

## SMART RF HELMET FOR TWO WHEELERS WITH SENSORS AND FEATURES OF ANTILOCK SYSTEM, ALCOHOL DETECTION SYSTEM, ACCIDENT SMS ALERT AND TRACKING VEHICLE LOCATION

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**Abstract:** *The main purpose of this smart RF helmet is to provide safety for the bike rider. In the India, motorcycle accidents are happening day by day. Currently there are not technological interventions being used to prevent such events. A smart RF helmet is type of protective headgear used by rider which makes bike driving safer than before. This can be implemented by using advanced features like alcohol detection, accident identification, location tracking use as a hands free device, fall detection. This makes it not only a smart helmet but also a feature of a smart bike. It is compulsory to wear the helmet, without which the the ignition switch can not turn ON. A RF Module can be used as wireless link for communication between transmitter and receiver. If the rider is drunk the ignition gets automatically locked, and send a message through GSM along with location with the help of GPS module. In order to overcome the death rate of the people due to this, we can use this technology.*

### I. INTRODUCTION

The thought of developing this project comes from social responsibility towards the society. As we can see many accidents occurring around us, there is a lot of loss of life. According to a survey of India, there are around 698 accidents occurring due to bike crashes per year. The reasons for the accidents may be many such as no proper driving knowledge, no fitness of the bike, rash driving, drink and drive etc. In some cases the person injured the accident may not be directly responsible for the accident, it may be fault of some other rider, but end of the day it's both the drivers involved in the accidents who is going to suffer. If accidents are one issue, lack of treatment in proper time is another reason for deaths. According to the same survey if 698 accidents occur per year, nearly half the injured people die due to lack of treatment in proper time. The reasons for this may again be many such as late arrival of ambulance, no person at place of accident to give information to the ambulance. This is what is running situation in our day to day life, a thought of finding some solution to this problem come up with this idea of giving the information about accident as soon as possible and in TIME....!!!! Because after all time matters a lot, if everything is done in time, at least we can save half the lives that are lost due to bike accidents. So, a thought from taking responsibility of society

came our project "SMART RF HELMET FOR TWO WHEELERS WITH SENSORS AND FEATURES OF ANTILOCK SYSTEM, ALCOHOL DETECTION SYSTEM, ACCIDENT SMS ALERT AND TRACKING VEHICLE LOCATION". The aim of our project is to give information to the ambulance and family members about the accident as soon as possible so that they can take certain measures to save the life of the person who met with an accident. The idea of this project is to give information about the accident to the ambulance and family members, so we have chose GSM technology to give the information by sending SMS. We are using GSM module which has SIM card slot to place the SIM and send SMS. Sending SMS alone can't help the driver, if we send an SMS saying that accident had occurred where the ambulance will come without knowing the location of the accident. So we include GPS location in the SMS which we are sending so that the ambulance will have perfect information about where and when the accident has occurred. For this we use GPS module to extract the location of the accident, the GPS data will contain the latitude and longitude values using which we can find the accurate position of the accident place. To run the GPS and GSM module we use ATmega328 microcontroller. The Arduino is a very user friendly device which can be the microcontroller will send the SMS using the GSM module by keeping the GPS location in the SMS which is obtained from the GPS module. But when should all this be done? IR sensor which is placed in the helmet. The IR sensor is placed in the helmet such that it detects vibrations of the helmet. When the rider crashes, the helmet hits the ground and the vibration sensor detects the vibrations that are created when the helmet hits the ground and then the microcontroller will send an SMS containing information about the accident and location of accident. This is the methodology used in the project, let me once again give a brief description About the working of project, When the rider crashes, the helmet hits the ground, the IR sensor senses the vibrations and asks the microcontroller to send SMS, the microcontroller will send SMS through GSM module containing information that accident has occurred and the GPS location obtained from GPS module. Each day, our lives emerge as greater based on 'embedded systems', virtual data era this is embedded in our environment. More than 98% of processors carried

out these days are in embedded systems, and are not seen to the consumer as 'computers' with inside the everyday sense. An Embedded System is a special-motive gadget wherein the laptop is absolutely encapsulated with the aid of using or committed to the tool or gadget it controls. An embedded gadget is a single-motive laptop constructed into a bigger gadget for the functions of controlling and tracking the gadget. A specialized laptop gadget this is a part of a bigger gadget or machine. In these days' era, particularly with inside the younger generation, the rage to trip motor motorcycle is hastily growing. The middle-elegance households choose to shop for two-wheeler over four-wheeler due to their low price. As the range of two-wheelers on the street are growing, avenue mishaps also are growing day with the aid of using day. In the occasion of an accident, loss of well-timed clinical interest to the injured character may also cause death. Thus, there may be a want for a gadget which guarantees protection of rider with the aid of using implementing rider to put on helmet as in step with authorities hints and additionally help in offering the rider for a clinical help with inside the occasion of an accident. The project "SMART RF HELMET FOR TWO WHEELERS WITH SENSORS AND FEATURES OF ANTILOCK SYSTEM, ALCOHOL DETECTION SYSTEM, ACCIDENT SMS ALERT AND TRACKING VEHICLE LOCATION" first-class fits to perform the subsequent objectives –

- Status of rider carrying helmet
- Alcohol content material takes a look at riders
- Accident Detection
- Accident Location

We will use liquid crystal display (LCD) for showing the message. We will even use GSM modem as an interface among cell and microcontroller. It will ship message to any Telecall smartphone no matter the GSM community via the modem linked to the programmable tool. Today, motorcycle has become a very common mode of transport for individual riders. Motorcycle gives the freedom and flexibility for the riders to move anywhere they want and at any time. Riders do not have to be dependent on the public transportation services, which in many cities and countries are extremely unreliable.

However, motorcycle riding has its own risks involved, especially when the rider does not follow the rules and do not take the necessary precautions to avoid unfortunate situations, which can lead to accidents, which are sometimes fatal. Although there are laws related to safe operation of motorcycles most of the times the rules are not followed. The traffic police which is responsible for enforcing the laws on the riders find it very challenging due to rapid increase in the number of motorcycle riders and not having adequate manpower to monitor the situation. In March 2015 there were 154 million registered two wheelers operating on Indian roads. In such circumstances technological innovations can significantly assist the traffic police in maintaining the rules on the road. There are many novel ideas proposed to

tackle this problem. Cameras can be installed at important traffic junctions to monitor the traffic as well as to identify the traffic violators and issue appropriate fines to such riders. Apart from jumping of traffic junctions or similar violations of the traffic laws one major issue with riders is not wearing the helmet while operating a motorcycle and another major problem is of drunk driving especially during night. Here in this project the authors are proposing a novel concept of embedding sensors in the bike and the helmet to analyze the breath and the wearing of the helmet by the rider. If the rider is not following the rules the bike will not start. The aim of the project is to provide reliability and soundness on the helmet to the bikers against road accidents. A Smart Helmet is innovative recommendation which make motor cycle driving safer than before, this is performed using GSM Modem and GPS receiver technology. The one more supremacy of this project is to know the alcohol level of drunken motorcyclist who is sitting on the bike. An embedded kit or an embedded system which consists of microcontroller, RF decoder and sensors, is incorporated in the helmet which monitor whether the biker is drunk or not and also some sensors to check whether the biker has worn the helmet or not. The alcohol level is determined and displayed on a LCD display. Whenever the alcohol is detected by the alcohol sensor in the helmet, the vehicle won't start and buzzer is blown and the respective authorized people will get the notification. In today's world vehicles accidents are one of the main causes for increase in the death. This death rate can be reduced by forwarding a message and the location of the accident to the victim's family and concerned authorities who can take the necessary action in a timely manner. In many cases the delay in giving the appropriate medical treatment is the major cause of death after an accident. In this project a GPS and a GSM module is embedded in the helmet which can provide the exact location of the accident.

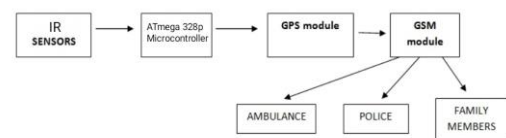


Figure 1 : - Basic Block Diagram

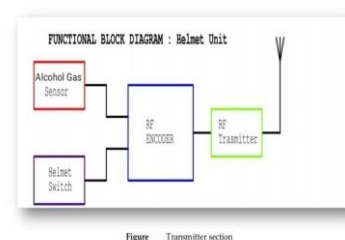


Figure2 : - Block Diagram of Transmitter section(Helmet Unit)

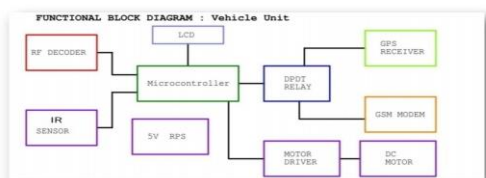


Figure Receiver section

Figure 3 : - Block Diagram of Receiver Section(Vehicle Unit)

II. NEED OF COMPONENT

(a) Normal Helmet :-



(a) HI-Watt Battery :-



(a) 12V Relay :-



Power Supply Adapter :



1602 LCD Display



DC Motor :-



(g) ATmega328 MICROCONTROLLER :-



(h) NEO-6M GPS MODULE WITH EPROM :-



SIM900A GSM MODULE



(a) IR Sensor :-



(b) Alcohol Gas Sensor :-



## I. CIRCUIT DIAGRAM

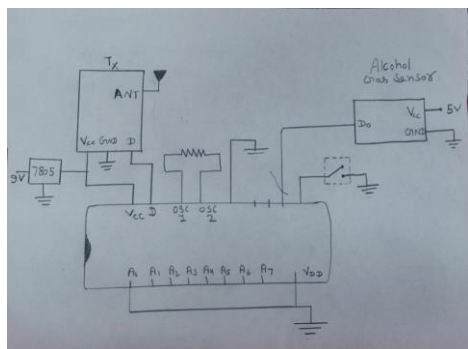


Figure4 : - RF Transmitter

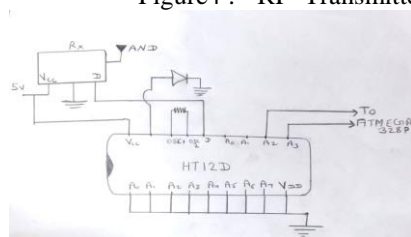


Figure 5 : - RF Receiver

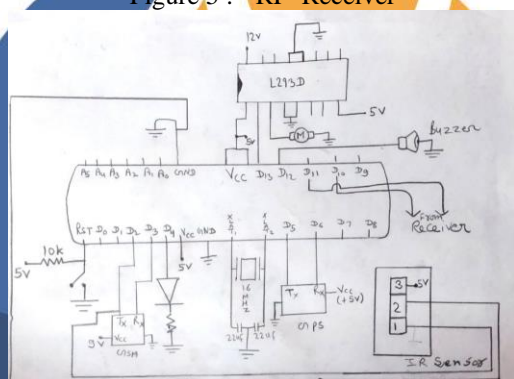


Figure 6 : - Microcontroller Section

## PRINCIPLE OF WORKING

The principle of working is simple. If the biker had consumed the alcohol, the alcohol sensor placed near the front end of the helmet senses the alcohol and don't allow the biker to start the bike. The second purpose is when the biker meet with an accident the IRsensor in the bike receives the signal send a message and the location of accident to the family members. The third purpose is where the bike won't activate until the helmet is worn when RF decoder sends information to the microcontroller which allows the biker to start the bike. The Figure shows the schematic diagram of the vehicle unit, it has a microcontroller which helps in every process of operation. It has a IR sensor to detect accident that occurs. RF decoder is connected to helmet to receive the data from the helmet. It consists of 16x2 LCD to display the various information. DPDT relay is used to switch to GSM. RF decoder : The capability of this device is, it can receive information from a long distance and it can be from the space too. And it has a DC driver which is used to drive the DC motor which acts as the vehicle or

bike in this project. The hardware part of the helmet mainly consists of ATmega32 Microcontroller running at 8MHz clock and operates at 5V power. It has a RF decoder which is connected to GPIO (general purpose input/output) pins. Microcontroller consists of interrupt pins and these pins connects to the helmet switch and the vibration sensor. The 16x2 LCD is configured to work on 4bit mode and is connected to the port C of microcontroller. The LED and the buzzers are used for indication when there any uncertainties occur. The GPS and GSM Modem is connected to DPDT delay switch which in turn is connected from GPIO pins. The input port of the system is 9V since hardware requires 5V supply the 9V is converted to 5V using LM7805 Regulator. As soon as the microcontroller is powered, the peripherals such as GPIO, TIMER are initialized. The RF decoder and the IR sensor is monitored by the microcontroller. The vehicle do not start because not wearing the helmet, once the helmet is worn the RF encoder sends the signal to the microcontroller and engine gets started. the helmet unit, it has an alcohol sensor which senses if the biker is alcoholic and a helmet switch which interprets the message to the LCD display saying that the biker has not worn the helmet. The bike will not turn on until the biker wears the helmet. The helmet consists of 3.6V lithium battery and a battery charger. It also have A HT12E encoder, 434MHz RF Transmitter, Alcohol sensor and a Helmet switch and a boost Converter. In HT12E encoder the 434MHz RF Transmitter is affixed to the encoder the alcohol sensor is bridged to data pin of the encoder and the helmet switch is attached to enable pin of the encoder. The input ports helmet is 3.7V but it regulated to 5V by using a boost converter.

Figure 7 : - FUNCTIONALSCHEMATICSDDIAGRAM : HELMETUNIT

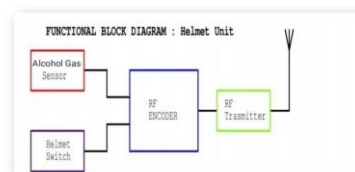


Figure Transmitter section

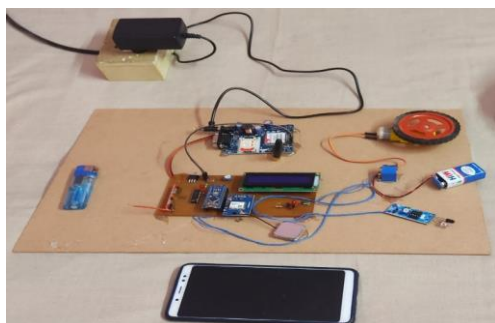


Figure 8 : - FUNCTIONAL SCHEMATIC DIAGRAM : VEHICLE UNIT

## II. WORKING OF ALL SECTION



Figure Receiver section



### I. FLOW CHART

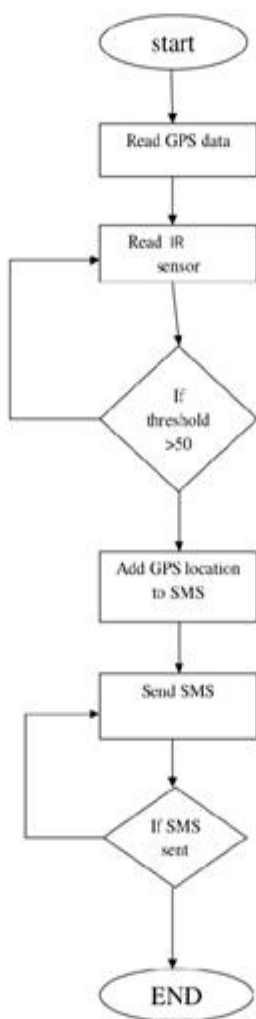


Figure 9 : - Flow Chart

**TRANSMITTER SECTION :** - If the switch is pressed after wearing the helmet, it feeds a logic level 1 to the input of the transmitter through an encoder ht12e. If alcohol is detected in alcohol gas sensor, it feeds a logic level 0 and that 0 logic level is received by the receiver.

**RECEIVER SECTION :** - When the biker Wears the helmet and ON the switch, the logic level 1 is received by the receiver which gets decoded by the ht12d decoder and triggers and the microcontroller and the motor gets on. When alcohol is detected the logic level 0 is received and motor gets off. When the IR sensor gets triggered for an accident, gps and gsm both get ON and SMS is sent along with the biker's location.

**MICROCONTROLLER :** - In microcontroller, when logic signal 1 is triggered the motor driver 1293d makes the motor on. When IR sensor is triggered, the microcontroller is executed. GPS and GSM then get on and the buzzer produces sound.

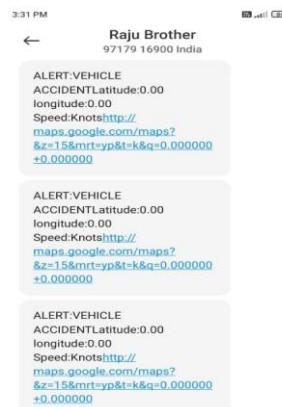


Figure 10 : - Working Model

## VII. ADVANTAGES OF PROJECT

It will facilitate to scale back the amount of road accidents that are very frequent during a country like Bharat wherever the traffic is extremely high.

It will help to form awareness concerning the necessity wear helmet throughout bike riding.

The system will make sure that the motorcycle won't begin unless the rider is sporting a helmet and has not consumed alcohol.

Also GSM technology is employed to tell the members of the family in case of associate accident.

## VIII. APPLICATION OF PROJECT

- (a) The proposed smart helmet ensures the safety of the rider, while driving on the road. The proposed model comprises of an alcohol detection, accident identification, location tracking, hands-free device, solar powered module and fall detection. The proposed smart helmet will be connected to the ignition.
- (b) It can be used in real time safety system.
- (c) We can implement the whole circuit into small VLSI chip that can be embedded into the helmet and bike unit.
- (d) This safety system technology can further be enhanced in car or other vehicle by replacing the helmet with seat belt.

## IX. FUTURE SCOPE

- (a) We can implement various bioelectric sensors on the helmet to measure various activities.
- (b) We can use small camera for recording of drivers activity.
- (c) The vehicle tracking system can be implemented. This will protect the vehicle from theft. This can also be used to ensure that rider is not misusing the bike.

## X. CONCLUSION

(a) In this project, we developed a smart helmet based system which was successfully able to detect whether the rider as worn the helmet or not. It also sets an alarm if he has consumed alcohol beyond permissible levels. GPS module tracks the location and then GSM module automatically sends message to ambulance or police or family members.

(b) The aim of our project is to give information to the ambulance and family members about the accident as soon as possible so that they can take certain measures to save the life of the person who met with an accident.

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