# ENACTMENT AND ANALYSIS OF SMART HELMET

**[1]M. RAMESH, [2]P.SAI SIVA,[3] M.MANASA**
[1]Assistant Professor, [2]Assistant Professor, [3]Assistant Professor
[1]Dept. of EEE
[1]Annamacharya Institute of Technology and sciences, Rajampet, AP, India.

**Abstract:** Currently, accidents are a major problem for everyone. The risks are increasing day by day, so efforts are being made to avoid reducing their effects. We live in a world where traffic laws are unimportant and are frequently violated. Moreover, its human nature to withstand what is imposed upon them. As a consequence, using a different perspective, provides security with elegant and smart features using smart helmet. Two of the modules are in the helmet and each bike works in sync, to ensure wearing a motorcyclist helmet. Radio waves are responsible for the cable connection between the helmet and the bike chain. The Piezo power generator is used to determine speed and this function is optimized to limit the speed of the user. The ALCHO-LOCK function is used to stop alcohol and driving: Accelerometer detects accidents, and this is communicated through the use of the GSM module in our area, which is designed specifically to send a message for personal contact and the relevant authority of the person concerned. In traffic accidents and fog infections due to fog or smog is also. Another application known as E-HELMET allows to reduce the amount of money needed by virtual reality users without stopping their rider from stopping and paying for it.

***INDEX TERMS:*** *RF module; accelerometer; MQ-6, LDR; microcontroller 89S52; Arduino*

## I. INTRODUCTION

It is a known fact that the new generation prefers bicycles and motorcycles over four wheels. Studies show that more than 70% of riders avoid wearing helmets for no particular reason. Speed and drunk driving have become a major problem. Due to lack of experience or focus and traffic violations, it has resulted in serious accidents. So with the help of technology we have made sure that the traffic rules are followed, the problems mentioned above are avoided and their effects are reduced.

The idea of developing this work stems from our social responsibility to the community. In many accidents occurring near us, there is a great loss of life. According to the study, about 7500 people die on the roads each year as a result of bicycle accidents. There are various reasons for accidents such as not having enough driving power, two defective Wheelers, driving too fast, “drinking and driving”, etc. injury. Therefore, it is important that there be a facility to minimize the effects after these accidents. However the main purpose of our work is to make it.

Compulsory for the passenger to wear a Helmet during riding still provides solutions to some major accident issues. This sense of ethical commitment to society, therefore, laid the foundation for our "Smart Helmet" project. So the basic idea for the development of this project "Smart Helmet" is taken from [1] [2] And detail functionality of each of hardware and software components used are, for example, the radio transceiver is taken from [3] and the information and operation of the sensor [4]. The main component used is microcontroller 89S52. The principles of operation of the circuits and connections, etc. are taken from references [5] and [6]. Therefore, all references have contributed to the development of the project.

### II TRADITIONAL PROPOSED SYSTEMS

A simple telemetry system is stimulated by the pressure applied inside the helmet. The technology used is compatible with RoHS and is the same for long-term use. Today's focus is on new hats for things like the addition of an MP3 player or wireless phone or flashing light on it. But none of these features provide extra security for the rider and are just for fun.

### III RECOMMENDED SYSTEM

#### *A. Helmet unit*

The helmet unit contains an alcohol sensor, protection detection cycle, fog sensor, GSM module, LCD display, microcontroller ATMega328-PU, accident detection and RF module. The sensors mounted on the helmet provide analog output. This deduction was provided by a comparator acting as ADC. The output signal from the comparator and key sensor is connected to the binary signal, which is transmitted through the RF transmitter. The RF Module has a transmitter that is 5 meters wide. It is used to transmit control signals to the bike's operating module. Encoder HT12E is an 18pin chip used for encoding before transmitting it through an RF transmitter. Coordinators make all functions work well. The compilers have 4 inputs and 4 inputs. Its basic operating basis is based on comparing the voltages provided by their positive and negative input pins to compare and output them.

Whenever a passenger traverses the range of the remaining RF transmitter it is automatically pulled from its wallet known as E-Wallet. And whenever a passenger enters a certain range of speed limits their speed limit is set and whenever that LCD pass limit indicates more speed and sound alarms

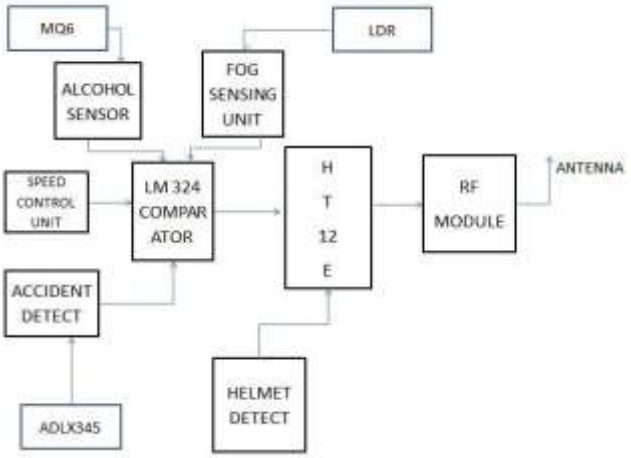


Fig 1. Block Diagram for Helmet Unit

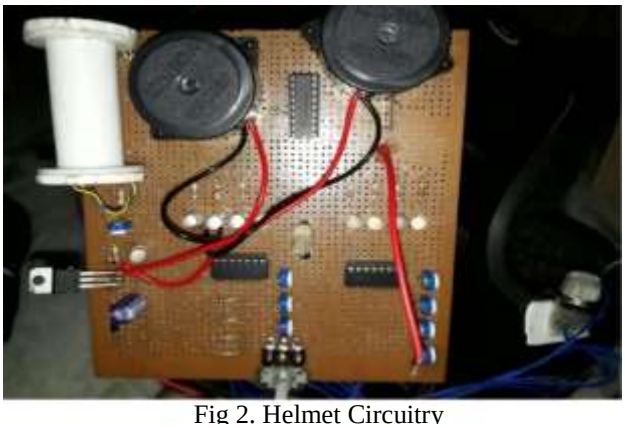

Fig 2. Helmet Circuitry

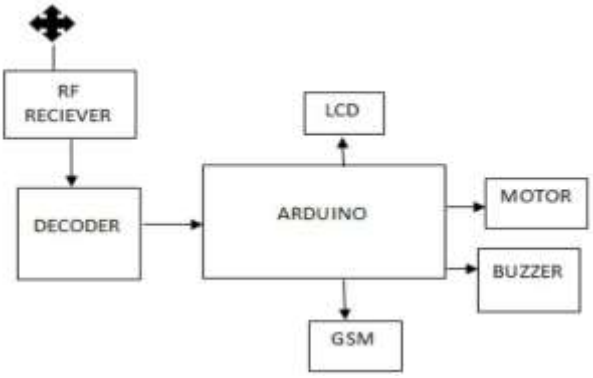


Fig 3. Block diagram for Helmet Unit 2

This section contains the available part and control signal. The reception section is accessible by bicycle; It consists of a radio frequency detector, decoder, microcontroller, LED as an indicator, motor motor. The RF Finder receives the input binary data transmitted by the RF transmitter and transmits it to the code. The decoder stores the incoming digital data and assigns four bits to the MCU, if only the encoder address and the decoder match. This is to ensure the safety and security of the system. So the similarity of encoding with the decoder increases the security and integrity of the system. The MCU controls the DC vehicle when it receives the information. If the sensor detects that the passenger is wearing a helmet, then the engine is turned on and when the MQ6 sensor detects liquor, the bike-mounted module shuts off the engine to avoid any accidents and the drunk man takes appropriate steps to reach his destination. Decoder HT12D cuts all incoming data and transmits it to the microcontroller for processing The AT89S52 is a programmable microcontroller with a small instruction set. Controls the functionality of the module by analyzing the input of the input data and providing appropriate control signals. The Voltage Administrator 7805 is used to control the voltage voltage received from the power source. 7805 gas controller provides 5V output. The upper parts together make our helmet smart and work in sync to ensure a safe and fun user experience.

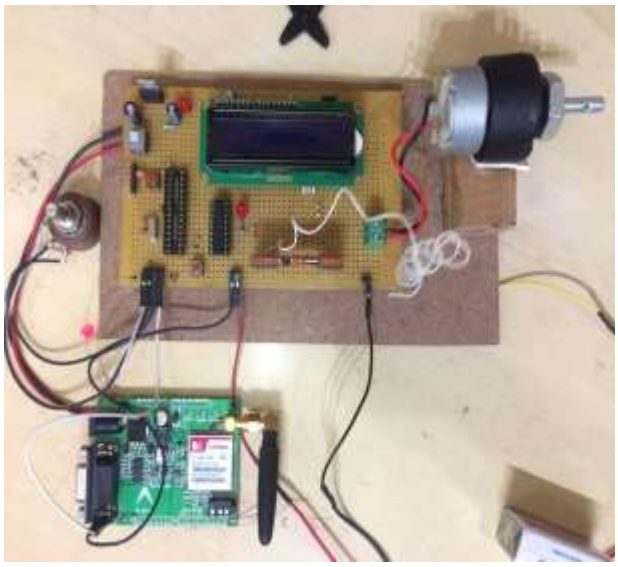

Fig 4. Helmet Circuitry 2

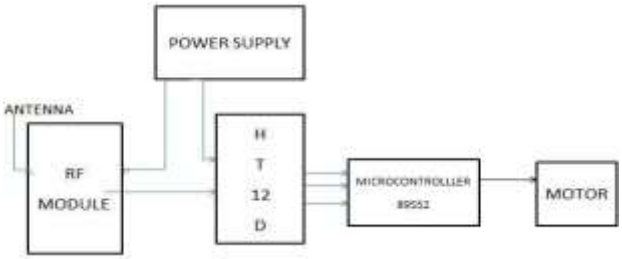


Fig 5 Block Diagram for Bike Unit

Fig.6 Bike Circuitry

***B. Speed Limiter and E-wallet***

This unit is a unit to be set on speed boards to determine the maximum speed, this will work in such a way that whenever the speed of a speeding bike is reached it is set according to the speed of the speeding board and when the crosses at fixed speed on the alarm board start to inform the rider about excessive speed. The system will also be set up in bills and parking areas and similarly when a wide-angle toll booth arrives or in parking lots a certain amount of demand is drawn wirelessly into the helmet which prevents passengers from standing for this purpose.

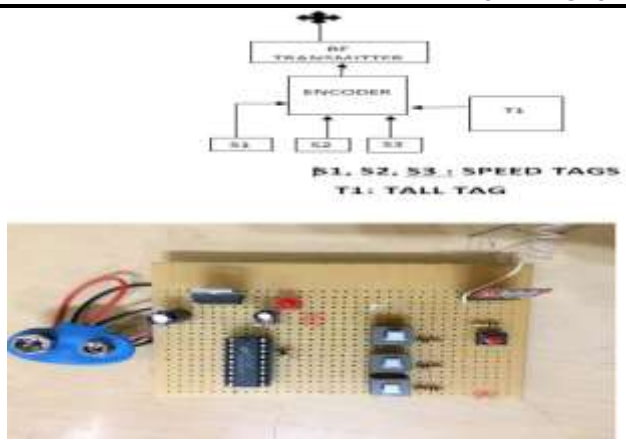


Fig.7 Toll collection and speed tracking section

**IV PRINCIPLE OF OPERATION**

The proposed system operates simultaneously with the transmission and receiver component. The magnetic chip connected to the helmet holds whether the passenger is wearing a helmet or not. The chip sends an analog signal, showing the system that a helmet has been found and the passenger is wearing it. This is determined by the maximum output received from the chip. A low impact is produced when the offline clip makes the system almost bicycle.

Another system uses a gas sensor (MQ-6), which can detect the presence of alcohol. The surface of the senses is sensitive to various concentrations of alcohol. It detects alcohol in the spilled air of the passenger. The amount of resistance decreases resulting in a change in voltage. This altered voltage is then passed to the comparator, which compares the voltage to a predetermined value, and then converts it according to the alcohol level below the level of illicit consumption. If the sensor voltage exceeds the voltage at the output current voltage, the microcontroller performs the appropriate action.

The speed limit sensor item contains a turbine. A moving bicycle turns the car into a turbine that tells us the speed of the bike and when the set limit has exceeded the buzzer it goes off warning the rider to speed up.

Another feature is using LDR to avoid events due to low visibility of fog. The fog unit contains LDR i.e. Light Dependency Register that receives light from the LED. If the presence of the fog prevents the light from the LED from reaching the LDR, the fog sensor sounds an alarm, to this end we are hiring a bright red LED that makes the passenger's presence more visible.

The accident detection cycle was performed with the accelerometer and other resistors. The accelerometer monitors the inclination of the helmet to detect the possibility of an accident. If a helmet is more than a set value, set in accordance with an accident, the feeling of a bad fall concludes that the passenger accidentally collapsed. At the time of the accident the accelerometer generates the voltage read by the unit sends a signal to the bicycle module to turn off the engine and sends a message to one contact with the relevant authority that the accident occurred.

The GSM module communicates with the microcontroller via USART (Universal Synchronous Asynchronous Receiver Transmitter) and the microcontroller provides command to the GSM modem known as AT (Attention) command.to send a message to a single contact person.Vel-Lock and E-wallet section.

Whenever bike comes in the range of the speed limiter it makes contact with the helmet. The board sends the limited speed to the helmet circuitry through RF transmitter on the board. RF receiver on the helmet receives the signal and forwards it to the HD12D decoder. It decodes the signal and passes it to the microcontroller. Microcontroller sets the threshold value of the bike speed in accordance with the value sent by the speed limiter. Whenever the speed of the bike crosses the threshold value it sounds a buzzer on the helmet and a message “OVER SPEEDING” is displayed on the LCD.

Another switch used is for our E-wallet purpose as it automatically deducts the fixed amount from our virtual wallet. Whenever the bike comes in the range of toll plaza it sends the signal to the HD12E encoder, it encodes the signal and transmits it to the bike circuitry through RF transmitter. RF receiver on the bike circuitry receives the signal and sends the signal to the HD12D decoder, it decodes the signal and transmits it to the microcontroller. Microcontroller automatically deducts the balance from the virtual wallet and displays the remaining amount on the LCD, also it displays the message “LOW BALANCE ALERT” when balance is low in the wallet.

## V SYSTEM WORK FLOW

### *A. Flow of Control and Data Operations*

A smart raised helmet supports a variety of activities. First it looks at whether the driver is wearing a helmet using a magnet clip. It also checks whether the driver is in a shortened state or not. The MQ6 sensor is used for this purpose. Only when the driver is alert and wearing a helmet. This helps reduce the chances of drunk driving and drunk driving.

The helmet uses a variety of sensors. LDR (light detection) is used to detect the presence of fog. An accelerometer is employed to detect accidents by measuring the slope of the helmet. Data from the accelerometer is transmitted to the Arduino microcontroller. All information from the sensor is entered into the computer for evaluation in comparison with the reduced setup values. If a violation of the microcontroller 89S52 is found to be in violation of the engine shutdown command in case of an accident it causes a noise if it alerts the driver.

Other features are made with an Arduino Uno microcontroller connected to the LCD to provide user information. Data from RF tags for speed boards is provided by Arduino. These values are used to set the discount rates used to track the speed and to keep a check on traffic errors in different settings for example highways, alleys etc. If the speed values from the potentiometer are found to exceed the speed limit the warning signal.

Comes from the LCD with a buzzer sound. The charging dock is also provided with a separate RF tag. As soon as the helmet reaches the deck, a tax is paid on the user's physical bag. The Arduino is programmed to display the remaining balance on the screen and provide a low balance warning when the amount reaches a specified minimum value. A recycling point is also provided within the circuit to load the bag with cash. The updated value is then transferred back to the Arduino for future use. In the event of an accident the GPS module sends urgent messages to 2 uploaded contacts informing them of the bad situation. This helps in coordinating the emergency assistance activities of the person involved in an accident. The proposed system provides safe, smooth and fun riding that makes it extremely desirable in today's conditions.

## VI .HARDWARE REQUIREMENTS

MP Lab is used to hardcode the program into microcontroller. Other hardware requirements are given below.

Table 1. Required Components

| S.no | Components | Name |
|---|---|---|
| 1 | Microcontroller | 89S52,ATMEGA328-PU |
| 2 | Alcohol Sensor | MQ6 |
| 3 | | |
| 4 | Transceiver | RF module 434 MHZ |
| 5 | Fog sensor | LDR |
| 6 | LCD display | RG1602A |
| 7 | Arduino | Arduino UNO |
| 8 | GSM | SIM900 |
| 9 | Encoder/Decoder | HD12E/HD12D |

## VII. RESULTS AND DISCUSSION

All materials are assembled and tested successfully. The cycle is designed in such a way that the bike does not start until the rider wears a helmet. And the bike will not start when the rider is intoxicated, this is a helmet to shock the rider when he or she crosses a certain speed limit with an alarm. In the event of an accident the engine automatically shuts off to avoid further damage.

Fig 6: Rider is not wearing the helmet

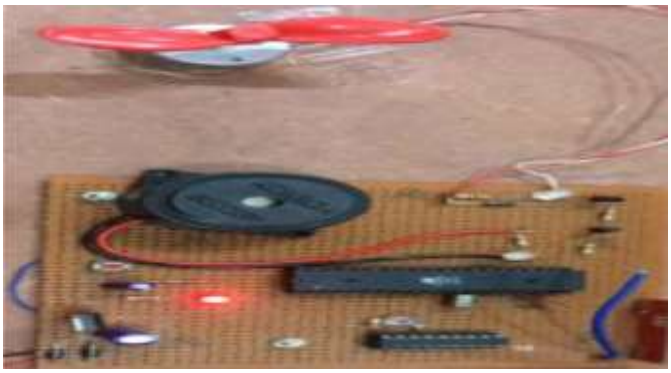

Fig 7. Helmet Unit Prototype

Therefore, the testing phase was completed. This study was conducted in a controlled manner. Therefore, there is no pressing need for several tests of real-life situations but before they can be fully implemented for a long time more needs to be done. In the future, the GSM module and GPS module may be included in the system where the sensor reports the emergency to relatives and nearby police personnel. This can be achieved by encrypting GSM, GPS modules to transmit GPS coordinates of the hazard directly to the responsible authorities that enables them to identify the nasty state of emergency action that can help save lives. Fig 8 and Fig 9 indicate working Bike unit representing two scenarios where Fig 6 is the case in which the rider is not wearing the helmet and fig 7 is the case where the rider wares helmet.

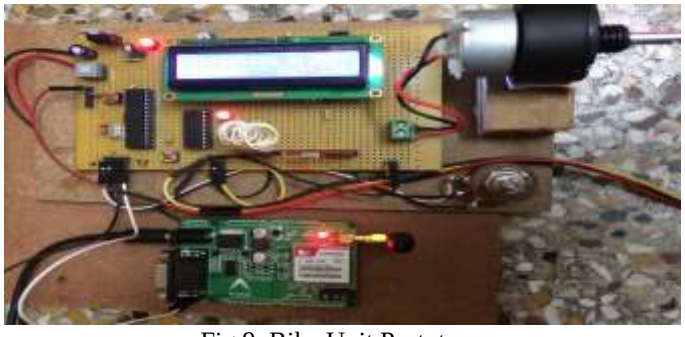

Fig 9. Bike Unit Prototype

Therefore, the project was successfully completed and all aspects were implemented accordingly.

## VIII CONCLUSION

Smart hat is an effective solution to many problems. Wearing a helmet and being modest is a prerequisite for starting a bike and reducing the chance of a crash. Although people are sometimes cautious, accidents do occur. It is here that the risk of the accident is removed. The smart helmet works just like a virtual cop holding the driver making the road safer.

## VII Acknowledgement:

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