

# Helmet Based Vehicle's Auto Ignition with Alcohol Detection and Accident Indication and Reporting System

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**Abstract:** The World Health Organization states that 1.2 million people lose their lives annually due to road traffic injuries. More than half of the deaths caused affect the two wheelers in the form of head injuries. Most of these deaths are preventable by the compulsory use of helmets. Studies have shown that wearing a helmet can reduce the fatalities by 70%. Global initiatives have been taken to make helmets a high priority for public health. Many awareness drives have been launched, laws have been enforced in the public interests but still we find people violating the rules and driving very casually without wearing helmets and thereby risking their lives. Hence to overcome this problem we came up with a novel project of smart helmet. This system is designed in such a way that the vehicle will not start unless the rider wears a helmet and passes the alcohol test, thereby also solving the problem of drunken driving. The helmet has an additional feature of accident indication and reporting through GPS – GSM technology which sends message to the hospitals and family members at the time of accident. This project is designed for people's safety and is in the best interest of the society.

**Keywords:** Helmet, Alcohol detector, Accident reporting, Safety, Gps-Gsm.

## I. INTRODUCTION

The world has seen an increase in the sale of two wheeler over the years especially in countries like India where the rate of growth of two wheelers is 20 times the rate of population growth. This scenario had led to the increased number of accidents and deaths. The major reasons of accidents include violation of traffic rules, drunk driving, carelessness etc. Studies have shown that most of the severe injuries and death case can be prevented to more than 50 percent if a person wears a helmet and avoids driving after drinking alcohol. Even after being aware, people tend to ignore these simple rules of safety and tend to incur fatalities or even death to themselves or others. Also we have seen situations where due to lack of proper on time treatment and late ambulance arrival at the accident sites lead to a person's death that could have been saved if accident report was sent on time. These problems have led us to think and come up with a solution of helmet based auto ignition system of vehicles with alcohol detector and accident detection and reporting system. The idea is that the vehicle will not start unless the rider wears a helmet and also passes the alcohol test by the help of IR sensor to detect the person's head and alcohol sensor for alcohol test. The helmet will also have 180 degree motion sensor for accident indication and GPS and GSM module for accident reporting. These smart helmets will come along with two wheelers with a unique

identification card for each person and would prevent numerous accidents caused due to the above mentioned

## II. BLOCK DIAGRAMS

The Figure below represents the block diagram of the project. The system is divided into two parts :-

A. THE TRANSMITTER SECTION WITHIN THE HELMET:

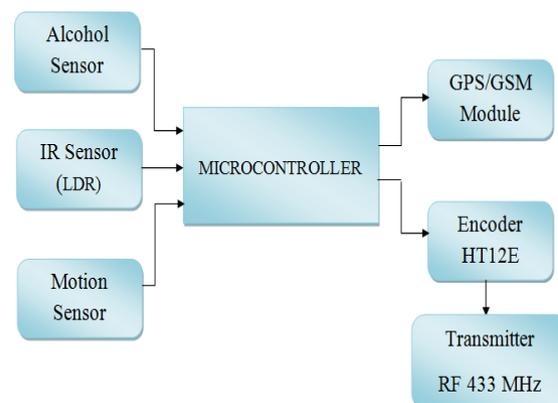


Fig. 1 Block diagram of transmitter section within the helmet

B. THE RECEIVER SECTION WITHIN THE VEHICLE:

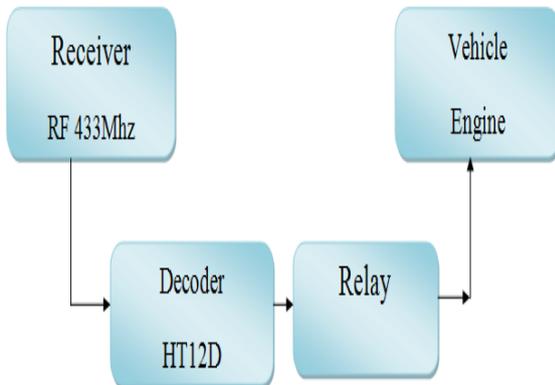


Fig 2. Block diagram of receiver section within the helmet

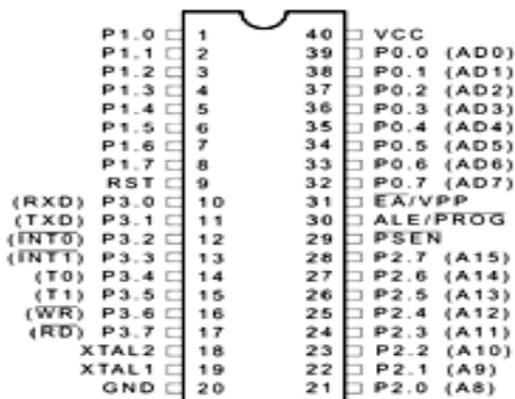
The transmitter section consists of Alcohol Sensor, IR Sensor, Motion Sensor interfaced with the Microcontroller 8051. The output of the Microcontroller is then interfaced with a GPS-GSM Module and an Encoder. The encoder output is then sent to the transmitter at 433MHz frequency.

The receiver section consists of a Receiver working at 433MHz frequency. The output of the receiver is then fed to the decoder unit. The decoded output is forwarded to the relay which is connected to the vehicle's engine.

III. TECHNICAL DESCRIPTION

A. MICROCONTROLLER (MCU)

AT89C51 of Intel MCS51 series is used here. It is 8 bit single chip microcontroller with 4Kb On-chip ROM, RAM, I/O ports designed according to the Harvard architecture.



AT89C51

Fig 3. Microcontroller AT89C51

B. ALCOHOL SENSOR

MQ303A is used as the alcohol sensor. It has high sensitivity, fast response and is small sized.

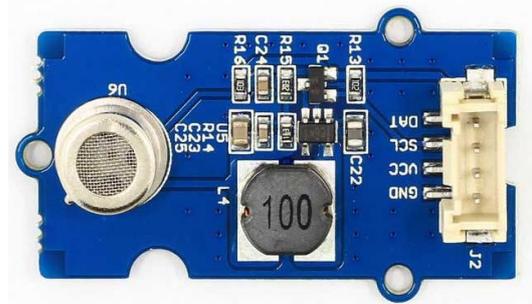


Fig 4. Alcohol sensor

C. IR SENSOR:

The infrared sensor is used to detect the presence of an object by measure of radiations.

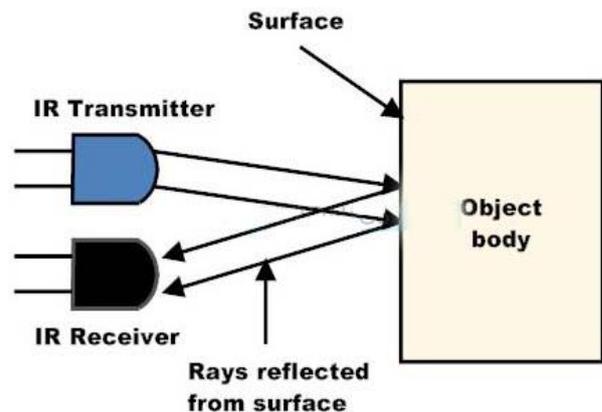


Fig 5. Working Process of IR Sensor

D. MOTION SENSOR –

Here 180 degree motion sensor is used for accident detection.

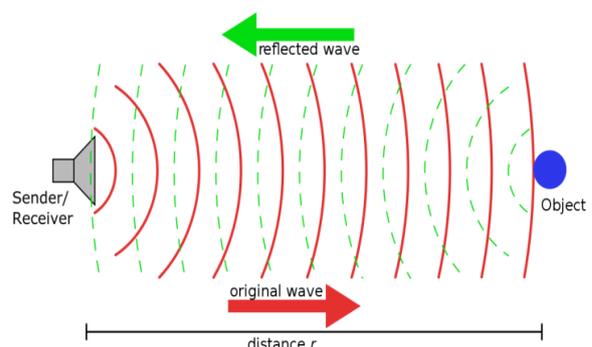


Fig 6. Working Process of Motion Sensor

E. GPS-GSM MODEL:

Global Positioning System(GPS) is a global navigational system used to display current location in terms of latitudes and longitudes. Global System for Mobile Communication is standard for mobile communication is the form of voice messages or text messages (SMS).

F. ENCODER:

Here HT12E is a 12 bit encoder IC used for remote control system applications.

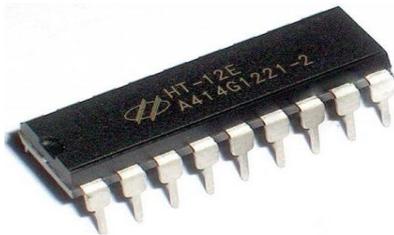


Fig 7. Encoder HT 12E

F. DECODER:

HT12E is a 12 bit decoder IC used to decode the rf signals received.

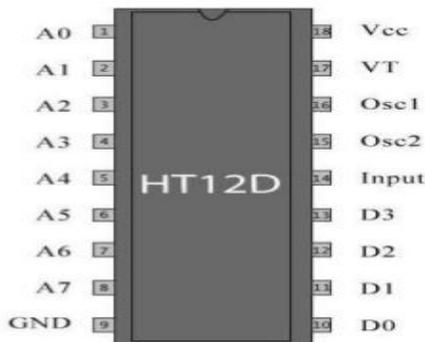


Fig 8. Decoder HT 12D

IV.FLOW CHART

The flow chart below represents the flow of actions / steps executed by the system during its course of action.

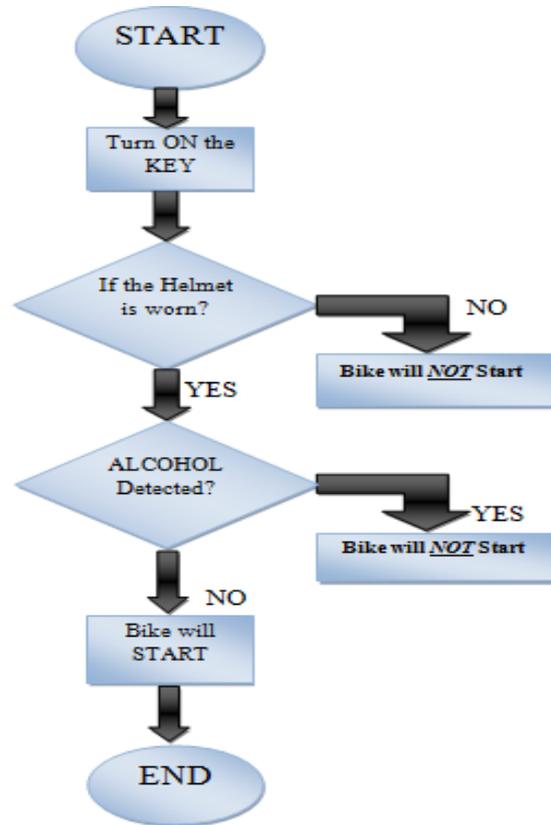


Fig 10 Flow chart

G. RELAY -

It is an electromechanical switch used for switching purpose.

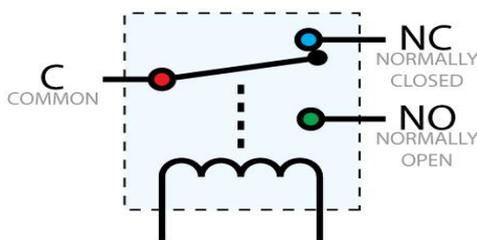


Fig 9 Relay Working and Relay

H. TRANSMITTER AND RECEIVER:

The transmission and reception of the RF signals are done at 433MHz frequency.

V. WORKING

This project is designed for the check of helmet and alcohol before allowing the vehicle to start. When the rider of the 2 wheeler sits on the vehicle and turns the key on, the bike will not start unless the rider wears the helmet. Once the IR Sensor detects the presence of the rider's head it signals the microcontroller to check for the alcohol. The MQ303A alcohol sensor is used to detect the presence of alcohol. If there is absence of alcohol the sensor will signal the microcontroller to output a high pulse to the Encoder IC HT12E. The encoded output is then sent to the transmitter for the transmission of RF signal at 433 MHz. The microcontroller, alcohol sensor, ir sensor encoder, transmitter is embedded within the helmet. Along with the above units, the helmet has a 180 degree motion sensor which is used to detect the accident condition. The titled head of the driver after an accident will cause motion sensor to respond to the microcontroller to give a high output to the further interfaced GPS-GSM module. This gps module will track the location of accident and the gsm module will send a text message to the area's ambulance and also to the family of the victim. The other half of the project is embedded within the vehicle and it includes the receiver, a decoder and a relay. The rf transmitted signal is

received by the receiver working at 433MHz frequency. The received signal is then decoded using a HT12D decoder IC. The output of the decoder excites the relay to switch in order to complete the connection with the engine of the vehicle.

Once the relay switches to turn on the engine, the vehicle tends to start. Thus in order to complete the system , to turn the engine on; to start the vehicle is it a necessity that the rider wears a helmet and has not drunk alcohol .

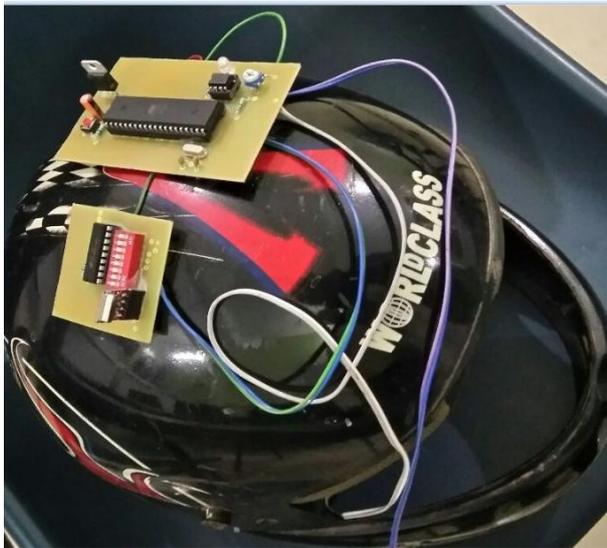


Fig 11 Embedded Helmet

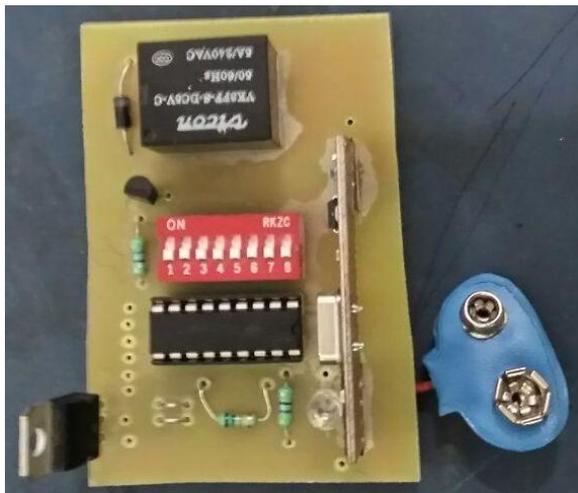


Fig 12 Receiver Section

### VI. INTERFACING

The microcontroller 8051 forms the main unit with its inbuilt input output port being interfaced with the sensors, encoders, gps gsm module. This transmitter is interfaced within the helmet.

The other section called the receiver section comprising of the receiver, decoder and relay is fitted inside the vehicle in connection with the engine.

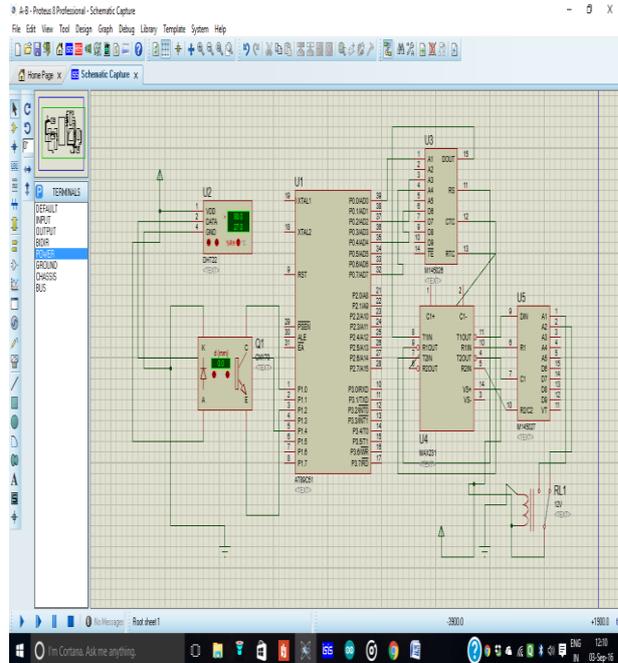


Fig 13 Interfacing Diagram

### VII. RESULT AND CONCLUSION

This smart helmet is developed to decrease the number of injuries caused to a 2 wheeler rider due to drunk driving and helmet skipping. The implementation of this prototype will force people to wear the helmet first in order to drive the vehicle.

The number of road traffic accidents would decrease by huge amount after successful implementation of the proposed helmet project compulsorily by the government for the safety of people.

The project also incorporates accident reporting system which would save the precious time wasted for ambulance and first aid arrival at the accident site. Time is a valuable deciding factor between life and death in case of accident. This helmet would make the 2 wheeler journey more safe and secure and is in the general interest of the society.

### VIII. FUTURE SCOPE

The government should allow more advanced development of this project and should allow subsidy so that it is under every individual's reach. The two wheeler manufactures should incorporate these helmets as an integral part of the vehicle.

There can be security system for this helmet to avoid the risk of theft by use of unique locking codes, fingerprint sensors, alarm system etc. An additional system to check the speed of the vehicle can be added to this helmet.

To avoid the basic complain of suffocation problem, helmet can be modified with ventilation holes.

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