Smart Helmet—An Intelligent Key for Safety Management System

S. Arvind, S. V. Devika, Abhishek Dani, Vashisht Goud, and Naga Sai Teja

Abstract Bike riding is a lot of fun, but accidents happen. An accident is a unexpected, unusual and unintended external action which occurs in a particular time and place, with no apparent and deliberate cause but with marked effects. India is one of the busiest countries in the world in terms of road traffic. The Indian road network, spanning over 5 million kilometers, carried almost 90% of the country's passenger traffic and about 65% of the goods. India in 2019, an average of 414 a day or 17 an hour, according to the transport research wing of the ministry of road transport and highways. People choose motorbikes over car as it is much cheaper to run, easier to park and flexible in traffic. In India, 37 million people are owning two wheelers and 17 million units were sold in 2020. Since usage is high, accident percentage of two wheelers are also high compared to four wheelers. Motorcycles have high rate of fatal accidents than four wheelers. The impacts of these accidents are more dangerous when the driver involves in a high-speed accident without wearing helmet. So, wearing a helmet can reduce this number of accidents and may save the life. We have simple yet ready to use smart helmet system. A module affixed in the helmet, such that, the module will sync with the module affixed on bike and will also ensure that biker has worn Helmet. Additional feature of alcohol detection module will be installed on the helmet.

Keywords Smart helmet · Intelligent key · Safety management system · Bike riding · Accident

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1 Introduction

As of now we have no system for alerting the driver and to immobilize in case subject is not wearing a helmet or if subject is under the influence of alcohol at the time of riding the two-wheeler [1]. Because of this negligence, there may be a chance for getting accidents, which costs man lives. To avoid this, we are developing this proposed system, which alerts the driver and lets the vehicle to continue to stay in immobilized state. In the proposed system, we are going to let the vehicle stay in the immobilize state when the helmet is not being worn by the driver or if the alcohol sensor is positive. In either of the case as above, there is an alert that comes in the form of buzzer sound. Which kills the power to the vehicle immediately and also, in this paper, the data of the positive sensor will be collected for future safety. It can be sent to the database of the authorities for immediate action in case of emergency situations [2]. This paper presents the detailed components used in the design of the smart helmet which is intelligent in nature to save human life.

2 Working Principle

The Design of this Helmet needs Hardware and Software for product model. Hardware consists of Arduino Nano Board, Arduino Uno Board, Power Split Board, Click Switch, Alcohol Sensor, RF Transmitter, RF Receiver, Buzzer, 9.9 V battery.

Software used to write the program is Arduino IDE 1.8.13 running on Windows 10 and this design has two modules.

1. Helmet Module
2. The Bike Module

2.1 The Helmet Module

In the Helmet module, Arduino Nano Board is used due to its size, which is just 1/4th size of the Arduino Uno Board, which is easy to be placed inside a helmet with a battery pack and also doesn't increase the weight of the helmet by much (comparing to helmet that already exist which are brought in Indian market).

A Power Split Board is being used to split the power between the

1. RF Transmitter
2. Alcohol Sensor
3. Arduino Nano Board

Alcohol Sensor detects the presence of the alcohol in the air (or on the breath of the subject, who's wearing the helmet), RF Transmitter has to transmit the output data of the Arduino Nano Board to the RF Receiver of the Bike Module [3].

2.2 The Bike Module

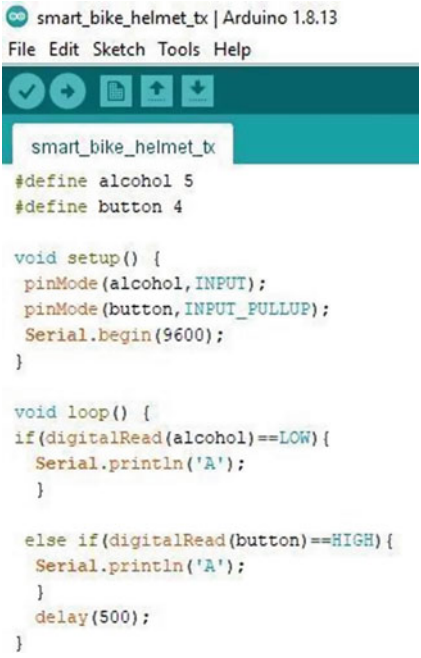
In the bike module, Arduino Uno Board is used as it is bigger in size and cannot be used in the helmet module. Also, the other advantages of using this is Arduino Uno Board has a DC power input which can be taken from the bike it-self without interfering it with an electric plug converter.

RF Receiver is the next component connected to the Arduino Uno Board which receives the Output 'A' from the Rf Transmitter that is connected to the Arduino Nano Board in the Helmet Module. Buzzer is the last component connected to the Arduino Uno Board and it has to buzz when the Arduino Uno Board gives output, when it gets input of 'A'.

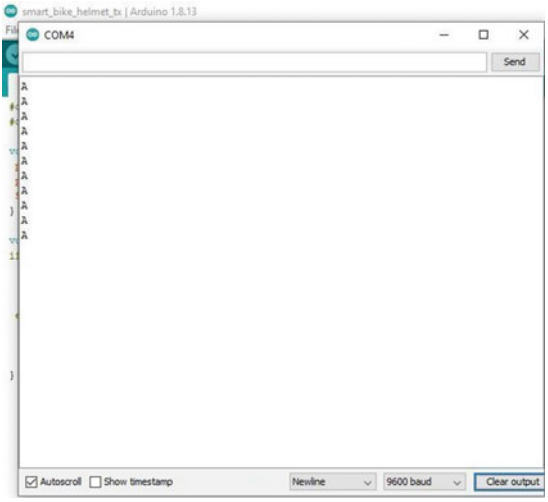
The program states that whenever the button is sensing any pressure or the alcohol sensor detects any positive signature, its output has to be 'A' (which is understood by the program in the Arduino in the Bike Module).

3 Program Code

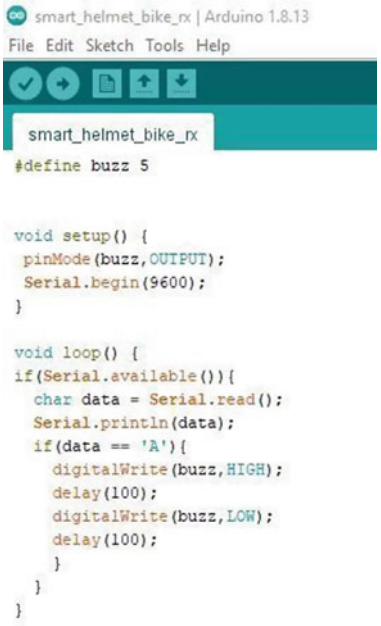
3.1 The Helmet Module



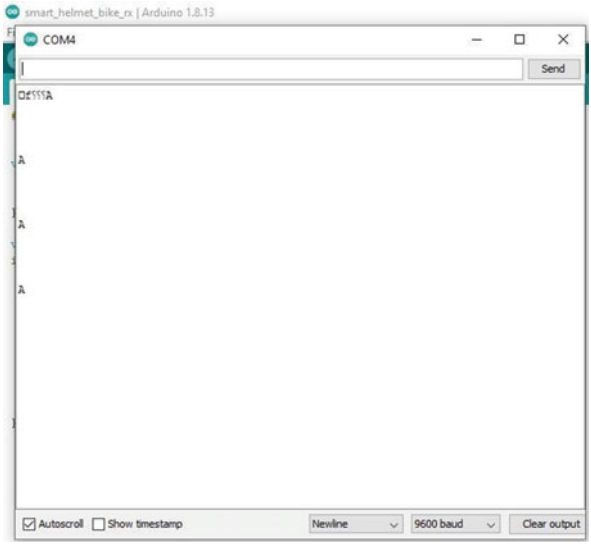
3.2 Output



3.3 The Bike Module



3.4 Output



4 Result

Basically, when the subject is wearing the helmet—the switch is being press due to the weight of the helmet against the head, also the alcohol sensor should give a negative reading for the alcohol contain in the air then it is positive sign for the engine to keep running.

5 Conclusion

The main aim of the project is for the people to at least wear a helmet while riding the two-wheeler so that the main part of a body i.e. Brain is the well protected and the fatalities can be decrease if there is any mishap. We hope the working bodies of the government to take up this project and include it in the rules, which will be beneficial to everyone.

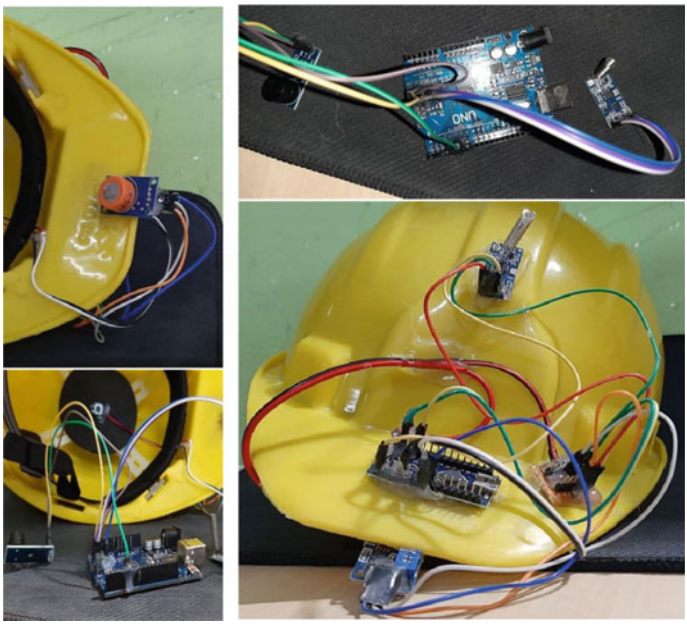


Fig. 1 Prototype pictures of smart helmet

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