

Smart Helmet

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Abstract - There are many countries enforcing a regulation that requires the bike rider to wear a helmet when riding on their bike. With this reason, this project is specially developed as to improve the safety of the bike rider. The impact when bike 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. An alcohol detection sensor and ultrasonic sensor is used for detection of the rider's head and alcohol content. The module is connected to compression discharge ignition unit of bike engine. Arduino uno is a microcontroller used to control the entire component in the system. Only when the rider buckled the helmet then only the bike engine will start. A LED will flash if the helmet is wearred and alcohol content is not detected.

Keywords: Arduino, ultrasonic sensor, helmet.

1. INTRODUCTION

Road accidents are on the rise day by day, and in countries like India where bikes are more prevalent many people die due to carelessness caused in wearing motorcycle helmets. In order to put an end to this misery we have developed the smart helmet for motorcycle, a way to stop starting of vehicles without wearing helmet or even if the driver is boozed. In addition, it has a great feature of detecting accidents and informs specific people via SMS with accident location, thus aiding ambulance to reach the correct location. This smart bike helmet system has two modules, both are on the helmet. Ultrasonic sensor and alcohol sensor are attached with the helmet module and connected to arduino board. The output voltage of the arduino board is not enough for engine ignition.

An electronic circuit is designed to amplify the voltage, and connected to compression discharge ignition unit of bike. The two sensors- alcohol, and the ultrasonic sensors are assembled here; it will run with a 9V battery. IC connected to the circuit will convert 9V to 5V. This circuit contains sensors and regulator. Output from each of the sensors is connected to the data input pins of arduino board. Alcohol sensor must be placed in front of the mouth to check alcohol content in the breath. The engine of the bike can start only if the rider has buckle up helmet. For these, we use ultrasonic sensor. The second step is alcohol detection. Alcohol sensor is used as a breath analyzer which detect the presence of alcohol in rider breathe if it is exceeds the permissible range ignition cannot start. The third main issue is accident and late medical help. Around every second people die due to late medical help or the accident place is

unmanned. For this we develop an android application. The application is installed on the smartphone.

Arduino uno microcontroller is used in this project. Signal transmission between the helmet unit and bike unit is possible by means of wires. 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 ultrasonic sensor.

2. PROPOSED SYSTEM

The engine of the bike can start only if the rider has buckle up helmet. For these, we use ultrasonic sensor. The second step is alcohol detection. Alcohol sensor is use as breath analyzer which detect the presence of alcohol in rider breathe if it is exceeds permissible range ignition cannot start. It will send the flag value to arduino. MQ-3 sensor is used for these. When these two conditions are satisfied then ignition will start. The third main issue is accident and late medical help.

Around every second people die due to late medical help or the accident place is unmanned. For this we develop an android application. The application is installed on the smartphone. In fall detection, if mobile shakes higher than the threshold value, the application will send message to predefined contact numbers. The aim of this project is to make a protection system in a helmet for a good safety of bike rider. The helmet is fixed with sensors. Arduino uno microcontroller is used in this project. Signal transmission between the helmet unit and bike unit is possible by means of wires. If both the conditions are true then ignition start. The output voltage of arduino is amplified by a circuit and connected to CD unit of engine. Thus the engine gets enough voltage for ignition.

2.1 ARDUINO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms.

2.2 ULTRASONIC SENSOR

The sensor we use in our proposed system is ultrasonic sensor. It is used because of its reliability and outstanding versatility. An ultrasonic sensor is a device that can measure the distance to an object by using sound waves at a specific frequency and listening for that sound wave to bounce back. Time difference between sending and receiving the sound pulse is used to determine the Distance to an object.

Distance = Time x Speed of Sound divided by 2

2.3 MQ 3 ALCOHOL SENSOR

MQ-3 Alcohol sensor is right for identifying the alcohol content from breath. It can be positioned just front of the face. It determines by helmet unit, whether the rider is drunk or not. MQ-3 sensor has potentiometer for adjusting different concentration of gasses. Here we use digital output of this sensor which is gives output in terms of high or low. It decided by our helmet unit whether rider is drunk or not.

3. WORKING

Helmet is upgraded with ultrasonic and alcohol detection sensor. Arduino uno micro controller is fixed on the helmet. Sensors are connected to the arduino using wires. Program is coded in to the arduino board. Data values from sensors is verified by the program and gives output. Ultrasonic sensor can measure the distance to an object by using sound waves. It works by transmitting energy in the form of ultrasonic waves to a target object. It reflects the waves back to the sensing head. These sensors are largely used in measuring distances. If an object is detected, then it will pass the value to the arduino. Sensor has 2 openings on its front: Trigger and echo. Trigger opening transmits ultrasonic waves and echo receives them. The speed of sound is 340 m/s or 29 microseconds per centimeter. Ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.

Alcohol sensor is suitable for detecting alcohol concentration on breath. Engine starts if and only if the content is less than 500. The four pins in the sensor are : A0,D0,Vcc,GND. These pins are connected to arduino. If concentration is high, then engine will not start. Arduino uno is a microcontroller board based on the ATmega328P . Simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

An android application is developed to detect accidents. It is based on the shake value of smartphone. Threshold value of shake is 500. If shake value > 500, then app will send message to the emergency contacts which includes the accident location. Application must be installed in smart phone. For getting location we make use of google play services.

4. RESULT

Implementing this system provides a safer two wheeler journey. Outcome of the project showed that the bike engine will start if the helmet is weared and no alcohol content is detected. Accidents are successfully detected and informed others via sms.

The project consists of 3 parts:

1. Helmet authentication: to ensure that the bike rider is wearing a helmet.
2. Alcohol detection; to ensure that the bike rider has not consumed alcohol.
3. Fall detection; in case of accident, to inform bike rider's family about the accident.

CONCLUSION

The proposed approach makes it mandatory for the rider to use this protective guard in order to drive a two-wheeler vehicle and ensures the safety of the human brain and therefore reduces the risks of brain injuries and deaths in case of an accident. If accident occurs, the location is send via sms to close relatives by the android application.

FUTURE WORKS

In future this intelligent system can be fabricated in a compact size so that it is globally acceptable to notify No entry and No parking areas. By implementing such mechanism in two wheeler, deaths due to driving under influence of alcohol and other road fatalities can be minimized to large extent. Our system helps to know the location of the vehicle for rescuing in the case of theft incidents. This system be modified for four wheelers. GPS can be used to track the location of accident. In addition to the breathalyzers, skin sensors can also be provided for more safety.

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