

# Intelligent Helmet

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**Abstract**— The paper proposes an Intelligent Helmet; the main advantage of this helmet is it can prevent road accidents to a great extent. The bike riders in our country are increasing day by day and the traffic rule followers are outnumbered. One of the main reasons for accidents is drunk and drives. 70 percentages of accidents in India occurred due to this reason. So to reduce this rate this paper is introduced. The circuit modules fixed in the helmet and bike will do the work. The module in the helmet consists of breath analyzer which detects the amount of alcohol content in the breath this module is sync with the module in the bike so if the driver is drunk the engine will not start. If the driver tries to remove the helmet and ride the bike fails to start. The helmet circuit is connected to bike using RF module. Other features installed for accident detection is accelerometer and a GSM module, which monitor the intensity of the accident and report to the given phone number after seconds delay. If the accident is not severe the rider can abort the message sending function pressing the abort switch.

**Key words:** Alcohol Sensor, Accelerometer

## I. INTRODUCTION

In today's era, especially in the young generation the craze of motorbike is really remarkable. As the bike in our country are increasing, the road mishaps are also increasing day by day due to which many deaths occurs, most of them are caused by negligence in wearing helmet. There are different reasons for road accidents carelessness, drunk and drive, due to high speed, violation of traffic rules etc. among these problems drunk and drive is the major reason for 70% of accidents in India. So to reduce the accident rate we proposed this idea called "INTELLIGENT HELMET". There are two modules both in the helmet part and bike part. The helmet part consists of RF module, sensors and gas analyzer. The bike part consists of accelerometer, GSM module and relay. If the rider is drunk and tries to ride the bike the gas analyzer monitor the breath of the rider and a active low signal is send to the receiver in the bike, this deactivate the relay of the bike so engine cannot be started. Same condition happens if the rider does not wear the helmet. Accelerometer installed in the bike is basically a gyroscope, if the tilting angle exceeds threshold that means the vehicle have fallen , after a small delay the GSM module will send a message to the given number. If the falling is not serious then the rider can abort the message sending function by pressing an abort switch. We think that this solution will prevent road accidents to certain extent.

## II. LITERATURE SURVEY

Most of the helmet innovations today focus on only one thing that is adding fancy features such as MP3 players flash light on top of helmet and route map projected on the visor, camera. But none of these features give a guarantee that they are meant to be used for bike rider's safety. Now days some helmets have pressure sensor on it which activates when we wear it. . Once activated the transmitter sends a control signal to the receiver circuit and activates the relay. This is connected to the bike's ignition system. But such helmets can only be used with bikes which has incorporated this system.

### A. Alcohol Detection using Smart Helmet System

An accident is a specific, unexpected, unusual and unintended external action which occurs in a particular time and place with no apparent and deliberate cause but marked effects. Carelessness of the driver is the major factor of such accidents. Nowadays most of the countries are forcing the motor riders to wear the helmet and not to use the vehicles when the person is in drunken condition. But still the rules are being violated by the users. In order to overcome this they introduce a smart helmet which automatically checks whether the person is wearing the helmet and has nonalcoholic breath while driving. Here there is a transmitter at the helmet and a receiver at the bike. There is a switch used to sure the wearing of helmet on the head. An alcohol sensor is placed near to the mouth of the driver in the helmet to detect the presence of alcohol.

### B. Smart Helmet with Speed Indication to Government

In this paper they intend to present an improvement in existing helmet system with speed indication. This system ensures the safety of the rider, by making it necessary to wear helmet and ensures that the rider hasn't consumed high speed. The helmet is being made user friendly by including cooling system inside it, which help to maintaining a comfortable temperature. The system can transmit the information in real time also system is very clever enough to provide information which bike getting high speed then GSM system send a message to government. This project is expected to improve safety and reduce accident and restricted the high speed by informing the government especially fatal to the motorcyclist.

### C. Helmet with Traffic Adaptive Mp3 Playback

To encourage people to wear helmet this project is to be introduced that includes smart interactive robotic helmet with features like road hazard warning, wireless bike authentication and traffic adaptive mp3 playback. This helmet will warn the

rider when road hazard is ahead, also communicate with rider if he is not wearing it and will perform wireless bike authentication that act as prevention from theft. It will also adjust the volume of the speakers automatically while rider is listening to music as a safety precaution.

#### D. Head Mounted Helmet Intelligent System

The goal of this system has been to design and implement a smart head mounted system that can fit on any motorcycle helmet. The primary aim of the project was to design and develop a system that would be able to provide real time data from the motorcycle to the driver's windscreen helmet.

### III. PROPOSED SYSTEM

The proposed system is an Intelligent Helmet. The system ensures the safety of the biker, by making it necessary to wear the helmet, as per the government guidelines, also to get proper and prompt medical attention, after meeting with an accident. In this system a module is affixed in the helmet, such that, the module will sync with the module affixed on the bike. The system will bear following functions:

- It will ensure that the rider has worn the helmet. If he fails to do so, the bike won't start.
- It will also ensure that biker has not consumed alcohol. If the rider is drunk, the bike won't start.
- An accident detection module will be installed on the bike, which will be able to detect accident and will be able to notify quickly the accident to police control room and in case if the accident is minor, rider can abort message sending by pressing the abort switch.
  - It consists of 2 parts:
    - Module on helmet
    - Module on bike.

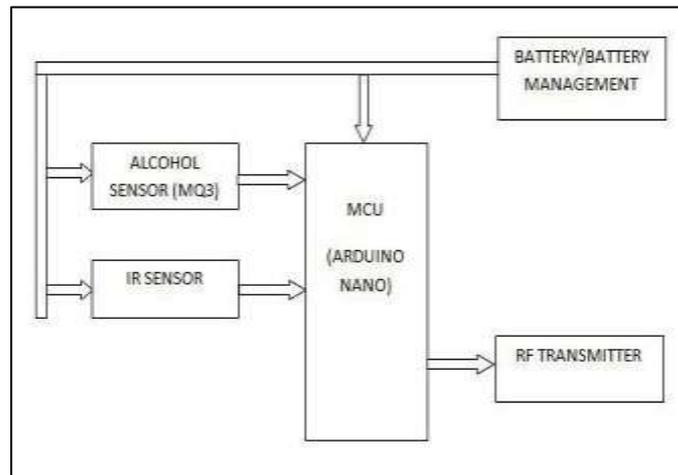


Fig. 1: Block diagram Helmet part

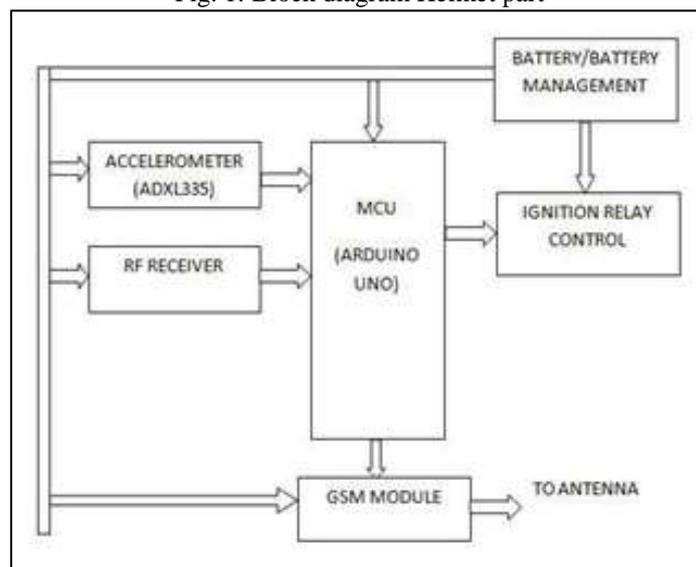


Fig. 2: Block diagram Bike part

#### A. Helmet Part:-

It basically consists of an IR sensor, alcohol sensor, microcontroller and transmitter.

1) *IR sensor:*

An IR sensor consists of an emitter, detector and associated circuitry. The emitter is simply as an IR LED and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the LED. The LOW or HIGH output of the IR sensor determines if the helmet is worn or not.

2) *Alcohol Sensor:*

Used for detecting alcohol concentration in breath. It provides an analog output based on alcohol concentration. If the amount of alcohol exceeds the threshold value it will not allow the bike to start.

3) *Microcontroller:*

In helmet section Arduino nano microcontroller is used. All the analog output from all the sensors on the helmet is sent to this microcontroller as input. According to the threshold set for alcohol sensor and low or high output of the IR sensor a decision is made and sent to the module on bike wirelessly.

4) *RF Transmitter:*

A RF transmitter operating at 434MHz Radio frequency is used to transmit the serial data to the receiver over wireless media.

**B. Bike Part:**

It basically consists of a RF receiver, Microcontroller, Accelerometer, GSM module and Abort switch. **RF Receiver:** Operating at 434 MHz. Radio Frequency is used to receive the data over wireless medium.

1) *Microcontroller:*

Arduino uno is used in this section. This is the actual decision making unit of the entire circuit and the programs will be fed into it. According to the data it will receive from the module on bike it will control the output of remaining components. Based on the output of the accelerometer, it will send message to previously set number using GSM module. And based on the outputs of alcohol sensor and IR sensor it will sends a relay output to the ignition system.

2) *GSM Module:*

This GSM modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Applications like SMS control, data transfer, remote control and logging can be developed easily. The modem can be connected directly to any microcontroller. It can be used to send and receive SMS or make or receive voice calls. Here we will be using SMS application of it to send SMS to the police station in case of accident.

3) *Accelerometer:*

An accelerometer can be used to measure the tilting of the bike as well as the helmet. The tilt of the bike is measured and sent to the microcontroller. If the angle of the bike is Zero with respect to ground, it will detect that the accident has occurred.

4) *Abort Switch:*

Abort switch is used to abort the sending of messages if the intensity of accident is minor.

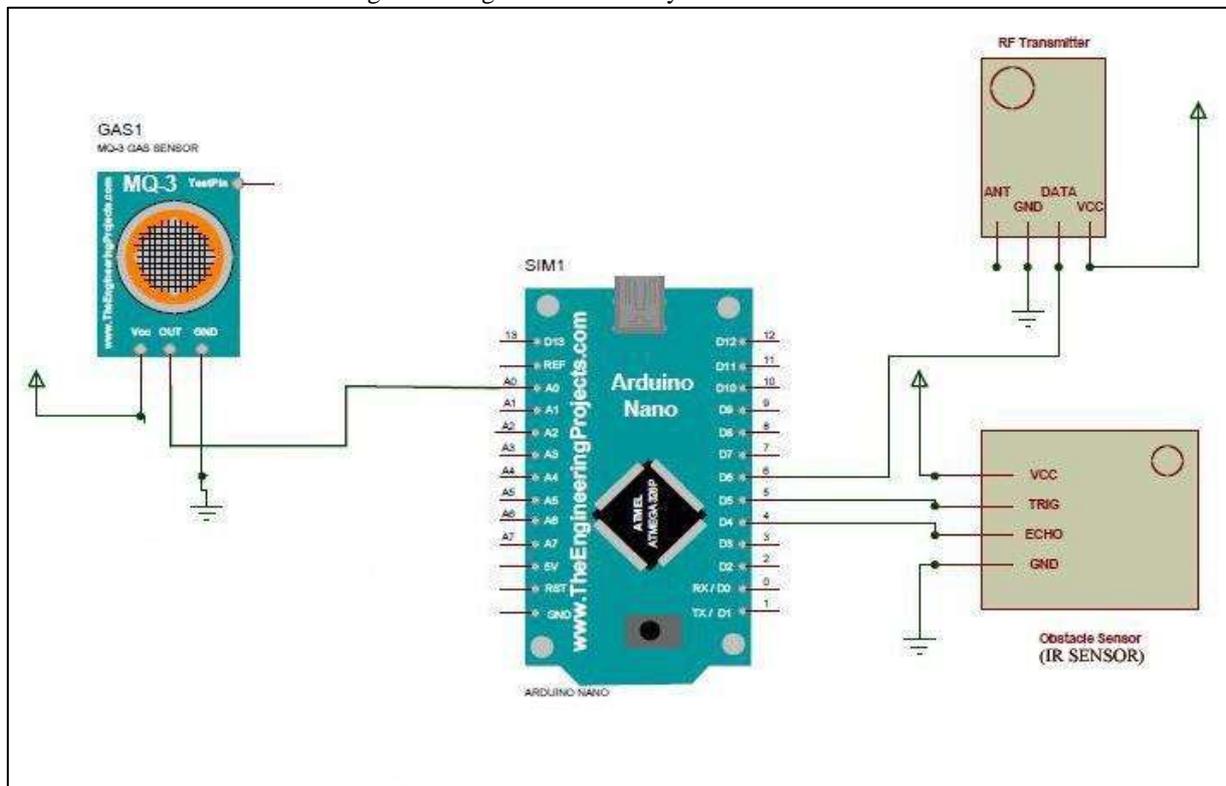


Fig. 3: Circuit diagram-Helmet part

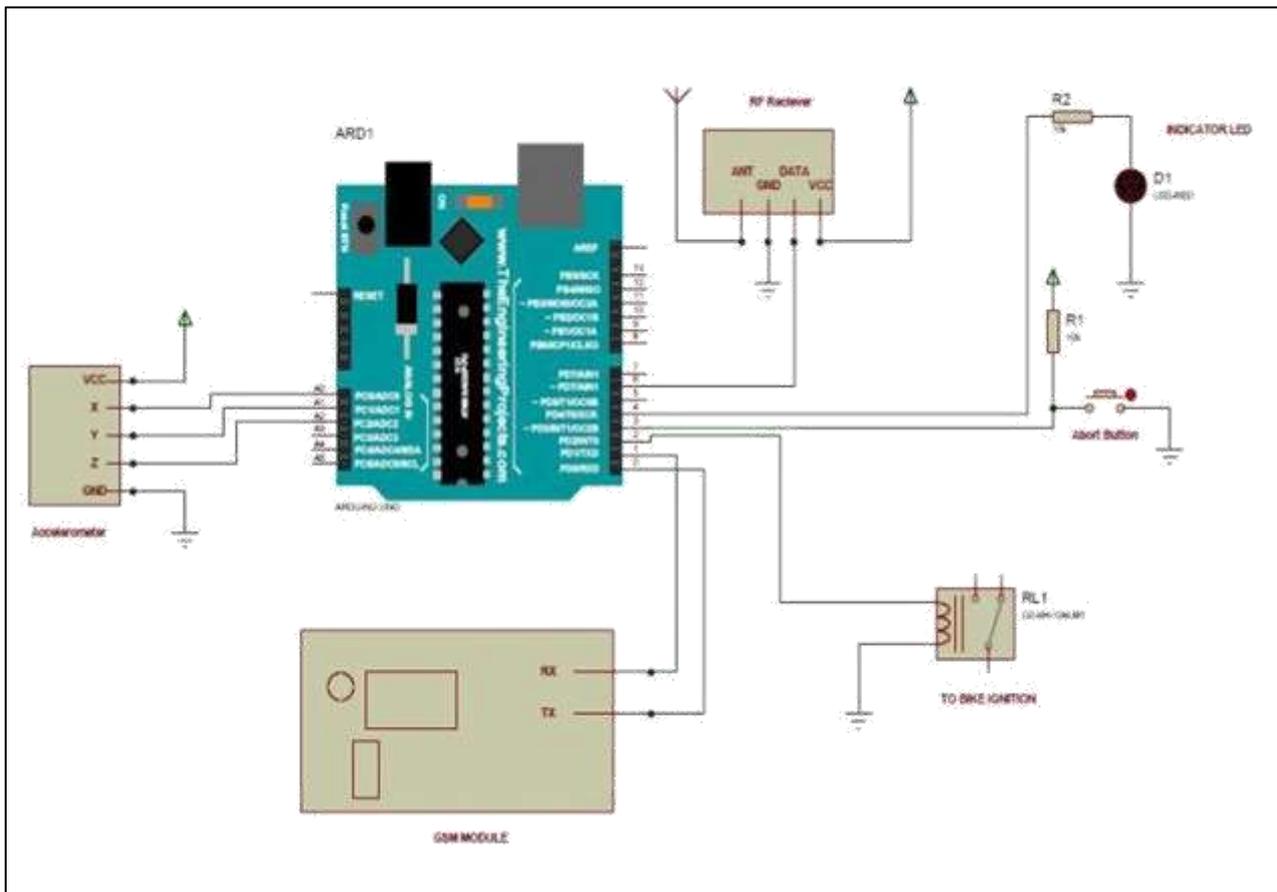


Fig. 4: Circuit diagram –Bike part

5) *Microcontroller:*

Arduino nano controller is Atmega328 architecture. Controller has 32KB flash memory of which 2KB is used by bootloader. SRAM is 2KB. Has 16 MHz clock speed. And has power consumption of 9 mA. Arduino uno microcontroller is ATmega328P. Operating voltage 5v, input voltage (recommended) 7-12 V. Flash memory of 32 KB, of which 0.5 KB used by bootloader. SRAM is 2 KB. 1 KB EEPROM. Has clock speed of 16 MHz.

6) *Alcohol Sensor:*

Here MQ3 alcohol sensor is using. This has a material inside it and the conductance of the material changes according to the amount of alcohol content in air which can be taken as an analogue voltage variation.

7) *Accelerometer:*

Accelerometer used is ADXL335. Very low current required, typically about 350uA. Has single supply operation of 1.8 V to 3.6 V. provides excellent temperature stability

**IV. SYSTEM WORK FLOW**

- The rider wears the Helmet.
- Initializing alcohol sensor and IR sensor.
- IR sensor detects an obstacle and gives LOW output. The alcohol sensor calculates the alcohol content in the rider's breath.
- Both sensor readings are sent to the microcontroller unit as input and MCU process the data and send it to the module on the bike via RF transmitter and receiver.
- If the both sensor reading are LOW, then a „S“ (safe) character is transmitted, if any of the sensor reading is HIGH a „D“ (Danger) character is transmitted.
- Microcontroller in the Bike section receives the transmitted data or character from the Helmet section through RF receiver.
- Initializing GSM module and Gyroscope.
- Checks the received character if it is „S“ or „D“.
- If it is „D“ the relay pin, danger pin (LED) and buzzer pin will be high.
- If the receiver signal is „S“ then the relay, danger pin and buzzer pin is low.
- Checks the accelerometer readings, if it is beyond the reference value then wait for 5 seconds and again take gyroscope readings.

- If the Gyroscope value is still beyond the reference value the accident is conformed then waits for the abort for 10 seconds.
- If it is not aborted within 10 seconds then the GSM module is activated and message is send to the previously set number.
- The program is hold until the accelerometer readings came below the reference value.

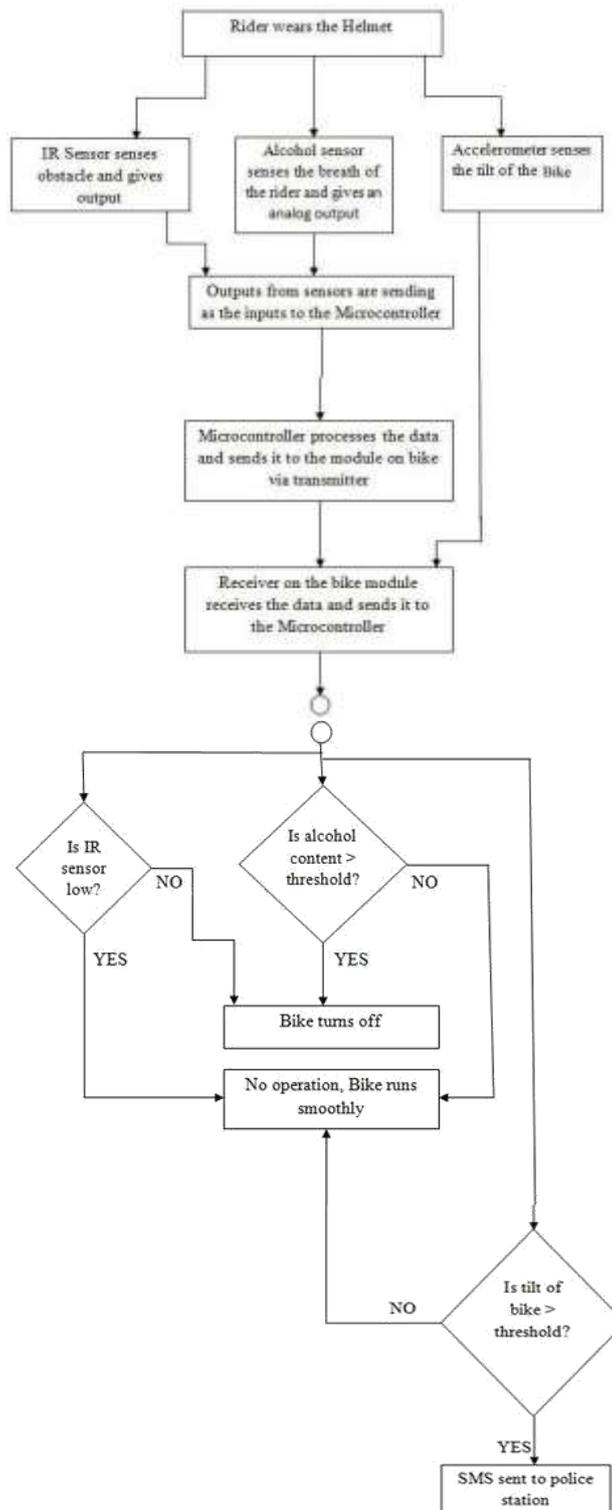


Fig. 5: Flow chart

## V. ADVANTAGES

- Prevents driving under the influence of alcohol and hence avoids the accidents due to the drunken drive.
- Ensures the rider always wears a helmet which provides safety.
- Makes arrangements to deploy quick emergency services.

- Help to inform the police if the rider met with an accident.

## VI. DISADVANTAGES

- Requirement of an External Battery.
- If no GPS then the location tracking become more difficult.
- Costlier than Ordinary Helmet.

## VII. FUTURE SCOPE

- Can be modified for Four wheelers
- GPS can be used to track the location of accident.
- Can construct intelligent system during a compact size.
- Light dimmer sensors can be used to dim the light automatically when light from other vehicles falls on it.
- Flexible solar panels can fix all along surface of helmet for power up the circuit.

## VIII. RESULT AND CONCLUSION



Fig. 6: Circuit in helmet part and bike part

## IX. CONCLUSION

As the concluding part of this project, we would like to say that- “without proper time, danger awaits us with a bigger face”. We must act on time when the person is injured. We must take care of person the way it is meant.

Now a day’s most case of accidents area unit by motor bike The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. In our project we have develop an electronic intelligent helmet system that efficiently checks the wearing of helmet and non-alcoholic breath. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries throughout accidents caused from the absence of helmet and additionally reduce the accident rate due to drunken driving. The system also helps in efficient handling of the aftermath of accidents by sending alerting message. A GSM module is used in this system that will send a message to the predefined number that is programmed using microcontroller in case of any accident. If this project imparts this idea in even one person, we would think that the project will be Successful.

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