

SMART HELMET SAFETY SYSTEM USING ATMEGA 32

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Abstract

Smart helmet safety system is the idea that has been developed for the social responsibility towards the society. Recently the number of bike riders has increased so there is over-all increase in the number of motor bike accidents. The system assists in reducing major number of accidents. It consists of microcontroller along with IR and PIR sensors for helmet authentication followed by alcohol detection with the help of MQ3 sensor. As soon as the bike rider try to start the bike it shall rst authenticate if the person is wearing the helmet through IR and PIR sensors. Secondly, MQ3 sensor detects the presence of alcohol, if detected the bike wont start. It also detects fall detection through accelerometer. The project focuses on bike rider safety and reduction of accidents which are fatal.

Keywords: Safety, Sensor, Helmet Unit, Bike Unit, Helmet Authentication, Fall Detection.

1. INTRODUCTION TO SMART HELMET SAFETY SYSTEM

According to survey, the no of two wheeler bikes are more than the three or four wheeler transport. More the no of bikes, more the no of accident in the city. The cause of accidents are drunk driving, vehicle hitting from behind, lack of attention while driving etc. The major reason behind the accident is drunk driving. When drunk, the riders thought process is slow. The vision is unclear, movements are slow, the obstacle in front of eyes seems dizzy and unconscious mind leads to an unfortunate thing like accident resulting in death of one or more person or destruction of private or public property.

In order to avoid this situation, we designed a system where the no of accidents will reduce to half. In this system, initially, there are PIR and IR sensors which shall detect the live body inside the helmet. Secondly, there is an MQ3 sensor for alcohol detection. Only after checking these two conditions, the helmet unit shall give signal to bike unit and the bike shall start.

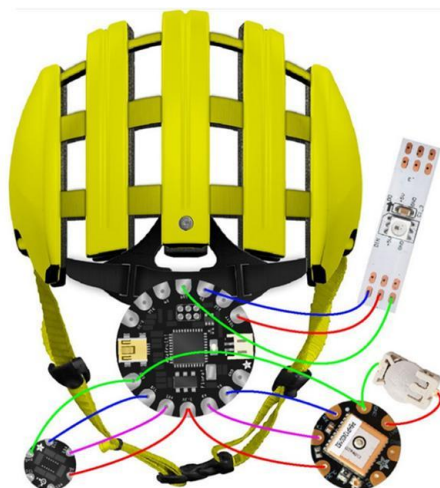


Figure 1: Smart Helmet

The system shall also check the obstruction continuously. In case of obstruction the accelerometer shall inform the micro-controller and the bike motor shall reduce its speed and the ignition shall be stopped. Also, in case of the fall detection, the GSM module shall send SMS to the concerned authority. This system believes in safety of citizens and making the world better to live.

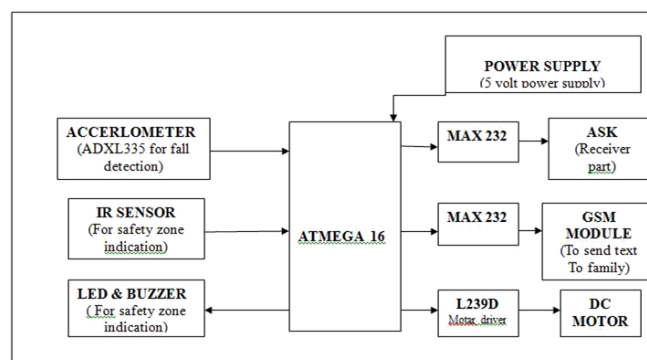


Figure 3: Block Diagram of Bike Unit

1.1 System Specification

1. Helmet Authentication- For helmet authentication purpose we are using two IR sensor and one PIR sensor. We mount one IR sensor on left side and other on right side inside the helmet. PIR sensor use for motion detection of head inside the helmet.
2. Alcohol detection- to ensure that the bike rider has not consumed alcohol.
3. Safety zone indication- If the bike comes too close, then the bike rider shall be alerted.
4. Fall detection- To informed the concerned authority like hospital, police station ,parents via text messages.

1.2 Block Diagram

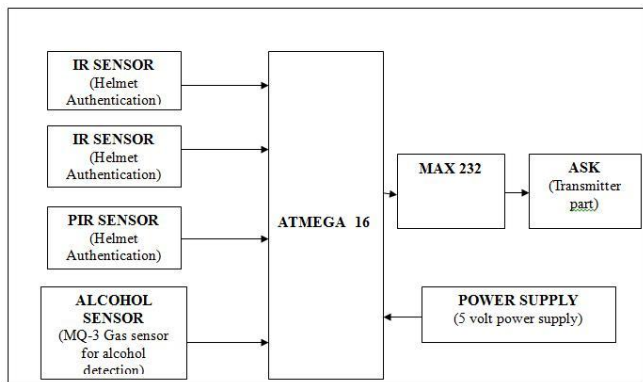


Figure 2: Block Diagram of Helmet Unit

2. MICRO-CONTROLLER ATMEGA 32

Microcontroller is the heart of our system. It will manipulate the data received from the various sensors. It checks the data at helmet unit and send the data to the bike unit by using RF transmitter and RF receiver and it shall also receive the data from the bike unit and transmit it to the helmet unit. We have selected ATMEGA 32 Microcontroller.



Figure 4: Micro-controller

3. IR SENSOR

The IR LED transmits the IR signal on to the object and the signal is reflected back from the object surface. The IR receiver will be receiving this reflected signal from object. The IR receiver can be a photo-diode/ photo-transistor or a ready made module. We are using 2 IR sensors on the left and on the right side of helmet for human head detection. Here, both of the IR sensors are used as obstacle detectors. We are using one IR sensor on bike module for safe zone detection. If any obstacle is detected, it gives signal to microcontroller and microcontroller take action and give alert to rider.

4. PIR SENSOR

We are using PIR sensor in helmet module for head detection purpose. A PIR sensor used to sense movement of people, animals, or other objects. When a living or non-living thing starts as an obstacle for the bike, in the sensor's field of view the temperature will rise from room temperature to body temperature. A change is seen in the output voltage from the incoming infrared radiation which is converted by the PIR sensors, and this triggers the detection. In helmet module PIR sensor is used to detect motion of head outside to inside to the helmet.

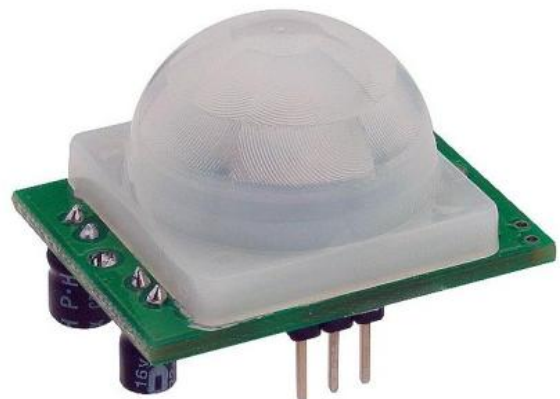


Figure 6: PIR Sensor

4.1 Alcohol Sensor

It is impossible for the traffic policeman to check each and every vehicle for drunken drivers. Therefore, an effective system is needed which automatically controls drunken driving. This system can be integrated with the ignition system of the bike thus allowing only sober citizens to drive the bike. MQ3 alcohol sensor is suitable for detecting alcohol concentration on your breath. It just like a common breathalyzer. It has a high sensitivity and fast response time. It can be placed just below the face shield. As per Government act, 0.08mg/L consumption of the alcohol is illegal. But for project demonstration purpose, we programmed the threshold limit as 0.04 mg/L.



Figure 7: Alcohol Sensor

5. GSM

GSM is used for sending messages to number which is pre-stored in the system. The technique that we have used is GMSK modulation in project. Hayes AT-Command set are used for GSM modem setup and control purpose. In smart helmet safety system we are using GSM module on bike. If accelerometer measure any inclination in x and y axis then message is send to pre-programmed number.



Figure 8: GSM

ACKNOWLEDGEMENTS

We would like to express deep sense of gratitude to our guide Prof. R.D.Komati for providing us with an opportunity to carry out the project on Smart Helmet Safety System and for her help whenever required.

Future Scope

1. GPRS can be introduced for knowing the exact location of the user.
2. Music system can be introduced for the infotainment purpose.
3. Bluetooth facility.
4. Similar kind of helmet can be made for military, rework, coal mines also.

5.1 CONCLUSION

A serious problem that has arise in this century are crashes and injuries which heavily includes motorcy-cles. It is a major challenge on our part to project the motorcyclist which hit and drive with the larger amount of speed. Only checking license and speed bar-riers won't be e ctive for checking safety concern. A SMART HELMET SAFETY SYSTEM would cease alcohol driving,help on controlling speed, sense ob-struction and in case of unfortunate fall shall inform the concerned authority. A prevention with Smart Helmet is better than unfortunate incident.

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