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# SMART HELMET FOR ALCOHOL DETECTION AND ACCIDENT AVOIDANCE

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**Abstract:** *Road accidents take place in big cities almost every day. Sometimes, these accidents prove to be fatal. Normally, it is cyclists and motor cyclists who are the victims of such accidents. One of the important problem with bike riders is that most of the time they don't bother to wear helmet which could be fatal when accidents happen. Also reckless drivers are in the habit of drinking.Under the influence of liquor they indulge in rash driving. A smart helmet is a unique idea which automatically checks whether the person is wearing the helmet and has non-alcoholic breath while driving. GSM & GPS technology and also different sensors like alcohol sensor, flow, sensor, tilt sensor, bumper switch, limit switch are used. Provision for cell phone charging is provided .*

***Keywords-****Alcohol sensor, Flow sensor, Tilt sensor, GSM, GPS,Smart helmet*

## I. INTRODUCTION

Number of two wheelers in total road accidents has raised continuously from 26.3 per cent in 2013 to 27.3 per cent in 2014 and 28.8 per cent in 2015 [2].Two-wheelers accounted for the highest number of fatal road crashes in recent years. Studies show that serious head injuries can happen even at low speeds (10-15 kmph).Due to drinking and driving two wheeler riders often get into accidents.The people involved in the accidents need to be taken care of and immediately taken to the emergency room.Hence Road Safety becomes a major issue of concern. Therefore it becomes necessary to implement such a technique which is not easy to bypass the basic rule of wearing helmet and to avoid drunken driving [3].

Hence we have proposed such a system which will help to avoid above problems. Taking into account the inconvenience caused in the helmet we decided to implement many features in the helmet which will make the rider comfortable. Here we designed a system which checks the two conditions before turned ON the engine of the bike. Our system includes an alcohol sensor and a limit-switch. A switch is used to detect whether the rider is wearing helmet. Alcohol sensor is used to detect whether the bike rider is in drunken condition, the output is fed to the MCU. Both the switch and the alcohol sensor are fitted in the helmet. If any of the two conditions are violated the engine will not turned ON. To know that accident has occurred collision sensor is used. Microcontroller will send an SMS containing information about the accident and location of accident to family member. Another important feature is that this we are providing security against bike theft, fuel theft and if towing of van is detected also message alert is provided for the same.

## II. PROPOSED SYSTEM

Our proposed system has following features:

- It consists of two sections:
  1) Transmitter section (Helmet Unit)
  2) Receiver section (Bike Unit)
  Data from the helmet will be transmitted wirelessly to the bike. According to the various sensor input the micro-controller will decide the actions of other blocks.

- Collision sensor is used for accident detection which will be placed on the bumper.
- This helmet is equipped security for bike theft and fuel theft. Also indication will be provided if bike is taken away by towing van.
- Panic switch is provided to alert relatives if rider is in danger.
- GPS is used to determine the location of accident in terms of longitude and latitude. This data is forwarded using GSM to relatives/friends.
- Cell phone charging feature is also provided [4].

The system ensures the safety of the biker, by taking it necessary to wear the Helmet, as per the government guidelines.

 

## III. BLOCK DIAGRAM

### 3.1 Transmitter section:-

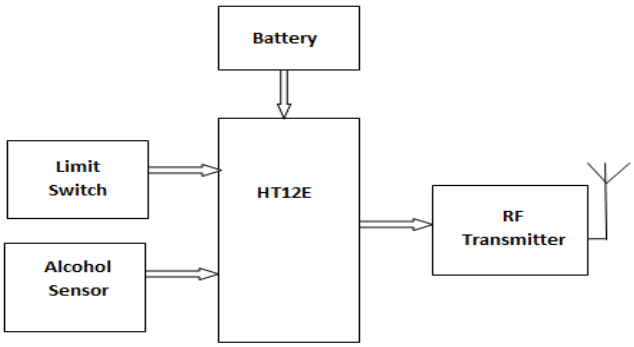


***Figure 1: Block Diagram of transmitter section***

Transmitter section consists of a limit switch and an alcohol sensor. When the rider wears the helmet , the switch gets pressed and the indication of same is given on LCD. Also alcohol sensor which is fitted at the mouthpiece checks whether the alcohol content is present in rider's breath. If found alcoholic ornon-alcoholic same will be indicated on the LCD.
Only if rider is wearing the helmet and has non-alcoholic breath then only the bike will start.HT12E converts parallel data into serial data and this data is transmitted wirelessly using RF module to the receiver section.

### 3.2 Receiver section:-

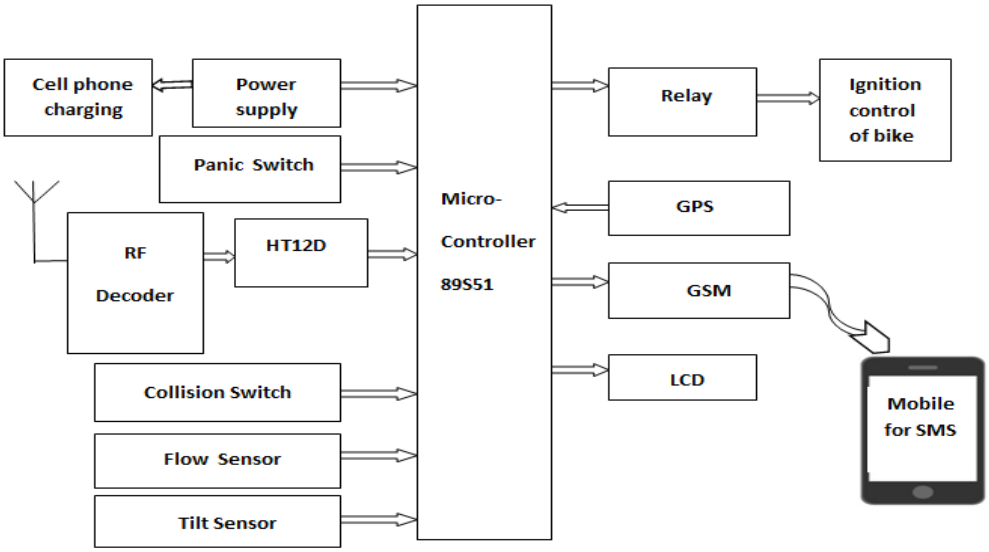


***Figure 2: Block Diagram of receiver section***

Data transmitted by transmitter section is received by RF decoder which is then encoded by HT12D connected to microcontroller. Microcontroller will process the data which will be provided by different sensors and accordingly will perform necessary actions.Collision switch is placed on the bumper of the bike. When other vehicle hits the bike forcefully pressure will be built on switch and occurrence of accident will be detected. GPS will provide coordinates of location where accident took place and this data will be sent to relatives using GSM. If bike ignition is off and if fuel is flow is detected then it will indicate that fuel is being theft. Similarly if bike is off and it is towed due to tilting of bike it will indicate that bike is

 

towed. Accordingly in both the cases GPS will provide location and message will be sent to owner via GSM.Relay is used for interfacing this circuitry to the bike .It is used to control turning ON and OFF of ignition of bike.If rider is in danger and needs help ,so to alert relatives /friends a panic switch is provided which will send an alert message to the same.Additional feature of cell phone charging is provided.

## IV. COMPONENT DESCRIPTION

### 4.1 MQ3 sensor

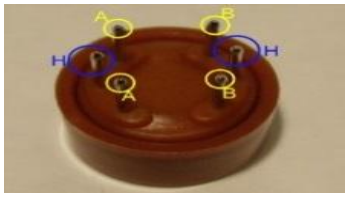


***Figure 3: MQ3 sensor***

Basically, it has 6pins, the cover and the body. Even though it has 6 pins, you can use only 4 of them. .Two of them are for the heating system,i.e.pin H, and the other 2 are for connecting power and ground, they are pins A and B.When rider start the bike then the systemcheck the alcohol level of rider, if it sensed then the bike engine is not started that time. If it sense nothing then the system allows them to start engine [5].

### 4.2 Tilt Switch

Tilt sensors typically have an array of mercury switches positioned at varying angles. Some of the mercury switches are in the closed position when you're parked at any particular slant, while some of them are in the open position. If a thief changes the angle of your car (for exampleby lifting it with a tow truck or hiking it up with a jack), some ofthe closed switches open and some of the open switches close.

### 4.3 GSM module

GSM module requires a SIM card just like mobile phones to activate communication with the network. In our system we are using GSM SIM 900. We are using GSM to inform family members about the accident and various other parameters like fuel theft, towing of bike and in case of emergency.The MODEM needs AT commands, for interacting with processor or controller, these are then communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command [6].AT commands used in our project are : –

AT+CMGS= Sends an SMS message to a GSM phone

AT+CMGF = Sets the GSM modem in SMS Text Mode or SMS PDU Mode[7].

### 4.4 GPS module

We are using GPS1268 module. In case of accident GPS will give co-ordinates of location of accident which will be then send to the family members with the help of GSM.

### 4.5 HT12E

HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together
with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable[8].

### 4.5 HT12D

HT12D converts serial data to its input to 12 bit parallel data. These 12 bit parallel data is divided in to 8 address bits and 4 data bits [9].

### 4.6 Flow Sensor

This sensor sit in line with your fuel tank line, and uses a pinwheel sensor to measure how much liquid has moved through it. A little magnet is attached to the pinwheel,and on the other side of the plastic tubethere's a hall effect magnetic sensorwhich can measure number of spins the pinwheel has made through the plastic wall.

### 4.7Microcontroller

In our project we are using microcontroller 89S51.The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. Features of 89S51 are: 128 bytes of RAM ,4K bytes of Flash, 32 I/O lines, two data pointers,a five-vector two-level interrupt architecture, two 16-bit timer/counters, a full duplex serial port, on-chip oscillator, andclock circuitry [10].In case of accident , microcontroller (89S51) receives the data from the GPS receiver through UART. GPS provides details such as latitude and longitude. This information is then sent to rider's relatives or friends with the help of GSM module.

## V. SOFTWARE REQUIREMENTS

Software used –Express PCB
Compiler-BASCOM
Language used-Embedded C

## VI .FLOWCHART

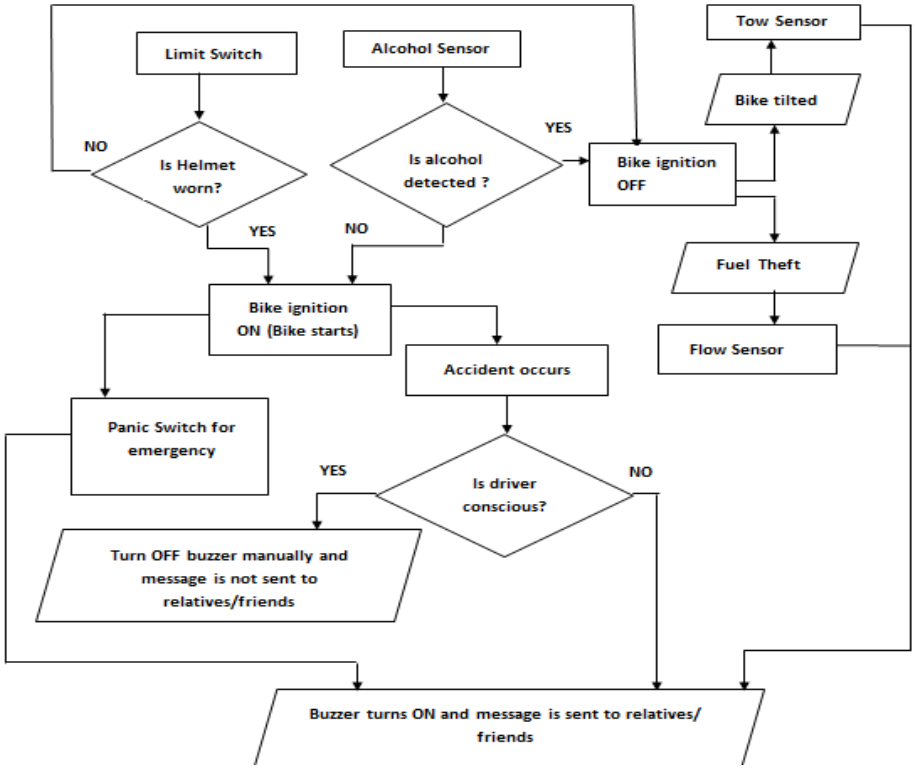


*Figure 4: Flowchart of system*

 

## VII. RESULTS

*Figure 5: Helmet is worn and rider has non-alcoholic breath*


*Figure 6: Bike tow detection*

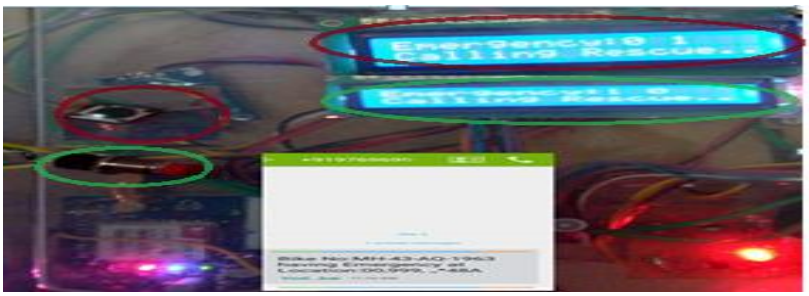

*Figure 7: Accident detection and indication of rider is in danger*


*Figure 8: Fuel theft detection*

 

## VIII. CONCLUSION

The main aim of our project which is to encourage people to obey rules and regulations of traffic authorities can be achieved . Thus fatal road accidents can be prevented to some extent. By implementing this system owner of the bike will be kept informed if some wrong practices are done with the bike.

## IX. FUTURE SCOPE

We can design an intelligent system to notify No parking and No entry area. Indication of the same will reduce crowd of vehicles. No entry area is mainly allocated during the development or repairing of the road, in case if the rider enters in such area this system would immediately give indication as No entry area and vehicle can stop automatically.

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