

# INTELLIGENT SYSTEM FOR TWO WHEELERS

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**Abstract** – An accident is a very unfortunate situation it can happen anywhere with anyone. No one can stop it from happening but what one can do is, we can make driving safer. By safe we mean to implement such technological advancements in the driving model of a two-wheeler, so that people do not drink and drive neither do a blunder by not wearing a helmet.

Accidents are just examples of care-free attitude of driver, even if an accident occurs then also the chances of survival is minimal because people are not obeying the basic necessity which protects them from such situations. According to a survey in India in every 4 minutes a person dies due to a bike accident because people are not obeying the basic necessity which protects them from such situations.. In order to overcome this we introduce a new technology known as wireless helmet or smart helmet. The complete system is governed by the MCU. Along with we have a RF module; a BJT, which is used to drive the motor and relay, is used as a switch to turn on and off the motor. A single line wire antenna is used to transmit data from transmitter side to the receiver side.

**Key words - Intelligent System, Drink and drive, Alcohol Detection.**

## 1. INTRODUCTION

Traffic is a situation, which can occur anywhere either in the city or either in the outskirts of the city. It is more evident that accidents that happen in highways are more deadly than those happen in city. The reason being people travel at higher speeds and tend to violate more rules than they often do while travelling in city and the reason is very simple that patrolling in public highways is less as compared to in cities. Accidents can lead to deaths of people, it can seriously injure someone really bad and could lead to severe injuries. After an accident not only a person gets affected but animals can also get affected, there have been so many cases where the riders have hit the animals that were crossing the roads. It is but obvious that such movements of animals should be controlled but the two-wheelers should also pay close attention in order to prevent such accidents. The worse part is people drive fast and they drink while driving. They have already broke one rule of over-speeding and now

if you're drunk then it is for sure that one is not in his senses. Above this people do not wear helmets, so even if they do not engage in any severe accidents and just slips on its way then also it could lead to devastating injuries because of the in capacity of the helmet. According to a survey, Uttar Pradesh ranks first in deaths due to accidents followed by Tamil Nadu and Andra Pradesh.

In regard with this news it was made compulsory by the ministry of road that a bike will be purchased compulsorily with a helmet. This helped a lot in bringing awareness among people but still people does not obey the laws. An increased penalty was imposed on those who violate the laws but still people do not follow. So that is we have this intelligent system, which can be tampered, but it is for sure by implementing it, this will reduce the accidents.

It follows It follows two cases first that the strap should be buckled properly and second that the rider should test its own breath for alcoholic content. If any of the case is violated then the engine of the bike will not start and rider cannot ride the bike. 2 wheelers are more prone to accidents than 4 wheelers reason being that bikes are not that secure like cars. So safety concerns for 2 wheelers is a more alarming situation that is why all electronic advancements are being used in securing their ride.

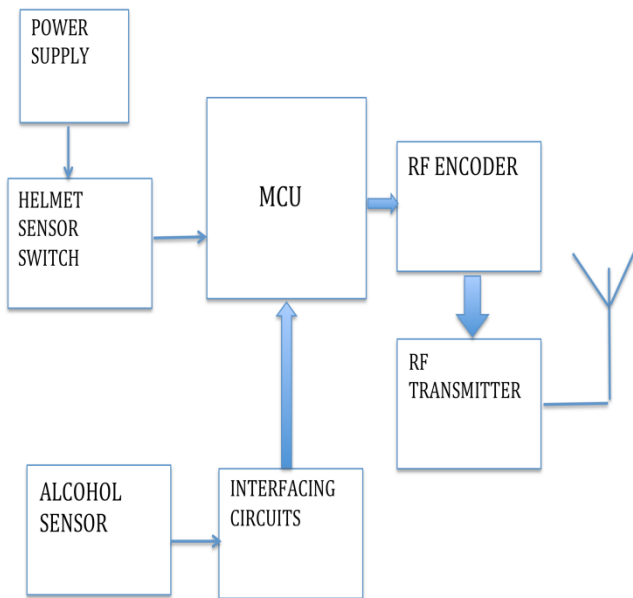
The reason for such involvement of electronics is pretty simple, it is cheap to use and can extensive safety to the riders. Our system includes an Alcohol sensor or a gas sensor namely MQ3. Till the time there is zero alcoholic content in this the bike will not start. According to the government of India the permissible limit of alcoholic content is 0.03% per 100ml blood. If found more then the person is not allowed to drive.

The alcohol sensor gives analog resistive output, which is fed onto the RF transmitter. RF transmitter is equipped with wire line antenna to transmit the data. The sensor is connected to MCU, microcontroller plays the main role in this system and checks whether both the conditions are fulfilled or not.

It is very difficult to check each and every person for alcoholic content and helmet. To control such a huge population we require a huge number of people to enforce them, which is technically impossible. According to the facts given by government of India more than 45% of population commutes through a two-wheeler.

In reference to increasing number of accidents government imposed many rules for the safety of two-wheelers. Firstly they alerted all authorities issuing licenses to the people that rides a two-wheeler must give their driving test by wearing a helmet. Few days back wearing a helmet was made compulsory for women too because it was seen that due to weak physical structure of women they suffer more injuries if any mishap occurs. Thus a need for such a technology is must which cannot be by-passed by riders and it becomes necessary for them to obey the rules of wearing a helmet and not drink while driving in order to get the engine of the bike started.

**2. BLOCK DIAGRAM**

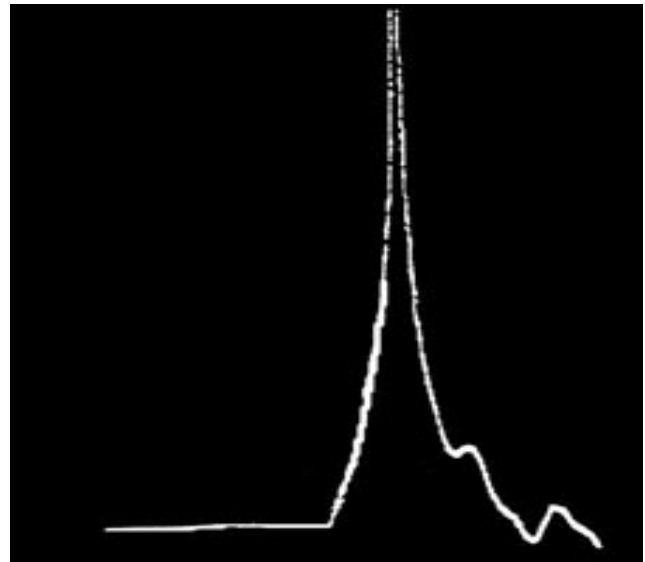


**Chart-1: Helmet Unit**

Our project combines two cases of wearing a helmet and drunken driving using a single embedded system. It is but obvious in spite of these accidents will happen but the severity of injuries in such accidents now will be very less. Brain injuries are 90% less if a person wears a helmet; this study was given by NHTSA.

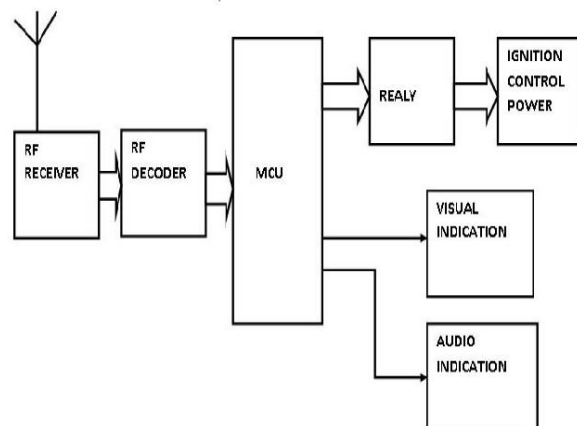
When a brain suffer from impact or explosive rotation of head the nerves in the brain gets pressurized and gets damaged which causes severe damages to head if one is not wearing a helmet, but if a person is wearing a helmet and undergoes an impact then all the pressure is

absorbed by the helmet. Helmets that are BIS-Bureau of Indian Standards marked are more preferred than others as they are tested accordingly. The below chart-2 shows the impact on brain with wearing a helmet and without wearing a helmet.



**Chart-2: Impact without helmet**

The damages caused by not wearing a helmet are very severe and could lead to permanent damages to brain. A sensor button is present on the helmet, which insures that helmet is being correctly worn. Then the MCU checks for the signals given to it. The MCU is designed in such a way that, to ON the engine both the pins should be high. This means the signal should be high in both the cases. The below chart-3 shows the vehicle unit or the receiver side which is placed at the two-wheeler. The signal from the transmitter to the receiver is given by the help of a RF module that works at 434 MHz frequency.



**Chart-3: Vehicle Unit**

The RF encoder is 12 bit binary coded out of which 8 bits are for address lines and 4 bits are for data lines. Address lines are used only when there are two decoders and single encoder. Then to indicate to which encoder will the signal go address need to be specified; otherwise the address lines are remained untouched.

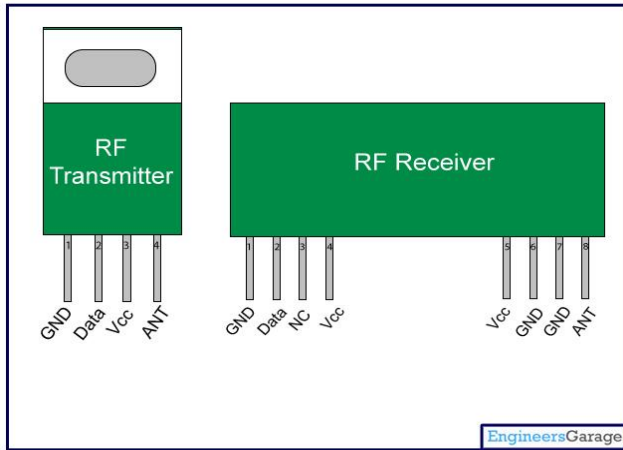


Chart-4: RF Module

The above shown is an RF module. The RF encoder is 12 bit binary coded out of which 8 bits are for address lines and 4 bits are for data lines. Address lines are used only when there are two decoders and single encoder. Then to indicate to which encoder will the signal go address need to be specified; otherwise the address lines are remained untouched.

The RF transmitter converts parallel data into series and RF receiver does vice-versa operation. RF sensor is used over IR sensor because the range of RF is far more than IR. Also RF frequency does not get disturbed by any kind of obstruction or physical blockage.

The IR sensor has point-to-point communication where as there is no such limitation in RF, moreover RF is better and reliable source of communication.

### 2.1 FLOW CHART REPRESENTATION

The below shown flow chart gives a complete process of how the system works. There are two processes that will take place one will be for transmitter and one will be for receiver.

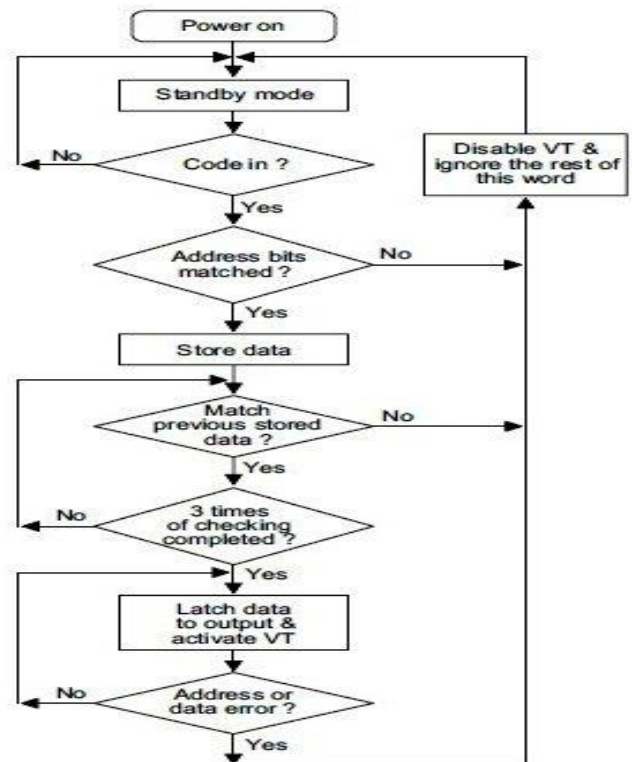


Chart 5: Flow chart of smart helmet system

### 3. WORKING PRINCIPLE

MQ3 gas detector or the alcohol sensor senses the alcohol content of the rider by using its breath. It is situated just below the rider’s mouth on the helmet. This sensor is very sensitive and could change according to the pressure and temperature accordingly. That is why the government has set a limit of 0.08mg/L of alcohol but for demonstration purpose generally 0.04mg/L of amount has to be considered.

Now if the buckle is strapped and the rider successfully passes the breath analyzer test then the control signal to the MCU and a relay will act as a switch which will monitor the working the of the engine. Thus the engine starts and the biker can ride the bike if any of the cases is not true then the engine of the bike will not start.

#### 3.1 STEPS FOR COMPLETE WORKING

- Connect the battery to the transmitter end, current from battery goes to voltage regulator 7805.
- Voltage regulator regulates pulsating dc to pure dc; it provides VCC and GND to each and every component of the transmitter circuit.
- Alcohol Detection: A potentiometer is used as a voltage divider biased common emitter configured BJT switch.

- Alcohol Sensor: It consists of three wires: purple, white, grey.
- Case 1) When drunk i.e. BAC (blood alcohol concentration) exceeds the specified limit, purple wire gets connected to GND. Hence base current is zero (BJT is turned off). All the potential at collector gets delivered to pin 11 of HT12E encoder.
- Case 2) Not drunk: Purple wire gets connected to white (VCC). We get certain base current and BJT turns on. So all potential of collector is grounded. Hence we get 0 at pin 11.

- The output pin 21 of microcontroller is connected to base terminal of common emitter configured BJT through a resistor.
- Output of first stage is connected to the input of second identical stage.
- When pin 21 is high both the transistors are on and VCC will be grounded.
- The output of second stage is connected to one end of dc motor and the other end of dc motor is connected to the live terminal.
- So when BJTs turn on, circuit is completed and dc motor/spark plug gets started. Hence bike starts.

#### Helmet Strap Detection:

- Case 1) when not buckled: No signal is transmitted to pin 10.
- Case 2) When buckled: 0 signal is transmitted to pin 10.

#### Encoder Working:

- It is an 18 pin IC.
- A0-A7 are used as address lines and we have this to GND, so address used is 00000000.
- A8 (pin 9) is GND terminal.
- When helmet is buckled, pin D0 becomes 0 and when not buckled it gets 1.
- Similarly when person is drunk, pin D1 gets 1 otherwise 0.
- The function of encoder is to encode data and address lines from parallel input to serial output.
- The output of encoder is connected to RF module. RF module converts digital encoded data to radio frequency signals (434MHz).
- The radio signal is transmitted through wire line antenna.
- Connect the battery to the receiver end, current from battery goes to voltage regulator 7805.
- Wire line antenna detects a signal.
- This signal is transferred to RF module. RF module converts radio signal to digital signal. The output of RF module is connected to pin Din (input of decoder HT12D).
- Serial input at pin Din of decoder generates a parallel output of decoder to pin D0 and D1.
- **Case 1)** 00 (When person is not drunk and belt buckled): Data 00 goes to pin 1 and 2 of microcontroller. Microcontroller is programmed such that when input at pin 1 and 2 is 00 then output pin 21 is high otherwise low.
- **Case 2)** 01 (When person is drunk and belt buckled): In this case output of microcontroller at pin 21 is low.
- **Case 3)** 10 (When belt is unbuckled): In this case output of microcontroller at pin 21 is low.

#### 4. ANALYSIS OF THE SYSTEM

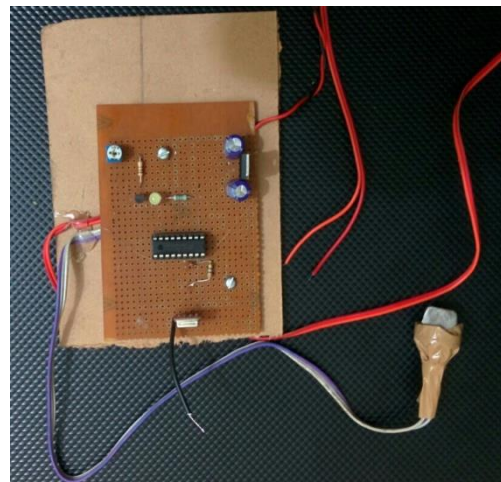


Chart 6: Transmitter side

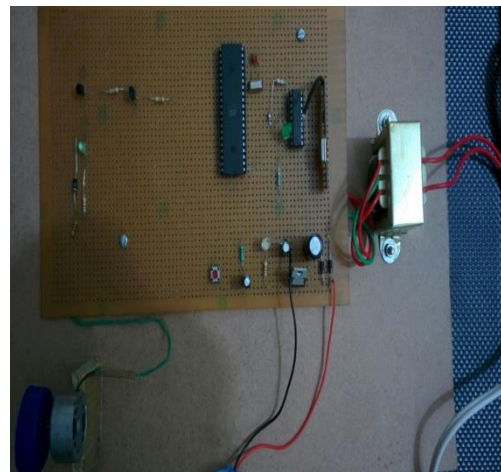


Chart 7: Receiver side

#### 5. RESULT

Nowadays most of the cases, which we see or hear, are particularly of two-wheelers. If we implement such a technological rule, which cannot be easily by-passed by the riders, then the number of accidents will decrease. Wearing of helmets are compulsory we all know that but

still people don't wear. So one must introduce such a system, which becomes a necessity to start a bike.

## 6. FUTURE SCOPE

Same system can be made more efficient if done through GSM in which the rider's family will be given a message if any mishap happens. Also the helmet can be equipped with ear sensor which needs to be plugged in your ear and gets activated by the beats of the lobes, by doing this helmet will be worn by everyone who is riding a bike.

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