehicle and locate the vehicle by means of sending a message using a system which is placed inside a vehicle. The project is designed for vehicle accident detection and tracking system by using GSM and GPS.

3. Proposed System

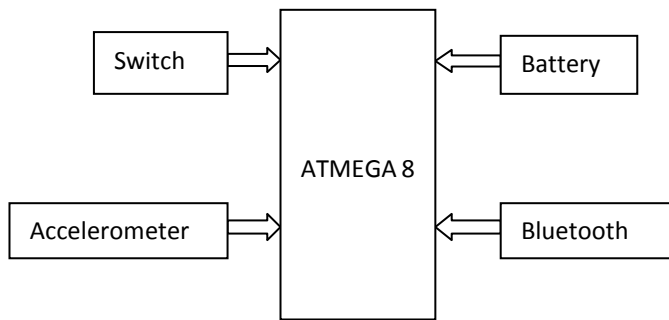


Fig 1: Block Diagram of Transmitter

In transmitter as shown in fig 1 we are using Atmega-8 (SMD), Limit switch, Analog Accelerometer(ADXL335), Battery and Bluetooth(HC-05). Firstly the Limit switch in transmitter checks whether the rider has worn the helmet or not. If yes, then it will send a signal to the receiver and it will provide ignition. The accelerometer will continuously monitor and if values of accelerometer will exceed the set threshold value then it will be considered as an accident.

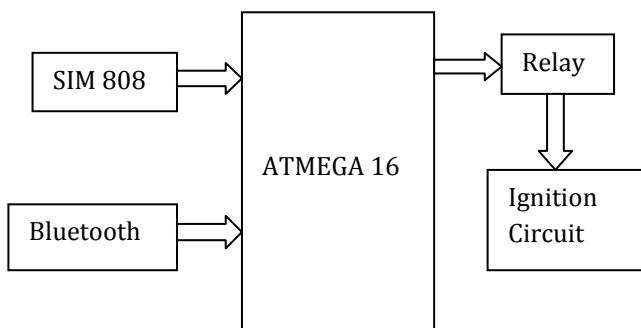


Fig 2: Block Diagram of Receiver

The receiver as shown in fig 2 consists of Atmega-16, Bluetooth (HC-06), Sim808 (GPS GSM), Relay. After the detection of accident via accelerometer the Bluetooth sends signal to the receiver which enables the GPS and GSM (sim808). The sim sends a message to the pre-defined number along with the location of the vehicle.

4. Flow chart:

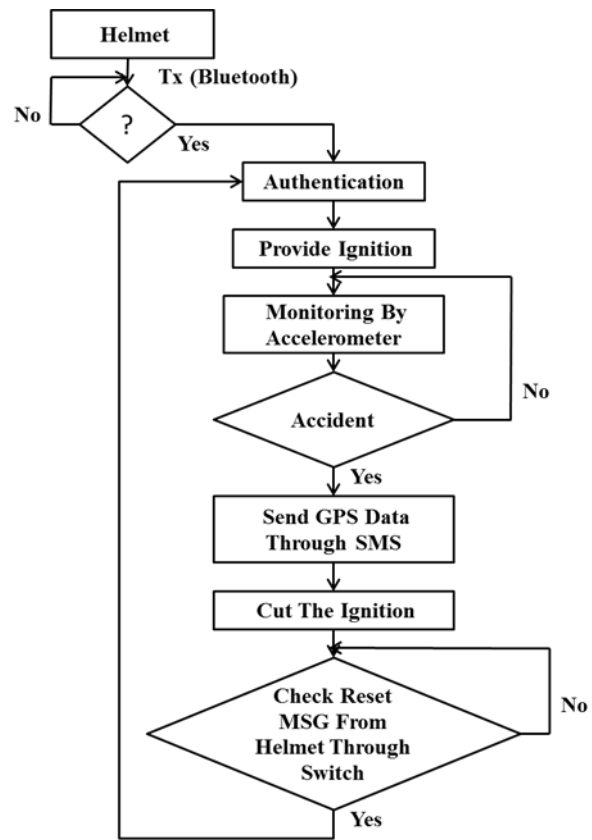


Fig 3: Operational Flow Chart

4. HARDWARE DESCRIPTION:

Microcontroller

Atmega 16 and Atmega 8 is high performance, low power Atmel AVR 8 bit microcontroller based on enhanced RISC architecture with 16KB(for Atmega 16) and 8KB(for Atmega 8) flash 512bytes EEPROM 1KB of SRAM. By executing powerful instruction in a single clock cycle, the ATMEGA 16 achieves throughputs approaching 1MIPS per MHz.

GSM/GPS Module SIM808 GSM/GPS

SIM808 is integrated with a high performance GSM and GPS engine. The GSM/GPS engine is a quad-band GSM/GPS module that works on frequencies GSM 850 MHz (As shown in fig 4).

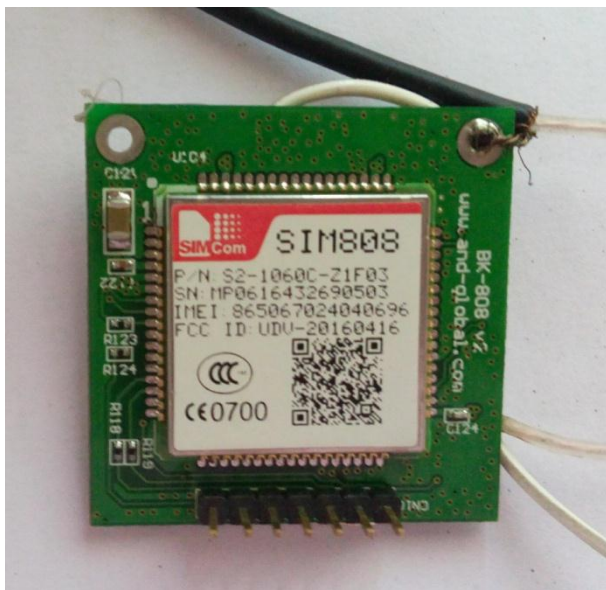


Fig 4: Module of SIM808 GSM/GPS

GSM :

In this project GSM is used to send a text message along with the location to the pre-defined number via AT-Command shown in table no.1(Refer fig 5).

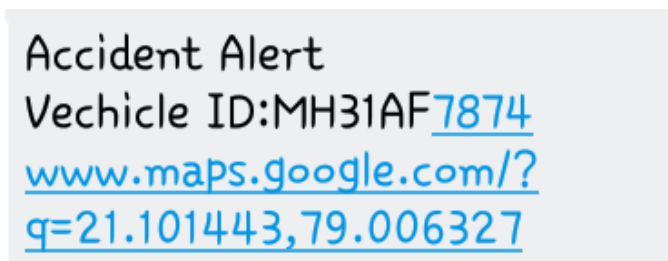


Fig 5: Snapshot of accident alert message containing longitude and latitude.

- Following table gives idea of AT- Command used to send message using GSM.

Table -1:

Command	Description
AT	Make sure the module is working properly.
AT+CMGF=1	SMS Configuration.

AT+CMGS="phone number"	Set the message transmission number and send SMS message. After receiving the symbol >, a message (end with 0x1A) can be sent out.
0x1A	This is a terminator. Before sending it out, you should check the option send as Hex.

GPS :

Sim808 with built in global positioning system. GPS receives the data from the satellite and decodes it in the form of latitude and longitude and send it on serial port. It operates on AT-Command shown in table no.2.

- Following are the GPS AT Commands used to send the longitude and latitude values.

Table-2:

Command	Description	Response
AT	To check the module	OK
AT+CGNSPWR=?	GPS power control	OK
AT+CGNSINF	Get current GPS location info	Response <GNS run status>,<fix status>,<UTC date & time>,<latitude>,<longitude>,<MSL altitude>,<speed overground> OK.

Accelerometer

The ADXL335 as shown in fig 6 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. Bandwidths is selected with a range of 0.5 Hz to 1600 Hz.

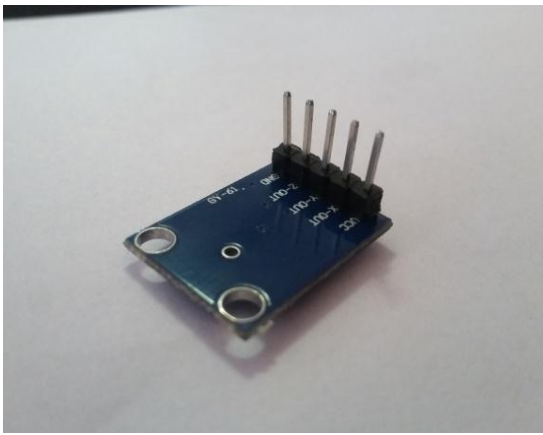


Fig 6: Analog Accelerometer

Table -6: Range

Device	Range(in meters)
Bluetooth	35-40

5. Testing of Hardware and Software

Table -3: Time Requirement

Function	Max. Time Required	Min. Time Required
To pair Transmitter and Receiver via Bluetooth	8 sec	3.4 sec
To fix GPS location	7 min	2 min

NOTE: Time required to fix GPS location may vary according to network availability.

Table -4: Response of Device

Action	Response
Sudden removal of helmet	Vehicle will stop immediately
After accident	LED's placed on band will continuously blink

Table -5: Total current consumption

Transmitter Section	50mA
Receiver Section	150mA

Accelerometer Testing

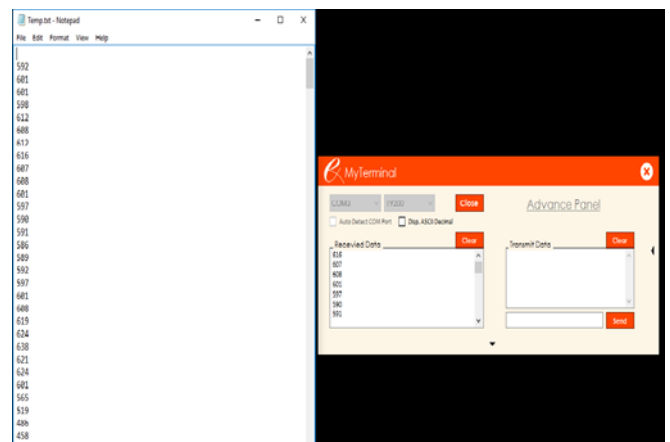


Fig 7: Readings on software(Atmel studio 6.0)

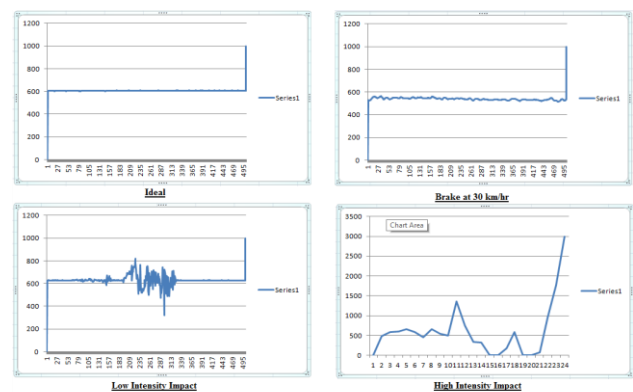


Fig 8: mg Vs No. of samples(where g=9.8 m/sec²)

Above fig shows plotted graph of readings tested on software.

First graph shows the ideal state of the accelerometer. Second graph shows the reading of sudden brake applied on vehicle at speed of 30 km/hr. Third graph shows low impact on the device. Fourth graph shows high impact on the device. By using this above plotted graph a threshold value has been calculated to detect accident.



Fig 9: Front View Of Helmet



Fig 10: Back View Of Helmet With Transmitter

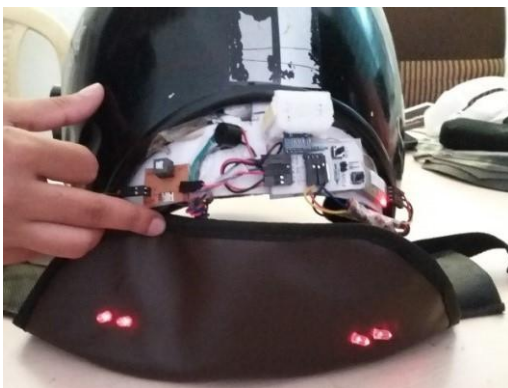


Fig 11: View Of Transmitter



Fig 12: View Of Receiver



Fig 13: Setup without vehicle



Fig 14: Setup with vehicle

6. CONCLUSIONS

In this project we have successfully designed a smart helmet band using GSM and GPS technology. The project made compulsory of wear helmet to start the ignition of vehicle and while riding if any sudden change in velocity occurs then accelerometer will monitor the change and a short message with the location of rider will be send to the predefined number using GSM module. This is a situation where we found some solution to the problem of increased death ratio.

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BIOGRAPHIES



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