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Smart helmet to detect and prevent accident

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ABSTRACT

The impact when a motorcyclist involves in a high-speed accident without wearing a helmet is very dangerous and can cause a fatality. Wearing a helmet can reduce shock from the impact and may save a life. There are many countries enforcing a regulation that requires the motorcycle's rider to wear a helmet when riding on their motorcycle, Malaysia is an example. A smart helmet is a special idea which makes motorcycle driving safer than before. This is implemented using GSM and GPS technology. The working of this smart helmet in IOT is very simple, vibration sensors are placed in different places of the helmet where the probability of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and gives to the microcontroller board, then controller extract GPS data using the GPS module that is interfaced to it. When the data exceeds minimum stress limit then GSM module automatically sends a message to ambulance or family members. It also has an alcohol detector sensor which detects whether the person is drunk and switches off the engine if the sensor output is high.

Keywords— IoT, GPS, GSM, Sensors, Helmet

1. INTRODUCTION

Now a day's most of the countries are enforcing their citizens to wear a helmet while riding a bike and not to ride a bike when the person is under the influence of alcohol, but still, rules are being violated. The motivation of this project comes from the real-world challenges that we face daily on the roads. Road accidents are on the rise day by day and in countries like India where bikes are more prevalent many people die to carelessness carried in wearing helmets. In the present day scenario, we encounter numerous cases of death due to two-wheeler road accidents. Despite the fact that helmets are available everywhere, people are not wearing them. In the event of road accidents, the message is sent to the emergency contact through GSM. 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 due to most common negligence of not wearing helmets, also many deaths occur due to lack of prompt medical attention needed by the injured person. The project aims at the security and safety of the bikers against road accidents.

2. OBJECTIVE

The objectives of this project are to design the circuit that can improve the safety of motorcyclists, to develop a smart safety helmet for the complete rider. This embedded system consists of a communication module, which enables the driver to stop the vehicle in an abnormal condition.

“Smart helmet with sensors for accident prevention” Mohd Khairul Afiq Mohd Rasli; Nina Korlina Madzhi; Juliana Johari: The impact when a motorcyclist involves in a high-speed accident without wearing a helmet is very dangerous and can cause the fatality. Wearing a helmet can reduce shock from the impact and may save a life. There are many countries enforcing a regulation that requires the motorcycle's rider to wear a helmet when riding on their motorcycle, Malaysia is an example. With this reason, this project is specially developed to improve the safety of the motorcycle's rider. Motorcyclist will be alarmed when the speed limit is exceeded. A Force Sensing Resistor (FSR) and BLDC Fan are used for detection of the rider's head and detection of motorcycle's speed respectively. A 315 MHz Radio Frequency Module as a wireless link which able to communicate between the transmitter circuit and receiver circuit. PIC16F84a is a microcontroller to control the entire component in the system. Only when the rider buckled the helmet then only the motorcycle's engine will start. A LED will flash if the motor speed exceeds 100 km/hour.

“An optimal driving system by using wireless helmet” Prajwala R Reddy, Naveen S Madhavan: In this Paper implementation of an add-online action system for a motorcycle is implemented using a wireless helmet. The system consists of a vehicle-to-

driver, vehicle-to-traffic signal, vehicle to speed breaker communication mechanism, which is based on a ZigBee technology. The system is focused to increase the safety level of a motorcycle, a compact embedded electronic unit implementing a voice recognition unit, ZigBee, RF module. The driver-to-vehicle interaction is based on an audio interaction located at helmet level.

3. METHODOLOGY

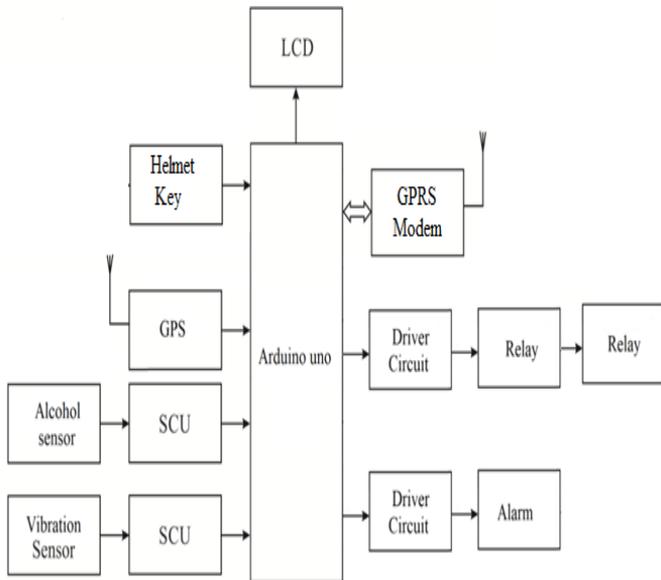


Fig. 1: Methodology block diagram

This module contains different sensors and a transmitter. The microcontroller contains three sensors which are alcohol sensor, vibrate sensor, helmet key, alarm, GPS, GSM. Alcohol sensor has been utilized to recognize the alcohol focus. The alcohol sensor will be put close to the mouth of the rider, inside. Vibrate sensor is utilized for crash location. Another microcontroller contains two sensors which are pulse sensor and UV sensor. Pulse sensor has been utilized for measuring of pulse rate. When the pulse rate increases it stimulates LCD which blinks white light. UV sensor will sense the front moving vehicle to avoid collision also controlling the accident. If any vehicle detected near to our vehicle LCD is activated which blinks red light. An RF transmitter which can transmit information from any controller or standard Encode IC has been utilized. The RF transmitter transmits information from the microcontroller on the helmet side to the recipient on the vehicle side through transmit antenna.

3.1 Alcohol sensor

Blood alcohol content (BAC), also called blood alcohol concentration, blood ethanol concentration, or blood alcohol level is most commonly used as a metric of alcohol intoxication for legal or medical purposes. Blood alcohol content is usually expressed as a percentage of alcohol (generally in the sense of ethanol) in the blood. For instance, a BAC of 0.10 means that 0.10% (one-tenth of one per cent) of a person's blood, by volume (usually, but in some countries by mass), is alcohol.

3.2 Vibration Sensor

A piezoelectric sensor is a device that uses the piezoelectric effect to measure pressure, acceleration, strain or force by converting them to an electrical signal. A piezoelectric transducer has a very high DC output impedance and can be modelled as a proportional voltage source and filter network. The voltage V at the source is directly proportional to the applied force, pressure, or strain. The output signal is then

related to this mechanical force as if it had passed through the equivalent circuit.

3.3 Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts.

3.4 GPS

GPS is used in vehicles for both tracking and navigation. Tracking systems enable a base station to keep track of the vehicles without the intervention of the driver where, as navigation system helps the driver to reach the destination. The navigation system will have convenient, usually a graphic, display for the driver which is not needed for a tracking system. When the rider met with an accident through GPS location can be tracked.

3.5 GPRS

GPRS architecture works on the same procedure as the GSM network, but, has additional entities that allow packet data transmission. This data network overlaps a second-generation GSM network providing packet data transport at the rates from 9.6 to 171 kbps. Along with the packet data transport, the GSM network accommodates multiple users to share the same air interface resources concurrently.

3.6 Arduino

Arduino Uno is a microcontroller board based on the ATmega328P. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It processes the input received from the sensors and produces the result to DC.

4. CONCLUSION

The two-wheeler safety system developed with smart helmet and intelligent bike system is reliable and aims to help in the prevention, detection and reporting of accidents hence reducing the probability of the drunk driver cases. It also has several advantages compared to the previous systems. Our proposed system gives the primary importance of preventing accidents and ensures safety for a greater extent in two-wheelers. Nowadays, most accident cases occur due to a motorbike. The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. By implementing this system, a safe two-wheeler journey is possible which would decrease the head injuries throughout accidents caused due to the absence of helmet and additionally reduce the accident rate due to drunken driving. A GSM modem is used in this system that will send a message to the predefined numbers that are programmed using a microcontroller in case of any accident.

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