Innovative Smart E-Helmet Accident Prevention System by using IOT
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Abstract:
Among the leading cause of human death, Road Safety for driver is an essential requirement of society. As number of vehicles increase day by day, collision of vehicle also increases simultaneously, in this situation this project fulfills the purpose of saving the lives. The aim of smart helmet is to provide safety to the bike rider. In this system, if accident has occurred our system will give information to the ambulance about the accident, so they can take certain measures to save the life of the person who meet with an accident. It is developed using Arduino. We place sensors in different sides of helmet, which is connected to Arduino board. So when the bike rider crashes an accident is an unexpected and unintended event. In today’s world road accidents stand sensors sense and the Arduino exact GPS location data using the GPS which is interfaced with Arduino. When the sensor data exceeds maximum limit of pressure then GSM module automatically sends message to ambulance, police and family members. In case of minor injuries, the rider can stop sending of message by SMS sending stop switch.

Key words: Arduino, GPS/ GSM, mercury Switch, Force Sensor, Power Supply, LCD Display.

1.1. INTRODUCTION
In less developed countries, road traffic accidents were the most significant cause of injuries, ranking eleventh among the most important causes of lost years of healthy life. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities. The problems with state drunk driving control systems can be solved in many ways. The most effective will follow several principles: They will invest authority and responsibility in people and organizations at all levels, local to national, because drunken driving control requires action at all levels. They will operate in the public eye, using the media to report on problems and solutions, because ultimate decisions on priorities and resources to control drunk driving must have public support. They will not promise instant solutions based on a single action but rather will take steady steps towards long-term improvement. And they will establish mechanisms for identifying and solving problems rather than attempting to apply one-size fits-all methods. Hence Road Safety becomes a major issue of concern. Therefore it becomes necessary to implement such a technique which is not easy to bypass the basic rule of wearing helmet and to avoid drunken driving. Here we designed a system which checks the two conditions before turned ON the engine of the bike. Our system includes an alcohol sensor and a helmet sensing switch. A switch is used to detect whether the bike is wearing helmet. Alcohol sensor is used to detect the biker is drunk, the output is fed to the MCU. Both the switch and the alcohol sensor are fitted in the helmet. If any of the two conditions are violated the engine will not turned ON. Alcohol sensor MQ3 is used here for detecting the alcohol concentration present in the driver’s breath. Sensor provides an analog resistive output based on the alcohol concentration. MCU is the microcontroller unit, which controls all the functions of other blocks in this system. MCU takes or read data from the sensors and controls all the functions of the whole system by manipulating these data. Alcohol sensor is connected to the MCU through an interfacing circuit and the helmet-sensing switch is directly connected to the MCU. MCU receives data from these sensors and it gives digital data corresponding to the output of sensors to the encoder only if the two conditions are satisfied.

1.2 LITERATURE SURVEY
Smart Helmet with Sensors for Accident the impact when a motorcyclist involves in a high speed accident without wearing a helmet is very dangerous and can cause fatality. Wearing a helmet can reduce shock from the impact and may save a life. There are many countries enforcing a regulation that requires the motorcycle’s rider to wear a helmet when riding on their motorcycle, Malaysia is an example. With this reason, this project is specially developed as to improve the safety of the motorcycle’s rider. Motorcyclist will be alarmed when the speed limit is exceeded. A Force Sensing Resistor (FSR) and BLDC Fan are used for detection of the rider’s head and detection of motorcycle’s speed respectively. A 315 MHz Radio Frequency Module as wireless link which able to communicate between transmitter circuit and receiver circuit. PIC16F84a is a microcontroller to control the entire component in the system. Only when the rider buckled the helmet then only the motorcycle’s engine will start. A LED will flash if the motor speed exceeds 100 km/hour. Keywords-Microcontroller PIC16F844a, 315 MHz Radio Frequency Module, Force Sensing Resistance, BLDC Fan, 5VRelay, LM311 and IC 555. Smart Helmets for Automatic Control of Headlamps Intelligent Safety Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. There are many countries enforcing regulations to wear a helmet while riding. India is an example. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. This project is designed to introduce automatic autonomous headlight technology for the safety of motorcyclist. Here, we focus on intelligent headlamps that react according to the rider’s facial movement. It makes use of
accelerator and other sensors to direct small electric motors built into the headlight casing to turn the head lights accordingly. Keywords-Smart helmets, Headlamps, Accelerometer, RF transmitter, RF receiver, Servo motor A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection. It is known that head gesture and brain activity can reflect some human behaviors related to a risk of accident when using machine-tools. The research presented in this paper aims at reducing the risk of injury and thus increase worker safety. According to the Research paper in 2016 titled ‘Smart Helmet’, in this paper the main objective of author is to force the rider to wear the helmet. In this competitive world one of the survey says that the death trolls due to motor bike accidents are increasing day by day out of which most of these casualties occurs because of the absence of helmet. Traffic police cannot cover remote roads of city. That’s why over primary objective is to make the usage of the helmet for two wheelers “compulsory”. Thus, no one other than the owner himself, who doesn’t have “password” which would have been created by the owner, can use the bike. In this author has proposed the feature that the bike will not start unless the bike rider does not wear the helmet. The other this module basically deals with the checksum of rider if he is wearing the helmet or not on first place to achieve this ultrasonic sensor is been used. Based on this the signal are been sent to the next module voice recognition module use for authentication purpose. Arduino is also used in this project, which is an open source tool for making computer that can sense.

1.3 PROPOSED SYSTEM:

The helmet checks if the rider is drunk and if the rider is drunk then the ignition of the bike is avoided and hence not letting the rider to ride the bike. In this system we use an ARDUINO UNO 328P microcontroller interfaced with alcohol sensor and it is used to monitor users breathe and constantly sends signals to microcontroller. The microcontroller on encountering alcohol signal from sensor and sends the data to motor using RF transmitter and we connect a RF receiver to the motor driver which stops DC motor to demonstrate as engine locking. The system needs push button to start the engine. If the alcohol is detected the system locks the engine. The system also sends a message starting “Accident occurred” including the latitude and the longitude locations of the incident using GSM and GPS. It uses a vibration sensor to detect an accident. It also has a temperature sensor, which notifies when the helmet gets heated up to avoid the circuit damage.

1.4 METHODOLOGY:

This module comprises of a LCD, GSM module, RF recipient, Receive antenna, DC motor, drive L293D and GPS module. This works with wireless communication. Receive antenna receives information from the transmit antenna then sends to the RF receiver which gets the information and sends it to the microcontroller for further Handling. In the Key words Safety; Head motion recognition; IMU; EEG; accident avoidance; human machine interaction. Coming of an accident, the GPS module will gain the co-ordinates of the事故 site. These co-ordinates are sent by means of GSM module to a pre-defined number. The person who belongs to this number receives the detection of accident along with location with the help of GPS. The start this module contains different sensors and a transmitter Circuitry. Microcontroller contains three sensors which are alcohol sensor, vibrate sensor and IR sensor. Alcohol sensor has been utilized to recognize the alcohol focus. The alcohol status is controlled by the microcontroller relying upon different conditions. Any sensor senses their activity DC motor decreases speed by using drive called driver L293D. LCD is used to display the conditions of sensors activities. Sensor will be put close to the mouth of the rider, inside the helmet. Vibrate sensor is utilized for crash location. Another microcontroller contains two sensors which are pulse sensor and UV sensor. Pulse sensor has been utilized for measuring of pulse rate. When the pulse rate increases it stimulates LED1 which blinks white light. UV sensor will sense the front moving vehicle to avoid collision also controlling the accident.

1.5 BLOCKDIAGRAM:

![Figure 1. Block diagram](http://ijesc.org/)

1.6 HARDWARE DESCRIPTION

1.6.1 ARDUINO:

There are numerous different microcontrollers and microcontroller platforms accessible for physical computing. Parallax Basic Stamp, Net media’s BX-24, Phidgets, MIT’s Handy board, and numerous others offer comparative
usefulness. These apparatuses take the chaotic subtle elements of microcontroller programming and wrap it up in a simple to-utilize bundle. Arduino additionally rearranges the methodology of working with microcontrollers; moreover it offers some advantages for instructors, students, and intrigued individuals.

1.6.2 GSM (Global System for Mobile Communications):
GSM also pioneered a low-cost, to the network carrier, alternative to voice calls, the Short message service (SMS, also called "text messaging"), which is now supported on other mobile standards as well. Another advantage is that the standard includes one worldwide Emergency telephone number, 112. This makes it easier for international travelers to connect to emergency services without knowing the local emergency number.

1.6.3 ALCOHOL SENSOR:
In this project, I am going to Interface an Alcohol Sensor with Arduino. Here I have designed an Arduino Shield PCB using EASYEDA online PCB simulator and designer. Arduino Alcohol Detector will detect the alcohol level in breath and by using some calculations in code we can calculate the alcohol level in breath or blood and can trigger some alarm. In this Arduino Alcohol Detector Shield we have used a MQ3 sensor to detect present alcohol level in the breath. A 16x2 LCD is used for displaying the PPM Value of alcohol. And an LM358 IC for converting alcohol level sensor output to digital (this function is optional). A buzzer is also place for indicating high alcohol level.

1.7 RESULT & CONCLUSION
Smart helmet is an effective solution to many problems. Wearing the helmet and being sober are necessary conditions for the bike to start, reducing the possibilities of accidents. Even if a person takes caution sometimes accidents do occur. Here our engine cut off feature reduces the chances of fatalities significantly. The smart helmet acts as a virtual policeman keeping the drivers in check and making roads safer. We have conducted a proof-of-concept study to demonstrate that electrodes mounted to the inside of a motorcycle helmet can reliably record alcohol detection and accident detection. Helmet can also help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory Helmet protection and detection of alcohol content during the starting on of the bike and most importantly saves the precious life of a person as one cannot run a motor vehicle once he is drunk and if the helmet is not present. Family members will be informed as well. The LED is used for sensors activities also buzzer is used for alarm. By inserting a buzzer in the helmet, the motorcyclist will be more alert and will slow down the motorcycle once they received the signal. This system also helps in efficient handling of the outcome of accidents by sending a SMS with the location of the biker to the family member. This ensures that the victims get proper and prompt medical attention, if met with an accident.

Figure.2. Physical Result of Proposed system

- IF RF module is not in range or helmet RF module is not switch on then the LCD displays as below.

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Invalid Input Check RF Module
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Figure.3. Display of Proposed system

- IF the rider not wear the helmet, then the LCD displays the message of “No Helmet Please Wear it”.

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No Helmet Pls Wear it
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Figure.4. Message Displayed on Proposed system

- IF alcohol concentration present in human breath then it display
the message on LCD and it sends the SMS to register number with their current location.

Figure.5. Alert message on mobile for drunk Driver

- If accident occurred, then bike is fallen. It displays the message on LCD and it sends the SMS to register number with their current geographical location.

Figure.6. Alert message on mobile for Accident

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