

E-Helmet for Safe Riding

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Abstract: In this busy life with a lot of advancement in the mode of transportation, accidents are very common. Considering the increasing number of motor cycle riders in our country and the number of accidents happening each year, it is evident that in most cases the rider suffers injuries to the head and it leads to fatal casualties. Road accidents occur in our day to day life because the riders or drivers won't stick to the rules made by the Indian Government and also because reckless drives are in the habit of drinking. Under the influence of the alcohol they indulge in rash driving. Some major reasons for the road accidents are over speeding, consumption of alcohol and riding the bike without helmet. Many people lose their loving family in accidents. Numerous lives could have been saved if emergency medical service could get accident information and each in time to the scene. To overcome these issues, we have proposed a system "E-Helmet". It focuses on three major applications. First, the bike won't start unless and until the rider wears the helmet. Secondly, alcoholic riding is not possible by using this helmet. Third application is accident detection. When the rider meets with an accident, sensor detects the motion and tilts of the helmet and reports the occurrence of an accident by sending the message to the family member and ambulance via GPS and GSM. The main feature of designing this helmet is that it will not only make the helmet smart but also provide safety to rider.

Keywords: Alcohol, E-helmet, GPS, GSM, Message, Microcontroller- Arduino Uno, Riders, Sensors.

1. Introduction

All over the world, there are many instances of bike accidents visible round us. Many people get injured in road accident more frequently because of the main reason not wearing a helmet or not wearing an ISI certified helmets. And the other reason is violating the rules and regulations formed by the government. Hence, in this proposed system we design a smart helmet that could help the motorcyclist to save themselves from road accidents. The system consists of a control unit microcontroller which is responsible for guiding the sensors. Sensors used are alcohol sensor which is responsible for checking the alcohol content of the rider, touch sensor is used for detecting if the rider is wearing helmet. Moreover, if the rider meet with any accident then also its sends an alert message to predefined numbers.

The proposed project work presents the E- helmet that ensures that the rider cannot start the bike without wearing it.

This E-helmet wirelessly switches on a bike, so that the bike won't start without both the key and the helmet. Also whenever the rider starts ignition, the alcohol sensor measures the content of the alcohol in his breath and automatically switches off the bike if he is drunk.

2. Literature Survey

The authors proposed mechanisms that can detect if one is wearing the helmet, detect accidents, and detect whether the person has over-consumed alcohol. For this purpose, we use onboard sensors – flex sensor, impact sensor, accelerometer (ADXL355) and breath-analyzer (MQ3). The accelerometer measures the change in tilt, in X Y and Z axes respectively, and sends the data to a server via an online application programming interface (API). The breath analyzer senses the amount of alcohol present in the breath of a person wearing the helmet and reports if it is beyond the legal limit. The server also uses the data gathered from the accelerometer and the pressure sensors, to train a support vector machine (SVM) [1].

The smart helmet developed is a smart and reliable piece of technology that is cheap to develop and operate and yet not compromise on safety. Additionally, it offers several advantages over the existing methods of accident detection and notification systems that rely heavily on the data collected from cellular devices of the drivers. Also, most of the systems that are available in the automobile market are designed for only four-wheeled vehicles. Thus, the Internet of Things based application- Konnect, proposed in this paper will prove to ensure greater safety for the motorists. [2]

Two wheelers significantly contribute to road accidents casualties being a major transportation mode in India. Proposed system aims to reduce fatalities, head and face injuries due to road accidents by enforcing helmet usage using RF communication. It also safeguards vehicle by replacing conventional key with keypad. Furthermore, extension of safeguarding mechanism involving multiple operational modes is also considered for implementation. [3]

This paper discusses previous pothole detection methods that have been developed and proposes a cost effective solution to identify potholes and humps on roads and provide timely alerts to drivers to avoid accidents or vehicle damages. The proposed

system captures the geographical location coordinates of potholes and humps using GPS receiver. The sensed-data includes pothole depth, height of hump and geographic location, which is stored in the database (cloud). [4]

The Helmet Operated Smart E-Bike to reduce head injuries from road accidents and from bike thefts is developed and tested. The system has mainly focused on helmet use as mandatory by providing two solutions in the helmet itself, which are security lock system and safety engine system. These two applications are operated when user uses the helmet in a proper manner. The RFID tag which is already fixed on the helmet shown on the RFID reader system matched and operated the locking mechanism and no proper RFID tag did not operate the locking mechanism, hence we made it as high security locking system. [5]

3. System Architecture

The fig. 1 depicts the overall architecture of E-helmet. The proposed approach of E-helmet for bike riders using microcontroller and its modules which will ensure compulsory possession of helmet with every motorcyclist. The bike won't start unless and until rider has worn helmet and he has not consumed alcohol. An android application has been created to get the alert message.

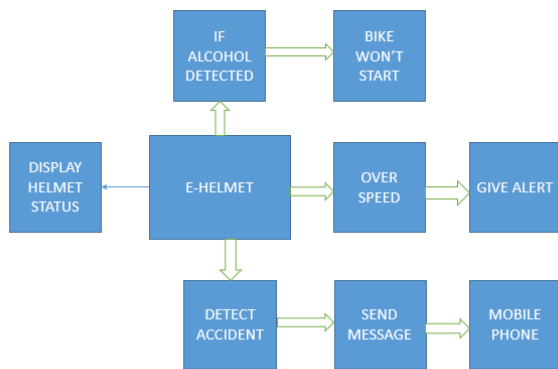


Fig. 1. Block diagram of E-helmet

The E-helmet can detect accident if occurs. If accident occurs the E-helmet program waits for 60 seconds to send the alert to the emergency contacts. Within 60 seconds if the rider presses the do not disturb (DND) button fitted with the helmet, the E-helmet understands that the rider is safe and no need to send alert to anyone. If the DND button is not pressed within 60 seconds, then it is considered as something serious condition and helmet sends alert to the android app and android app in return sends alert to the predefined contacts with GPS location as and SMS. When the rider over speeds it is sensed by the IR sensor and indication is given by a buzzer. If the rider is not wearing helmet or if he is drunk it is displayed on the LCD display.

4. Working

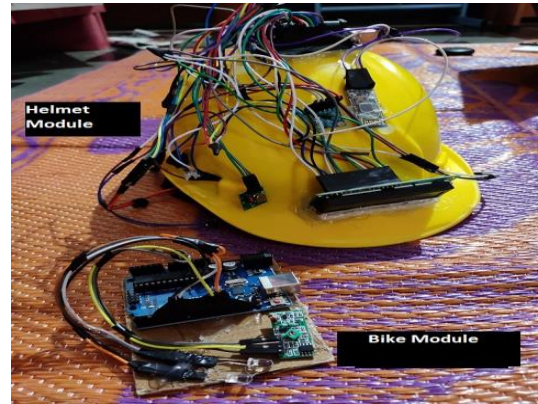


Fig. 2. Helmet and Bike module

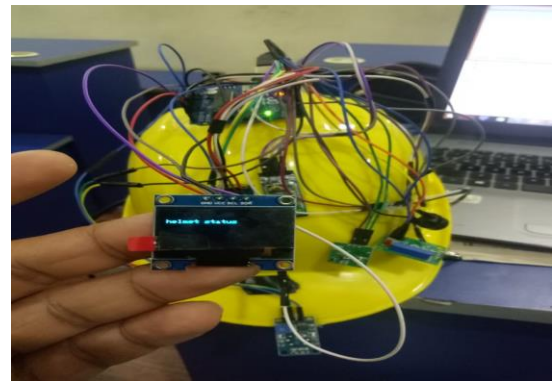


Fig. 3. LCD displays helmet status

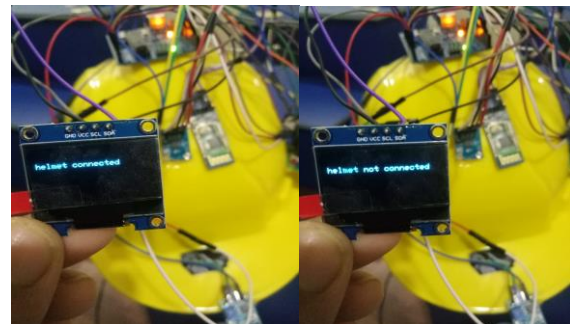


Fig. 4. (a) Helmet connected, (b) Helmet not connected

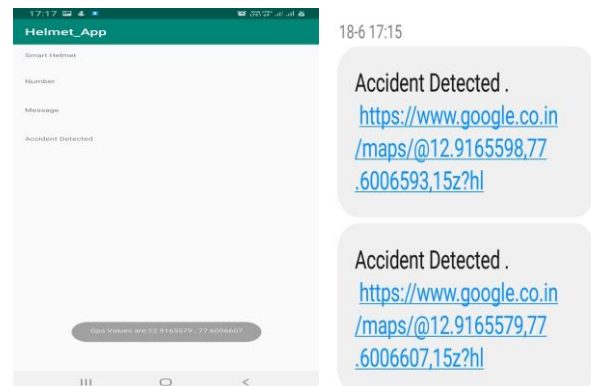


Fig. 5. Screenshot of android application

The figure 2 shows the helmet and bike module. The helmet consists of Arduino UNO ATmega328P and various sensors used are MQ2 gas sensor, Touch sensors, ADXL sensor, IR sensor, Bluetooth, RF transmitter, LCD and buzzer. The bike module consists of RF receiver, Arduino UNO. Figure 3 shows LCD which displays helmet status. The rider wearing the helmet is sensed using touch sensor Figure 4(a & b) depicts the whether rider has worn the helmet or not. Figure 5. Shows the screenshot of android application which shows the location of the rider when accidents occurs.

Arduino UNO board requires external supply of 7-12V. Touch sensors as the name is used to detect touch and it operates as a switch when it is touched. They are used to detect whether the rider is wearing helmet or not. MQ2 gas sensors is mainly used to detect the presence of LPG, propane, smoke. A threshold value of 360 is set to the sensor to get digital output notify the presence of alcohol. The RF module is been used to connect bike and helmet they have the voltage range of 3V - 12V. The ADXL 335 which is a 3 axis accelerometer has 3.3V regulator used in detecting motion of helmet when the accident takes place. Buzzer is a component used to give an alert to the rider when the rider over speeds. Buzzer is set to 10 seconds when the rider over speeds more than 60kmph, then it gives a beep sound. Bluetooth (HC05) module is used to connect rider's phone to the helmet, it is been placed in the helmet. An android application is developed to send the accident location to the predefined numbers.

5. Conclusion

The scope of the proposal ensures that the bike rider cares about their safety while riding. It also ensures that rider is under the influence of alcohol or not. It's a known fact that the

motorcycle riders are careless about their safety while riding, the creation of this E- helmet increases safety and rate of road accidents can be reduced. The E- helmet ensures the general safety of the rider so that he can reach his favored area without any damage to his life.

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