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Wireless smart helmet with sensors for accident detection

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ABSTRACT

In Countries like India, the major challenge is safety for two-wheeler riders. The rapid growth of two-wheeler vehicle road accidents is evident. According to a report by the National Crime Records Bureau (NCRB) In India, almost 2 lakh people die annually due to two-wheeler accidents. The government is forcing drivers to wear a helmet during driving but many of the riders are not following the rules. We would like to help society through our project, we would try to reduce the probability of deaths caused by two-wheeler vehicle accidents. In this project, we are introducing a Wireless smart helmet system that detects a person is wearing a helmet or not, and also the system can detect whether the person is drunk, here we have a Bluetooth transmitter in the helmet and a Bluetooth receiver at the bike. Two pushbuttons will be there to check whether the person is wearing the helmet or not. And an alcohol sensor is placed inside the helmet near the mouth of the rider to see whether the rider is drunk. If the accident takes place location of the accident will be sent to the predefined emergency contacts and there will be a buzzer sound and flashlight to grab attention so that the person gets immediate help. There is also another feature posture correction using haptic feedback which helps maintain the good posture of the rider. In this system, there is a switch that ensures the placing of the helmet properly. The conclusion of this paper is to prevent the accident while driving in the vehicle.

Keywords: Human Safety; Helmet; Arduino; Bluetooth Connectivity; Two-Wheeler Vehicle; Road Accidents

1. INTRODUCTION

Two-wheelers are accounted for the highest number of fatal road accidents in recent years. In countries like India, two-wheeler road accidents have raised continuously from 26.3 percent in 2013 to 27.3 percent in 2014 and 28.8 percent in 2015. Research shows that serious head injuries can happen even at low speeds

and another reason is drunken drive. The people involved in accidents have to be taken care of and immediately taken to the hospital room. Hence Road Safety becomes a serious issue of concern.

Therefore, it becomes necessary to implement such a way that isn't easy to bypass the essential rule of wearing a helmet and to avoid drunken driving. Hence, we've proposed such a system which can help to avoid the above problems. Taking into consideration the inconvenience caused within the helmet we decided to implement many features within the helmet which can make the rider comfortable. Here we designed a system that checks two main conditions before turned ON the engine of the bike. Our system includes an alcohol sensor and push-button switch. The switch is used to detect whether the rider is wearing a helmet. An alcohol sensor is used to detect whether the bike rider is in a drunken condition, the output is fed to the Micro Controller. Both the switch and also the alcohol sensor is fitted within the helmet. If any of the 2 conditions are violated the engine won't be turned ON. To know that accident has occurred collision sensor is used. The microcontroller will send an SMS containing information about the accident and the location of the accident to a family member. Another important feature is that posture correction using haptic feedback.

1.1 Need for the project

The need for this project comes from the real-world challenges that we face daily on the roads. Road accidents are on the increase day by day and in countries like India where bikes are more prevalent many of us die to carelessness carried in wearing helmets. In the present-day scenario, we encounter numerous cases of death because of two-wheeler road accidents.

Road Traffic crashes take the lives of nearly 1.3 Million per annum and injure 20-50 Million more within the world. According to the Global Status report on road safety, 2013 total

number of road traffic deaths remain unacceptably high at 1.24 Million per year. Only 28 Countries, covering 7% of the world’s population, have comprehensive road safety laws on three key risk factors: Drinking and Driving, Speeding, and de failing to use motorcycle helmets. So, to overcome this problem this smart helmet is being introduced which helps reduce the number of accidents that takes every day and also helps to reduce the death ratio. Despite the very fact that helmets are available everywhere, people aren't wearing them. This smart helmet can be used to prevent accidents and ensure safety for riders.

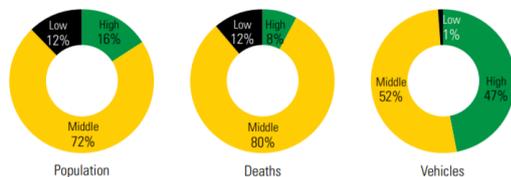


Fig. 1: Global Status Report on Road Safety 2013

1.2 Working of the project

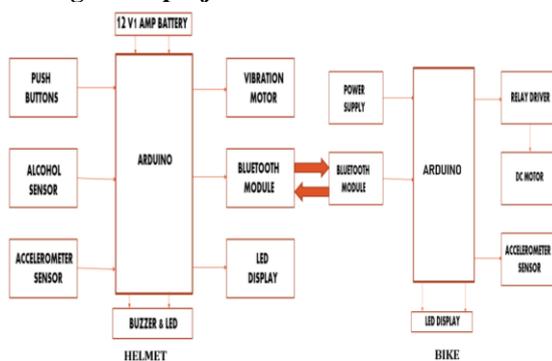


Fig. 2: Architecture Diagram

The working of WIRELESS SMART HELMET is simple. Here we used Alcohol Sensor, Accelerometer Sensor, Bluetooth Module, Arduino Nano, Arduino UNO, 12v Power supply, Vibration motor, GSM Module and a buzzer for alert purpose. This Wireless Smart Helmet consists of two Kits: - Bike kit and Helmet Kit. The system checks for two main conditions before the ignition of the bike turns ON. The conditions are to check whether the person is wearing helmet or not with the help of push buttons on each side of the helmet and other condition is alcohol sensor. When these two conditions are satisfied the Bluetooth transmitter module in helmet will send signal to Bluetooth receiver in bike. When the pushbutton inside is not detected the ignition is turned OFF and If alcohol content is detected with the help of alcohol sensor and threshold limit is set to 600. If alcohol level goes beyond 600 the ignition of the bike will be turned OFF. Accident is detected with the help of accelerometer sensor when there is change in x,y and z axis. It then sends the detected reading to the microcontroller in order to perform the appropriate action. If accident occurs the sensors get the location and send it to microcontroller. It will collect the numbers previously stored in the database. Then, with the help of GSM the Micro Controller send SMS of accident Location to users. As soon as accident takes place the alert system turns on which has light and buzzer which will grab the attention of the people nearby so that people

would get immediate help. Bad posture causes many problems such as back pain, rounded shoulders, etc... In order to help the rider, maintain good posture the accelerometer sensor will detect the bad posture of the rider and with the help of vibration motor (haptic feedback) the rider will be notified to sit properly. Hence, the rider can maintain good posture and good health.

2. CONCLUSION

The main aim of our project which is to encourage people to obey the rules and regulations of traffic authorities will be achieved. Thus, two-wheeler road accidents can be prevented to some extent.

The designed Smart helmet ensures the security of the rider by making it necessary to wear a helmet and also ensures that the rider hasn't consumed alcohol quite the permissible limit. If any of those prime safety rules are violated, the proposed system will prevent the biker from starting the bike. The system also helps inefficient handling of the aftermath of accidents by sending an SMS with the situation of the biker to the predefined emergency contacts. This ensures that the victims get proper and prompt medical attention if he/she met with an accident and helps correction of bad posture while riding.

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