IOT based framework for accident prevention in highways

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Abstract---Road accidents are the major cause for the loss of life's that held in our day to day. In 2018 road accidents is about 1,51,589.In 2021 road accidents is about 1,31,389.The main cause for road accidents is not wearing the helmet and consumption of alcohol. Our project is to control road accidents using smart bike and helmet. Our project consists of two parts: helmet part and detection part. In Helmet part we use IR sensor and Alcohol sensor another one is detection part. In detection we use LDR sensor, the ultrasonic sensor, speed sensor, display. It used to control road accidents by detecting the obstacles in distance using ultrasonic sensor. And the sound waves from ultrasonic sensors calculates the distance of obstacles and gives warning to the rider by using a display and using the WiFi technology to control the helmet and bike.

Keywords---LDR sensor, ultrasonic sensor, WiFi.

Introduction

In hill station mostly road accidents occur in night time due to unknown of obstacles. The survey report speaks about the year of 2018 approximately 5,200 road accidents occur in hillside areas and 984 peoples were died in this accident and then 2019 to 2020 4,170 hill accidents were occurred in India..The main cause for accident is riders not wearing helmet and consumption of alcohol and then unknown of obstacles. It can be controlled by our project. Project consists of two parts one is helmet and another is detection part. In helmet part consist of IR sensor which detects the rider wearing a helmet or not. And the alcohol sensor senses the rider consume the alcohol or not. If a person consumes alcohol and wearing helmet means the bike will not be ignited. In detection part consist of LDR sensor which senses the night time. The over speed of motor can be controlled by speed sensor. If Rpm is above 660 means the ultrasonic sensor detects the obstacles about nearly 10m. If obstacle is detected means it sends message to the rider in display as WARNING. If speed of rider is below 660rpm means detection of obstacle doesn't work. Wifi technology is also system that connects both helmet and bike. And it also act as a security system where the third person are not able to steal our bike.

Literature Survey

Smart Helmet for Two Wheeler Drivers

The problem identifies that the rider does not wear the helmet and consumption of alcohol can be detected by using alcohol sensor and IR sensor and detect obstacles using ultrasonic sensor and gives warning to the driver If a rider met with an accident it suddenly contacts the number that is stored in it and gives location to the police station. And the bike was not ignited when the rider did not wear a helmet and the rider consumed the alcohol. But our research is updated that by use of LDR sensor can identifies the night time and use of speed sensor with high Rpm ultrasonic sensor can detects obstacle gives warning to the rider.

Design and Implementation of Helmet for Accident Detection and Notification

The problem identifies the rider consumption of alcohol and not wearing helmet while riding. Rider consumes the alcohol it was detected by alcohol sensor and helmet was detected by IR sensor and bike was not ignited. If rider was met with an accident vibration sensor in helmet was activated and by use GSM module it sends message to emergency number that stored in it. And by use of GPS module it sends location to ambulance as well as police station. But our research is updated with LDR sensor it senses the night time and gives warning to the rider using ultrasonic sensor .And then gives security to bike by use of wifi module. So our project is quite effective in night time. We use one more method to protect bike from thieves. It is a wifi security system. It contains username and password by this only rider can able to ignite the bike.

Smart Helmet for Safe Riding

The problem identified that the rider cannot ignite the bike until the rider wears a helmet. And it sends a message that PLEASE WEAR HELMET. The helmet consists of FSR sensor on upper side, alcohol sensor on lower side. The alcohol sensor detects whether rider consumes alcohol. If rider consumes alcohol the bike will not ignite. And shows the message that "YOU ARE DRUNK". If a rider is met with an accident vibration sensor senses vibration and bike falling can be detected by accelerometer and RF circuit communicates with emergency number like ambulance by using GSM module and sends location to police using GPS module. But our research is updated by using an LDR sensor that senses the night time and in day time it does not work .Ultrasonic sensor can measure the distance of an object and display WARNING to the rider. By use of the GSM module it can display the message to the rider. And we use wifi technology to connect the helmet part and bike part. And wifi technology acts as a security by the username and password. And riser can avoid collisions by the smart bike method. And it also provide more security to the bike as well as the rider.

Microcontroller Based Smart Helmet by IR Sensor

The problem identified that bike will not ignited by the rider while rider does not wear helmet and drunken alcohol. The helmet was IR sensor and alcohol sensor. And IR sensor was placed near the ear side of helmet and alcohol sensor was placed in lower side of the helmet. RF transmitter placed inside the helmet and receiver placed in vehicle. And bike met with an accident it sends message to emergency number like relatives and ambulance by using GSM with share an accident location to police station using GPS. And the total system of GPS as well GSM was controlled by RF transmitter and receiver. But our research is using an LDR sensor that can detect the night time and detect the distance of vehicles using ultrasonic sensors and gives warning to the rider. And Wifi security system is available. There are two wifi modules and both are connected with each other one connect with helmet module and another one is connect with bike distance detection system. By the distance calculation rider can avoid the accidents easily and wifi security system gives more protection to the bike.

Proposed Methodology for accident prevention

Block Diagram

The block diagram of accident prevention system is shown in below figure
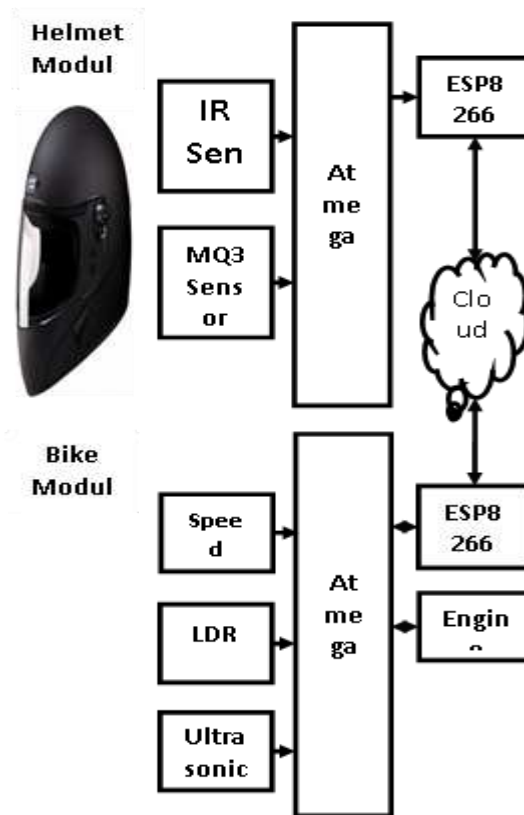
Fig.No 1 Block diagram of accident prevention system

IR Sensor

Infrared sensor which emits LED light rays at above 1 – 5m distance which detect an object in the particular distance. In our project we use IR sensor to detect the helmet of the rider.

Ultrasonic Sensor

Ultrasonic sensor is to measure the distance by passing the sound waves for a particular distance and it hits an object and returns back to the sensor and the distance is calculated. The range of the ultrasonic sensor is about 10m.In our project calculates the distance of obstacles present in.

LDR Sensor

The LDR sensor is a Light Dependent Resistor. It is used to detect the light levels. Their resistance decreases as the light intensity increases. Here, it senses the night time and detection part works on it.

Display

Liquid Crystal Display is an array of small layers which is coordinately called as pixels. The several layers were two panels made of glass material free of sodium called as substrate. Here, LCD display shown warning to rider.

Speed Sensor

It is a cylindrical permanent core with coil wire wound around it mounted on stationary hub carrier axle casing or back plate produces a magnetic flux which overlaps the rotating excitoring. It rotates and the speed of bike rpm is 660 in high and low rpm is 330.

GSM Module

GSM is Global System Mobile Communication. It is essentially identical to an ordinary mobile phone including the need for SIM to identify them to the network. Here, we calculate the distance and upload to the cloud and with mathematical works then a warning message is shown.

Alcohol Sensor

Alcohol sensor is to detect the consumption of alcohol through breath at an alcohol range of 0.04mg/L – 4 mg/L and we use a certain range of above 0.08mg/L. It shows that person consumed the alcohol.

ESP8266

It is a wifi module integrated with TCP/IP protocol that is used to communicate with two devices and control the function of devices. Here, It connects the both helmet as well as distance calculating system and controls the both helmet part and distance calculating part.

Results and Discussion

In our research the IR sensor detects the helmet worn by the rider and alcohol sensor detects that rider consumes the alcohol and the rider can't ignite the bike if the driver is drunk or not wearing the helmet.LDR sensor detects the night time. If it is a night time speed sensor increases the Rpm at about 660
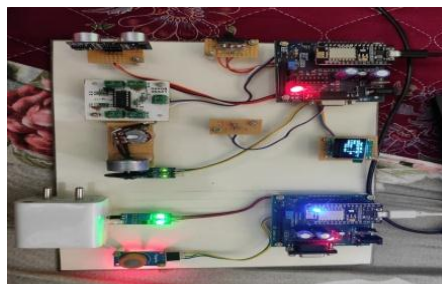

Fig No 2: Prototype of Accident Prevention System

The ultrasonic sensor emits sound waves and it travels for 10m then it hits an object and comes back and it calculates the distance of the obstacles. The rider gets warned by message in LCD display as"WARNING". The message displayed to the rider by the use of GSM module. While in low Rpm of 330 detection of obstacles does not work. And wifi technology is used as a security system by the username and password. By knowing the username and password then only the rider is able to ignite the bike. As a result, the driver gets alerted and avoids the accident.
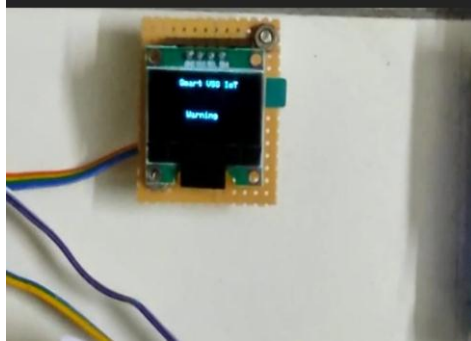

Fig No 3. Result of accident prevention system

Conclusion and Future Scope

In this project, the rider gets an alert message through the GSM module and the rider can avoid the accidents by the alert message displayed which provides security to human lives and also to the property. As further enhancement of the project, GPS module can be incorporated to track the location of the place when the accident occurs and the message can be send to the emergency number.

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