Smart Helmet

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ABSTRACT
This paper presents the smart helmet that ensures that the rider cannot start the bike without wearing it. This helmet uses simple cable replacement for wirelessly switching on a bike, so that the bike would not start without both the key and the helmet. Also, whenever the driver starts ignition, the alcohol sensor measures the content of the alcohol in his breath and automatically switches off the bike if he is drunken. To make driving more safe GSM and GPS technology is used. Vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and gives to the microcontroller board, then controller extract GPS data using the GPS module that is interfaced to it. When the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or family members.

General Terms
Ignition, Drunken, Interfaced, Stress limit

Keywords
Alcohol Sensor, Gsm, Gps, Microcontroller, Pressure Sensor, Smart helmet, Vibration Sensor.

1. INTRODUCTION
ROAD traffic crashes take the lives of nearly 1.3 million every year and injure 20-50 million more in the world. According to Global status report on road safety 2013 total number of road traffic deaths remains unacceptably high at 1.24 million per year. Only 28 countries, covering 7% of the world's population, have comprehensive road safety laws on five key risk factors: drinking and driving, speeding, and failing to use motorcycle helmets, seat-belts and child restraints. So, to overcome from this problem this smart helmet is being introduced which helps to reduce number of accidents that takes every day and also helps to reduce death ratio.

2. TRADITIONAL HELMET FOR BIKE RIDER
Most of the people use traditional helmets just to prevent from challan done by traffic control police not for the safety purposes. So, these helmets do not ensures the safety of the driver.

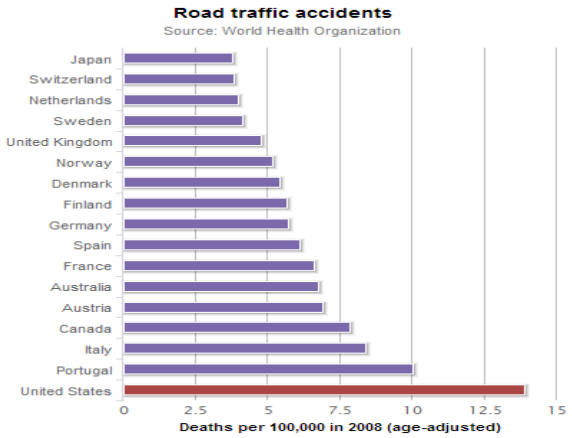


Fig.1. No. of deaths take place due to accidents

3. SMART HELMET
For two-wheeler rider, Helmet act as a basic protection device. But it does not ensure whether the rider strictly follows the traffic rules or not. So, to overcome from this problem this smart helmet can be used.

The smart helmet described in this paper is based on one single idea i.e. to ensure the safety of the driver as the bike will not start till the biker won't wear this smart helmet. Also, if the biker is drunk then also ignition of the bike will not takes place. If someone unfortunately met with an accident then the location of that particular place will be send to his neighbor as well as to nearby police station in the form of longitude and latitude values.

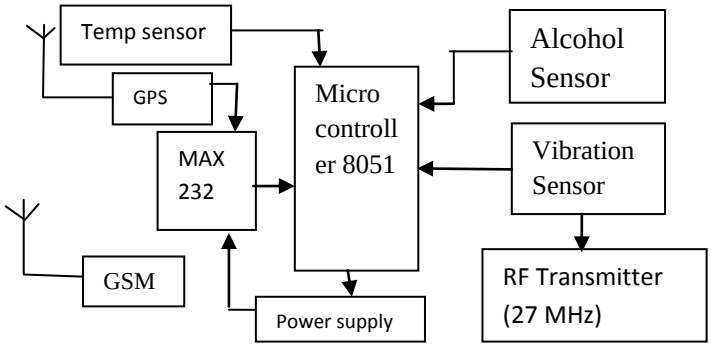
4. BLOCK DIAGRAM


Fig.2.Block diagram of Smart Helmet System

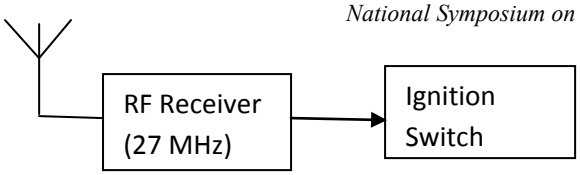


Fig.3.Block diagram of receiver and starter switch

5. PRINCIPLE OF OPERATIONS

This Smart helmet has two modules of operation i.e. one receiver part and one is transmitter part. The transmitter part is embedded in the helmet itself whereas receiver part can be installed in any particular bike. Thus, wireless communication takes place between two modules.

In the transmitter module, pressure signal is sensed by pressure transducer which is situated inside the helmet. A comparator converts analog signal to digital signal and feeds as logic level 1 to the input of transmitter whereas transducer gives the output. When the user takes off the helmet then the output of transducer becomes zero and the input of the transmitter will get 0 as logic level.

In the receiver module, a high level digital output will obtained by the output pin till the rider wears the helmet and the ignition unit circuit of the bike will be completed when this signal actuates the digital relay. When the rider takes off the helmet the relay opens and the connections of the circuit will get terminated.

Also, MQ-3 gas detector (alcohol sensor) is used to detect the alcohol content from the breath of the rider. It can be placed just below the face defend so that it can sense it easily. If the rider is drunk, then the resistance value drops which leads to the sudden change in voltage value. Then this value transfers to the microcontroller and it prevents from the ignition of the bike under this case.

6. PROPOSED CIRCUIT DIAGRAM

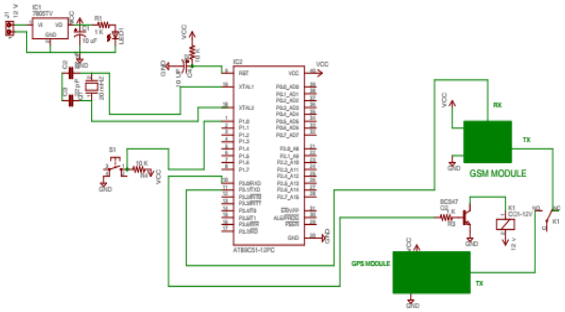


Fig.4.Circuit diagram of Accident Tracking System

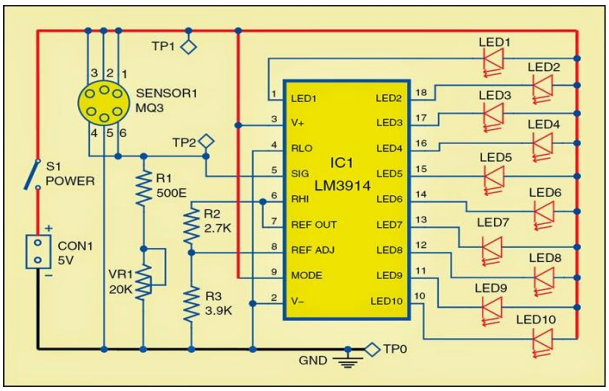


Fig.5.Circuit diagram of Alcohol Detector

7. SCHEMATIC DESCRIPTION

7.1 Gas Sensor (MQ3)

This sensor is used to detect alcohol content in biker's breath. It runs on voltage supply of 2-3.3V. It requires heater voltage with operating temperature of -10 to 70 degrees C. Its heater consumption is less than 750mW. Its dimensions are 16.8mm in diameter and 9.3mm in height without pins. It has a high sensitivity and fast response time. It costs around $4.75.

In this circuit, first 3 pins are connected directly to the power supply and 5th pin is connected to the ground whereas 4th and 6th pin of gas sensor is connected to the 5th pin of LM3914. When a drunken person comes in contact with this sensor, the alcohol vapours gets close to MQ3 detector and its resistance changes. This change will result in making LEDs glow. More the concentration of alcohol detects more LEDs will glow.

Fig. 6: MQ3 Sensor

7.2 GPS Technology

The Global Positioning System (GPS) is a satellite-based navigation system which is used to detect the location where the accident will be taken place. It detects the Longitude and Latitude values of particular place and sends it to GSM module. It works in all weather conditions. It also helps to determine other units like speed, distance, time, etc. There are 3 pins of GPS module which is used in this project. Receiver pin of GPS is connected to the transmitter pin of GSM module and Transmitter pin of GPS is connected to the receiver pin of GSM module and 3rd pin is connected to Vcc.

Fig. 7: GPS MODEM available in local market.

7.3 GSM Modem SIM900

GSM abbreviates as Global System for Mobile communication. It is used to establish connection between a computer and GSM system. It includes standard interfaces like RS232, USB, etc. The power supply circuit is also built in the module that can be activated by using a suitable adaptor. It costs around $20. It is used to send messages through the SIM.

Fig. 8: GSM MODEM available in local market.

7.4 Temperature Sensor

The LM3914 series is a temperature sensor whose values can be measured in degree Celsius. Here, it is used to detect the change in temperature that takes place during the process. Further it sends the signal to the microcontroller.

7.5 Microcontroller

In this project, 8051 microcontroller is being used. It can be known as brain of this circuit. It is an internally Harvard architecture, complex instruction set computing (CISC) instruction set, single chip **microcontroller** (µC) series. One can store commands and values which occurs during the mechanism of circuit. All the signals are processed in microcontroller and sends it to various other devices.

7.6 SIM

SIM abbreviates as Subscriber Identity Module. It is a small chip placed inside GSM module. It is used to send the location to the relatives of victim and nearby police station where the accident has occurred. Nowadays, there are dual sim smartphones are available so one can use any of the sim for the same.

7.7 Power Supply/Power Adapter

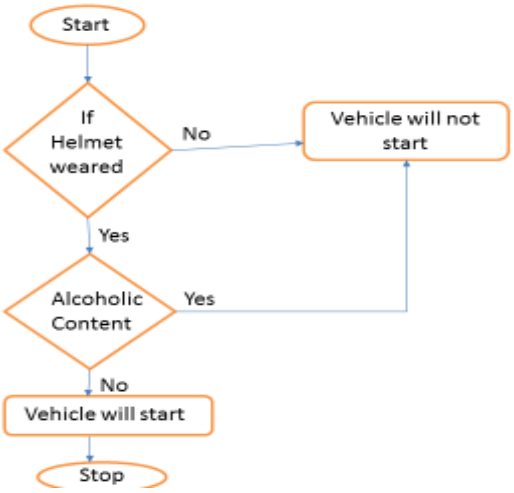
Power supply is the source of electrical power. Here, 5V power supply with the help of 7805 regulator is being used. Current will flow in the circuit in the form of direct current (DC).

7.8 Transformer

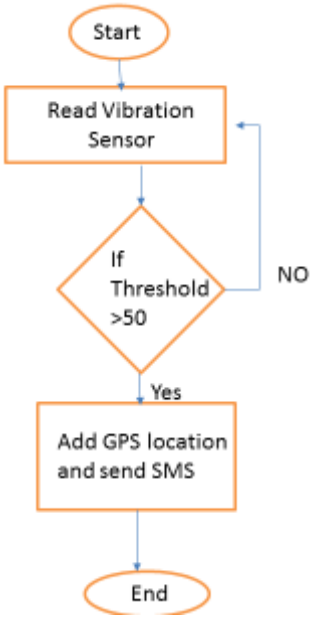
Transformer is used to construct 5V power supply. Through its primary and secondary winding can make step up as well as step down transformer. It helps to convert AC current to DC current.

8. FLOWCHART

8.1 Ignition of Bike



8.2 Accident Takes Place



9. RESULTS

Fig. 9: Prototype of Smart Helmet

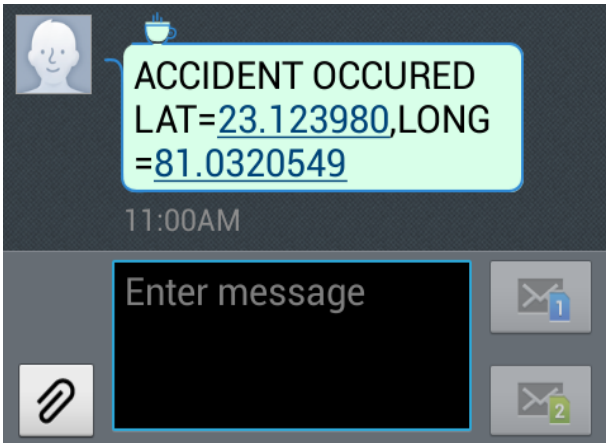


Fig 10. Latitude and Longitude values

10. CONCLUSIONS

This helmet can reduce number of road accidents that takes place every day. It ensures the safety of the biker as well as sends the victim's location to family members and nearby police station. Also, death rate can drastically be reduced by

implementing this circuit as mandatory while driving and make everyone's life easier and smoother.

11. FUTURE ENHANCEMENT

The project can be enhanced by adding Google Glass Technology. Through this technology, biker can see the upcoming road before reaching that particular place. It can prevent biker from pits and pitiful condition of roads. Also, biker can see navigation on it and can alert him while taking sharp turns. Further, it can implement on cars also. People can use car seat belt to start ignition of car which can enhance the safety of the driver.

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