

Two-Wheeler Safety System for Accident Prevention, Detection and Reporting

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Abstract:

The objective of this paper is to build a safety system which is integrated with the smart helmet and intelligent bike to reduce the probability of two-wheeler accidents and drunk and drive cases. The pressure sensor and the accelerometer sensor checks if the person is wearing the helmet or not. Alcohol sensors detects the alcoholic content in the rider's breath. If the rider is not wearing the helmet or there is alcohol content found in rider's breath, the bike remains off. The bike will not start until the rider wears the helmet and there is no alcoholic content present stating that rider did not consume alcohol. When the rider crashes, helmet hits the ground and sensors detect the motion and tilts of helmet and reports the occurrence of an accident and sends information of the location of accident to the family members of the rider and the emergency contact numbers.

Keywords: Safety, Helmet, Alcohol sensor, Pressure Sensor, Accident prevention.

1. Introduction

There is a significant increase in the usage of two wheelers day by day, hence the road mishaps are also increasing day by day.

This is a major area of concern as majority of these accidents are fatal. Safety is one of the most important aspect in everyone's life. Every person hopes to reach home safely. Despite of having all the safety rules while riding, many of the riders fail to follow them and this leads to road accidents and there are very less chances of survival. The accidents are fatal due to the common negligence of not wearing the helmet and lack of medical attention needed by the injured person in time. Another major cause for the accidents is the drunk and drive cases and over speeding. Hence our objective is to develop a two-wheeler safety system which aims for accident prevention, detection and reporting and to reduce the probability of two-wheeler accidents and the probability of drunk and drive cases.

2. Existing system

The existing system aims in the accident detection and notification. Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilized for building the system. The accident detection is done using the tri-axial accelerometer and the accident notification is done using the client and server-based system where the microcontroller is the client and the server is a web-based service. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a cloud-based service. The vehicle location is obtained by making use of the global positioning system.

Disadvantages

- Less accuracy in the detection of accidents.
- There is no system to check if the rider is wearing the helmet or not.

- There is no attempt to prevent the drunk and drive cases.

3. Proposed system

The proposed system aims in the prevention, detection and reporting of accidents. We are using Arduino UNO open-source microcontroller board based on the ATmega328P microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment)

There are three units in the system namely

- i. helmet unit
- ii. bike unit
- iii. receiver unit.

i. Helmet unit

Helmet unit is integrated with the pressure sensor, alcohol sensor, accelerometer sensor. GPS (Global positioning system) and the GSM (Global System for Mobile) modules are also integrated in the helmet unit.

a. Pressure sensor:

Pressure sensor is a device which senses the pressure and converts it into an electrical signal. We are using this sensor to check if the rider is wearing the helmet or not. The output from this sensor decides the ignition of the bike unit.

b. Alcohol sensor:

An alcohol sensor is used to check the alcohol consumption by the rider. The output value of this sensor is given as input to the microcontroller. If the rider is found to have consumed alcohol, then the microcontroller prevents the ignition of the bike under this case.

c. Accelerometer sensor:

Accelerometer sensor is used to measure the speed of the motion of bike. If the rider crosses the threshold speed, then there is notification given to the rider and to the contacts of the rider. Accelerometer sensor along with the pressure sensor is used to detect the accidents by first checking if the rider is wearing the helmet or not and if the rider is wearing the helmet it checks for the tilts of the helmet and then notifies the occurrence of accident.

d. GSM and GPS modules:

The Arduino GSM shield allows an Arduino board to connect to the internet, send and receive SMS using GSM Library. GPS is used to detect the

Latitude and Longitude of any location on the Earth, with exact UTC time (Universal Time Coordinated). Whenever there is an occurrence of an accident, GPS Receiver used for detecting coordinates of the vehicle, and GSM module is used for sending the coordinates to rider's emergency contacts by SMS.

ii. Bike unit

Motor driver circuit and DC motor represent the bike unit. Bike unit shows the output in the form of ignition. If the test cases of wearing helmet and no alcohol consumption are passed, then the bike's ignition will be on and if one or both the test case fail the bike's ignition remains off.

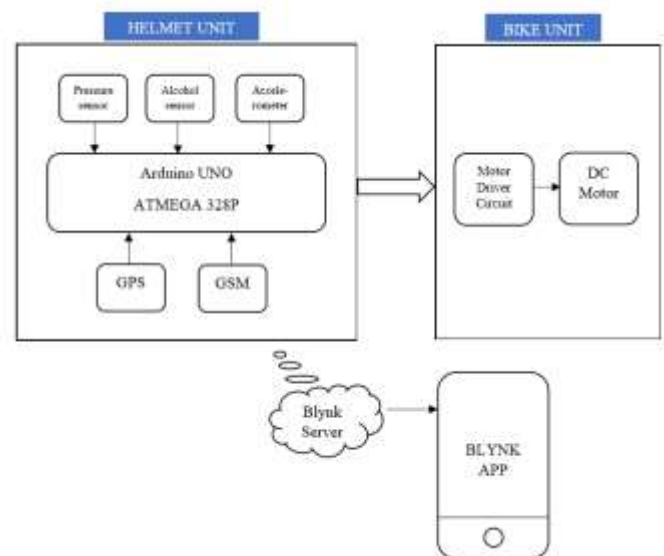


Figure 1: Overview of the proposed system.

iii. Receiver

Blynk is a software or app that allows the user to control Arduino devices from a smartphone. It is also used to control the hardware remotely. We have used Blynk application as receiver in mobile phones. The Blynk server is responsible for the communication between the hardware unit and the smartphone.

4. Results

In our system we have overcome the disadvantages present in previous systems. Our system is more accurate in detection of accidents by checking the motion of the bike and the condition of wearing the helmet by the rider. Our system implements the future extension of work in the existing system which is to detect the alcohol consumption and reducing the probability of the drunk and drive cases.

5. Conclusion

The two-wheeler safety system developed with smart helmet and intelligent biking system is reliable and aims to help in the prevention, detection and reporting of accidents also reducing the probability of the drunk and drive cases. It also has several advantages compared to the previous systems. Our proposed system gives the primary importance of preventing the accidents and ensures safety for a greater extent in two wheelers.

6. Future Work

As a future extension of this work the safety system can be integrated with cameras for security purposes. The system can also be integrated with an algorithm to find the nearest person or hospital to the place of accident which will reduce the time wastage in providing medical attention to the injured person.

7. References

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