

# Smart Helmet System

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## ***Abstract***

*A helmet is the most basic and essential safety equipment for riding a bike. Also, it is made compulsory by the government to wear a helmet while riding a motorcycle. There have been many incidents where the rider died in an accident because he/ she was not wearing a helmet. To make sure the driver is wearing a helmet we have come up with this project. Helmets are there to protect us in case of an accident but if we can eliminate the reasons behind the accident then it would be better for everyone. We have come up with two main reasons: 1) Drink and driving and 2) Driver drowsiness. In this project, we will be focusing on both reasons and thus try to avoid accidents.*

*Also, many times it happens that the helmet falls from the bike when the bike is standing or the bike falls in a stationary position which leads to false accident detection. In this project, we are trying to remove this error also.*

***Keywords:*** *Microcontroller, Arduino, Force sensor, IR sensor*

## 1. Introduction

A traffic accident is defined as any vehicle accident occurring on public highway roads. The thought of developing this project comes to do some good things towards the society. Road accidents are a major concern these days. This takes so many lives every year. The main reasons behind them are drinking and driving, not wearing helmets before riding, drowsiness, distraction, and not following any such guidelines provided by the government. Most people use helmets not from a safety point of view, but to avoid traffic police challan. So, to avoid all the carelessness and for the sake of the safety of motorcycle drivers, smart helmets would be a great solution. It will avoid all those reasons causing accidents. Smart helmet focus on three major applications which are helpful in our day-to-day life. At first and most one is the ignition of the bike will not turn on if we are not wearing a helmet. Secondly, alcoholic driving is not possible by using this smart helmet. If the rider is drunk, the bike will not start. The third application is Drowsiness detection. If the rider's eye is closed for a long time, then the IR sensor will detect and the bike will automatically stop.

## 2. Technical Study

### 2.1 Force sensor

It converts an input mechanical load, weight, tension, compression or pressure into an electrical output signal. It has two terminals. It is non polar. Its operating voltage is about 5V.



Fig. 1 Force sensor

### 2.2 IR sensor

Infrared sensors are used to sense characteristics in its surroundings by emitting and/or detecting infrared radiation and are capable of measuring the heat being emitted by an object and detecting motion. It has three terminals, one for supply voltage, one for ground and one for output signal. Its operating voltage is about 5V and recommended is about 7V to 12V.

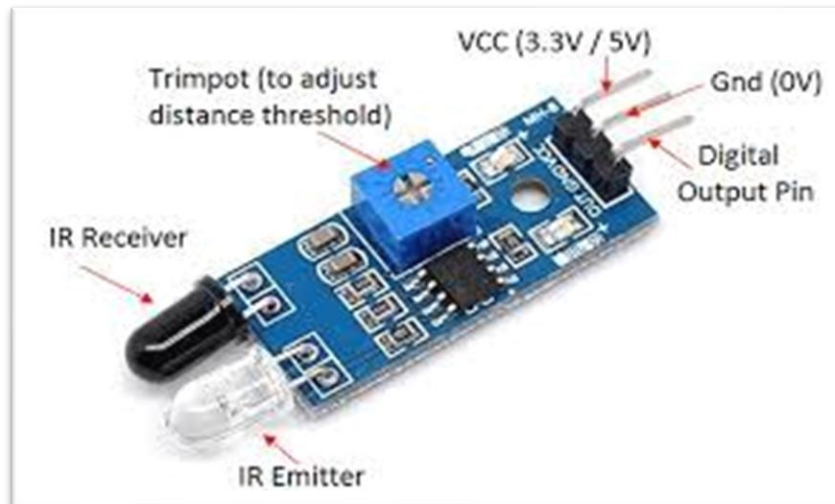


Fig. 2 IR sensor

### 2.3 Alcohol sensor

It detects the presence of alcohol gas in the air. It has four terminals, one for supply voltage, one for ground, and one for input and output signals. Its operating voltage is up to 5V.



Fig. 3 MQ3 Alcohol sensor

### 2.4 Arduino UNO

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Fig. 4 Arduino Uno

### 3. Working

- Sensors play a crucial role here. First our system takes input from the sensors. If all the inputs are proper then only RF transmitter will send a signal to the RF receiver. Only after that our motorcycle will start. If any of the sensors give a false input, then the motorcycle won't start.
- Starting with the Infrared sensor or IR sensor, which is used to detect the drowsiness of a driver, it will check if the driver's eyes are not closed much than the usual blinking time. It will send high signal if the eyes are wide open. It will send low signal if eyes are closed for more than usual blinking time.
- Pressure sensor is used to detect if the person is wearing helmet or not. It will be placed near the chin pad of the helmet. If the person is wearing a helmet, then some pressure will be
  - detected and it will send the high signal to the RF transmitter. If the person is not wearing the helmet, the pressure will not be detected and it will not send any signal.
- The alcohol sensor is used to detect the presence of alcohol in the air. If the alcohol content is within the permissible level, it will be ok but if the content is beyond the permissible level, then the system further won't start.
- So, in short, if the IR sensor sends a high signal, if some pressure is detected, and if the alcohol consumption is within the permissible limit, the RF transmitter will send the high signal to the RF receiver. The circuit closes the switch upon receiving a high signal and the motorcycle starts.
- The vehicle won't start if any of the given conditions is not true.

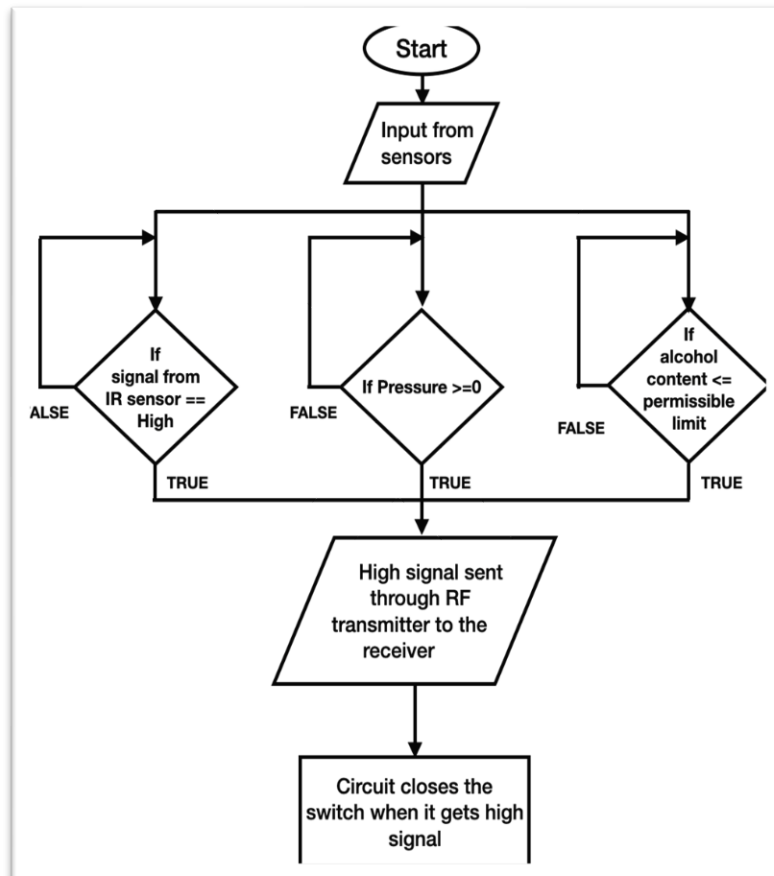


Fig. 6 Flowchart

#### 4. Result and Discussion

All the components are assembled and tested successfully. The circuit is designed in such a manner that bike does not start until and unless rider wears the helmet . Also the bike won't start if the rider is drunk, this helmet alarms the rider if he crosses a certain speed limit by buzzing an alarm. If an accident occurs the engine automatically shuts off to avoid further injuries.

Thus, the experimental phase was completed. This study was conducted in a controlled manner. Thus, there is no pressing need for further experimentation in real life conditions but before full time deployment more simulations need to be performed. In the future, a GSM module and a GPS module can be applied to a system in which the sensor reports an emergency situation to relatives and nearby police personnel. This can be achieved by encoding GSM, GPS modules to transmit the exact GPS coordinates of the accident to responsible authorities making them aware of the dire situation for quick action which may help in saving lives.

## 5. Limitations

Our project has limited Battery supply Hence, the proposed systems will work only when it has required battery power. If any failure occurs in the sensors would obstruct the ignition.

## 6. Future Scope

Our project ensures that driver is sober, driver is not sleeping during ride and driver is wearing a helmet or not. It has wide scope in future as we see more number of peoples are using two wheeler vehicle and there number is increasing day by day and it will be surely helpful for reducing number of accidents which will reduce deaths caused due to accidents. Using this kind of systems with full potential will surely change the future.

## 7. Conclusion

The system is able to make wearing helmet mandatory for the rider for those who driving two wheeler vehicle. Otherwise, the vehicle will not start (Engine will not Ignite). Also, our system will check whether the rider is drunk and drowsiness of the rider. Thus, the safety of rider is achieved to some extent by this proposed work. Moreover, violating of traffic rules of not wearing helmet will be reduced dramatically. Government should make this system mandatory for every two wheeler owners. Using this kind of systems with full potential will surely change the future. The proposed work is newly researched and innovative product for two wheeler automobile industry which soon will be implemented by companies after approval from transport ministry.

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