

SMART HELMET FOR ROAD SAFETY

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Abstract - In India, it is estimated that one accident occurs every two minutes. The reason behind this is not wearing a helmet and not getting proper medical attention after an accident. To reduce the number of accidents at the same time trying to prevent accidents with advanced technology. We have developed a “Smart Helmet” which ensures the riders safety, by making it necessary to wear a helmet.

A helmet is a headgear which protects the rider in case of an accident situation. A Smart Helmet designed as a problem statement is a protective headgear used by a rider which makes driving a bike safer than earlier. This implementation of the idea has been developed with advanced features like alcohol detection, location tracking, and accident identification, can be used as a hands-free device, fall detection. It is compulsory for a rider to wear a helmet, the ignition of the bike will not work till the helmet provides a message. A NRF module enables the communication between the bike and rider. If a rider is drunk in between the journey, the helmet detects the same and sends a message and turns off ignition. If the bike rider is in trouble due to an accident or any other situation, location of the rider and bike can be traced, and a message containing location of the rider can be sent.

Keywords - Alcohol, Bluetooth, Fall Detection, Live Tracking, Smart helmet, GPS, Message, Microcontroller-Arduino UNO, Riders, Sensors.

INTRODUCTION

In today's era, especially in the young generation, the craze of motorbikes is remarkable. As the bikers in our country are increasing, the road mishaps are also increasing day by day, due to which many deaths occur, most of them are caused by the negligence in wearing helmet. To overcome the above-mentioned problem, we are designing a smart system that prevents road accidents and this will be able to detect crash and will be able to quickly notify the accident to a predefined contact number.

The purpose of this project is to make driving safer and convenient. This system can provide security and safety to bikers against road accidents. Without wearing the helmet, the rider cannot start the bike and if the rider is drunk in the journey, then the helmet detects it and sends a message and turns OFF the ignition. If a rider in case meets with any accident or any other situation, the live location of the rider and bike can be traced with a message of location which will be sent to the emergency contacts. Taking into consideration all aspects above and to help society to save the lives of the beloved once, thus the system collects the data and checks maintenance of the bike and keeps record of it.

LITERATURE SURVEY

The authors have mentioned about a smart helmet which makes motorcycle driving safer than before by implementing the Arduino. This implementation was done by placing vibration sensors in different places of the helmet where the probability of hitting is more which are connected to the arguing board. When the data exceeds the minimum stress limit then the GSM module sends a message to family members automatically. The hardware used in this system is an Arduino board, Bluetooth module, vibration sensor and mobile phone.

Other solutions stated the use of the GPS and GSM as its core technologies. The mechanism of this smart helmet is very simple, vibration sensors are placed in different sections of the helmet where the chance of hitting is more which are connected to the microcontroller board. So, when the rider crashes and the helmet hit the ground, these sensors sense and provide it to the microcontroller board, then the controller extracts GPS data using the

GPS module that is integrated to it. When the data goes below the minimum stress limit then the GSM module automatically sends alerting messages to ambulance or family members. The hardware used in this system is alcohol sensor, GSM, GPS, microcontroller, pressure sensor and vibration sensor.

SYSTEM ARCHITECTURE

The solution is divided into two parts bike unit and helmet unit. The fig.1 and fig.2 show the complete architecture of a smart helmet. The proposed approach of smart helmet for bikers using microcontroller and its modules which will ensure compulsory possession of a helmet with every motorcyclist. The ignition of the bike will not start until the rider wears the helmet and is not that detected that he is under the influence of alcohol. The status of the helmet will be displayed on the mobile application. After checking these two conditions the ignition of the bike will turn ON. The android application is created for sending the message to emergency contact and provides navigational instructions to the rider.

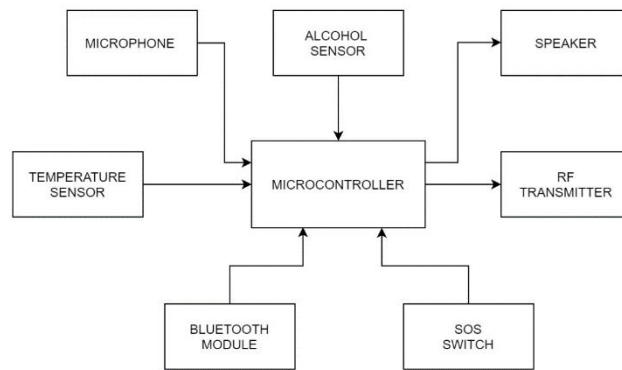


fig.1 Block Diagram of helmet unit

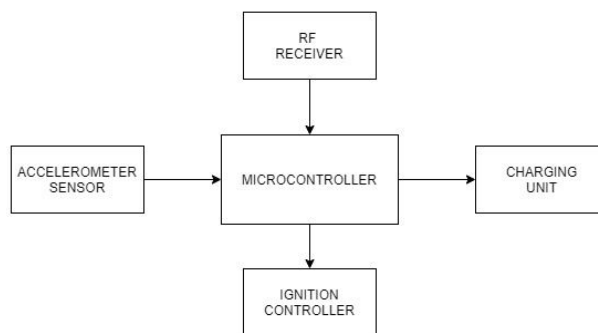


Fig.2 Block Diagram of bike Unit

BIKE UNIT

This module contains sensors, an ignition controller, a charging unit, and a receiver Circuit. When the NRF receives information from the transmitter NRF then sends it to the NRF receiver which gets the information and sends it to the microcontroller for ignition of the bike through the ignition controller circuit. If the NRF receiver did not get any signal it will not start ignition. The controller constantly monitors the accelerometer readings.

Whenever an accelerometer sensor will detect a crash or accident, there is a sudden change in accelerometer readings. There will be a beep continuously and will wait for 20 seconds. If the driver presses a button within this period to tell that this is a false case, no SMS will be sent, and the bike will stop. With the help of an app, the details of the accident along with the location will be sent to the predefined number. The start status is controlled by the microcontroller relying upon different conditions. The NRF transmitter transmits information from the microcontroller on the helmet side to the recipient on the vehicle side through the transmit antenna. Also, the bike unit contains a battery charging facility for both helmet unit and additional devices of a rider like a mobile phone.

HELMET UNIT

The helmet module contains Bluetooth module for application interfacing, NRF module is used for connection with the bike unit. Microphone for emergency communication and speaker for providing navigational instructions. Before starting the bike, the helmet will check for the inputs from the alcohol sensor and the NRF module will check for connection with the bike unit. If either one of the inputs is returned false, the bike will block the user from starting the bike. When both the conditions are returned true then the bike will turn on the ignition. During the journey if the SOS button is pressed or if the fall is detection signal is received from the bike module the Bluetooth module will immediately send the necessary signal regarding the same to mobile application.

The application will then communicate with the emergency contacts which are already been assigned by the rider at the time of one-time setup of the helmet. The navigation destination can be set by voice commands with the help of google maps integration with the helmet it will also provide the necessary navigational features on the inbuilt speaker.



Fig.2 Smart Helmet

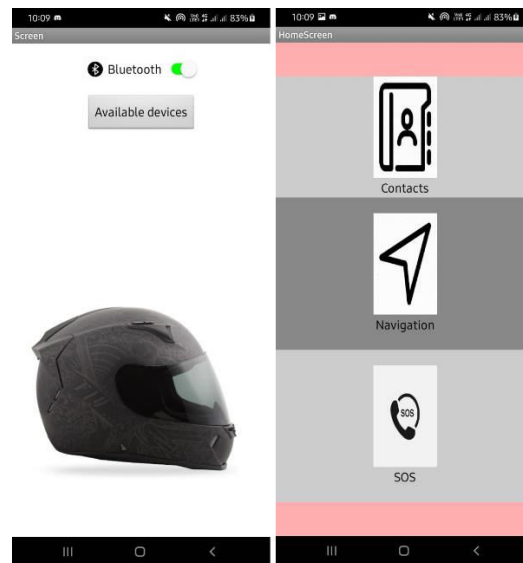


Fig.3 Android Application Screenshot

CONCLUSION

The purpose of the system is to make bike riding safer than earlier. The proposed helmet system ensures that the rider will compulsorily wear a helmet and does not consume alcohol i.e., will not drink and drive. If these prime conditions are violated by the rider, then the system will prevent the rider from starting the bike. The proposed design gives a solution for reducing the number of accidents with effective cost and advanced technology. It also helps in efficient handling after the accident occurs by sending the live location of the bike and rider to the police station and medical helpline number. This ensures that the victim gets proper and prompt medical attention after an accident.

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