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ELEGANT HELMET TO AVOID ACCIDENTS AND TO AIDE DRIVERS

S Vinodha[1], K DevKavin[2], K Suriaraj[3]

[1]AssociateProfessor, Department of Electronics and Instrumentation Engineering& Jerusalem College of Engineering, Chennai.

[2 & 3] U.G Student, Department of Electronics and Instrumentation Engineering & Jerusalem College of Engineering, Chennai.

Abstract -This 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 is very simple, vibration sensors are placed in different places of helmet where the probability of hitting is more which are connected to microcontroller board. 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 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.This is done with the help of ZIGBEE transmitter and receiver where the motor control is fixed with the receiver section of the project.

Key Words:GPS, Helmet, GSM, Arduino, Alcohol Sensor.

1.INTRODUCTION

Motorcycles and bikes form an integral part of personalized transportation in India. However, unfortunately, it also involves innumerable accidents and subsequent loss of lives. Every year, about 300,000 teenagers go to the emergency department because of bike injuries and at least 10,000 teenagers have injuries that require a few days in the hospital. Statistics say, motorcycle deaths accounted for 15 % of all motor vehicle crash deaths in 2015 and were more than double the number of motorcyclist deaths in 1997. Through an ONEISS survey conducted by the Department of Health, it was found that 90% of the motor cycles rider killed in accidents were not wearing a helmet at the time of impact. This, along with drunken driving are a major reason of accidents. We aim to mitigate these problems and hence the associated casualties by ensuring that the rider will wear the helmet all the time during his/her ride, thus ensuring safety. The helmet can understand if the person is wearing the helmet, using the pressure sensors, fitted inside the padding foam.

The helmet can detect a possible accident, using the onboard accelerometer and pressure sensor. If the values detected exceed a threshold, it is reported as an accident. Emergency contacts, specified by the rider during app setup, are informed about the possible accident, via a system generated email and text message, containing the address and GPS coordinates where the accident had been detected. The values of the accelerometer are also constantly sent to a remote server using an online application interface (API), and the server trains a support vector machine (SVM).

The first step in this system is to check whether the helmet has been wear or not, the bike will not start unless the rider wears the helmet for this we go for FSR sensor which will sense the pressure and force.The second step is to identify whether the rider has consumed the alcohol or not.

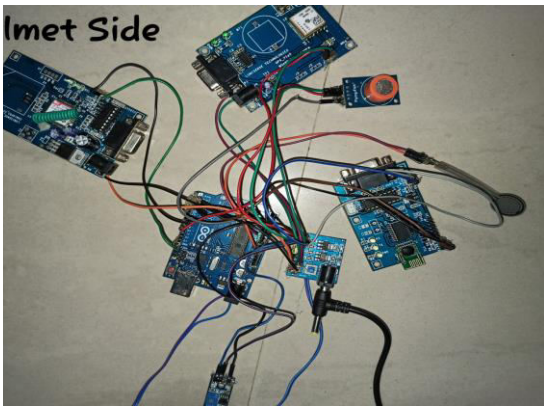
An alcohol sensor will check the alcohol in rider's breath, in order to prevent the accidents due to drunken and driving which cause a lot of accidents.

2. HELMET FOR ACCIDENT PREVENTION

The helmet checks if the rider is drunk. If the rider is drunk, then the ignition of the bike is avoided and the hence not letting the rider to ride the bike. In this system we use an Arduino microcontroller interfaced with alcohol sensor and it is used to monitor user's breath and constantly sends signals to microcontroller. The microcontroller encounters alcohol signal from sensor and send the data to motor using ZIGBEE transmitter and we connect a ZIGBEE receiver to the motor driver which stops dc motor to demonstrate as engine locking.

If the alcohol is detected the system locks the engine. The system also sends a message stating "Accident occurred"

Fig -1: Hardware – Helmet side



including the latitude and longitude location of the incident using GSM and GPS.

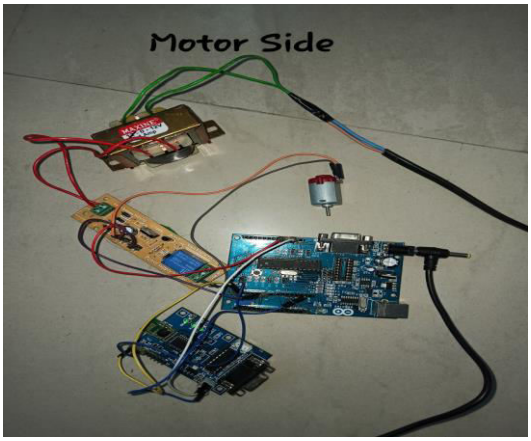


Fig -2: Hardware – Motor side

The above figures are representing the hardware photos of Helmet and motor side.

3. SYSTEM DESIGN

3.1. Functional Block Diagram

The block diagram of this project divided into two parts, one is Helmet side and the other is motor side which includes the blocks of Alcohol, FSR, vibration sensors, power supply, ATMEGA controller, ZIGBEE transmitter, GSM and GPS modules in the helmet side. Motor side consists of ZIGBEE receiver section, power supply, motor driver and motor.

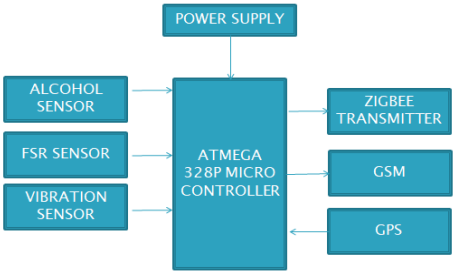


Fig -3: Block diagram – Helmet side

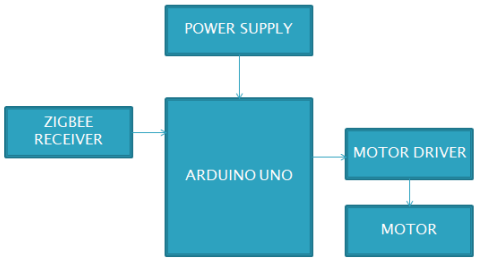


Fig -4: Block diagram – Motor side

3.2. MQ3(Alcohol Sensor)

MQ3 type alcohol sensor is used in this project to sense whether the rider consumed alcohol or not, if the person consumed alcohol, the bike cannot start the ignition, which is implemented through the hardware setup. The specifications of this sensor is given below,

Fig -5: Picture of Alcohol sensor

- An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading.
- The sensor can activate at temperatures ranging from -10 to 50° C with a power supply less than 150 Ma to 5V.
- The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers.

3.3.Helmet Design

The idea of developing this smart helmet is to avoid accidents and to aide drivers. So it is designed in such a way that it should make the rider safe at any kind of accident. Since its designed for accident prevention, the material of the helmet should be strong and firm enough to withstand the force and pressure it faces in accident.

In this, the material is yet to be decided, but most probably the material would be polycarbonate and other solid materials for circuit binding. The Circuits should not get affected and the rider too. So further process of developing

this project leads to the result of material determination and smart enough to make this project, unique and useful to the Society.

3.4.FSR Sensor

A force sensitive resistor (FSR) is a material which changesits resistance when a force or pressure is applied.

- Conductive film is an example of such force resistance material.
- In other words, force sensitive resistor it's a sensor that allow you to detect physical pressure, squeezing and weight.

Fig -6: Picture of FSR Sensor

3.5.ZIGBEE Module

Fig -7: Picture of ZIGBEE Module

RSSI stands for Received Signal Strength Indicator. It is the measured power of a received radio signal. It is implemented and widely-used in 802.11 standards. Received power can be calculated from RSSI.

- RSSI has a larger variation because it is subject to the deleterious effects of fading or shadowing.
- It is a non-linear with respect to distance.

3.6.GSM Module

The Global system for mobile communication is used to establish communication betweenmobile device or computing machine.

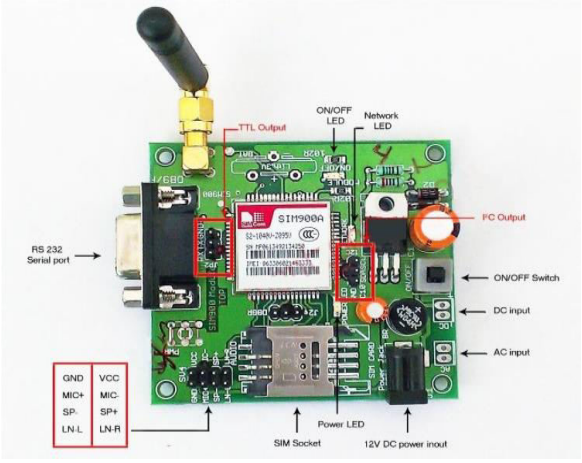
- GSM module is completely simple in design and also compact in structure.
- It can be easily embedded to the circuit being
- Used in the device.
- It is compact and does not require internet for
- Communication which makes it very reliable

This project requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification.

Fig -8: Picture of GSM Module

3.7.Working

In order for a GPS device to work correctly, first establish a connection to the required number of satellites. This process can take anywhere from a few seconds to a few minutes, depending on the strength of the receiver. Let us consider a



car's GPS unit will typically establish a GPS connection faster than the receiver in a watch or smartphone.

GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies: TDMA, GSM and code-division multiple access (CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 megahertz (MHz) or 1,800 MHz frequency band.

Power supply is a type of rectifier, it consists of transformer, diode and filter. The transformer is a step-up transformer with

a turns ratio of 1:3. Calculate the output for this transformer by multiplying the input voltage by the ratio of turns in the primary to the ratio of turns in the secondary. Diode on and off based on the biasing. The filter section, a network of resistors, capacitors, or inductors, controls the rise and fall time of the varying signal; consequently, the signal remains at a more constant dc level. The filter process more clearly in the discussion of the actual filter circuits. The output of the filter is a signal of 110 volts dc, with ac ripple riding on the dc.

The technology defined by the Zigbee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or more general wireless networking such as Wi-Fi. Applications include wireless light switches, home energy monitors, traffic management systems and other consumer and industrial equipment that requires short-range low-rate wireless data transfer.

Its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics. Zigbee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones.

Zigbee is typically used in low data rate applications that require long battery life and secure networking (Zigbee networks are secured by 128 bit symmetric encryption keys.) Zigbee has a defined rate of 250 kbit/s, best suited for intermittent data transmissions from a sensor or input device.

The amount of current produced is determined by how much of the gas is oxidized at the electrode, indicating the concentration of the gas. Manufactures can customize electrochemical gas detectors by changing the porous barrier to allow for the detection of a certain gas concentration range.

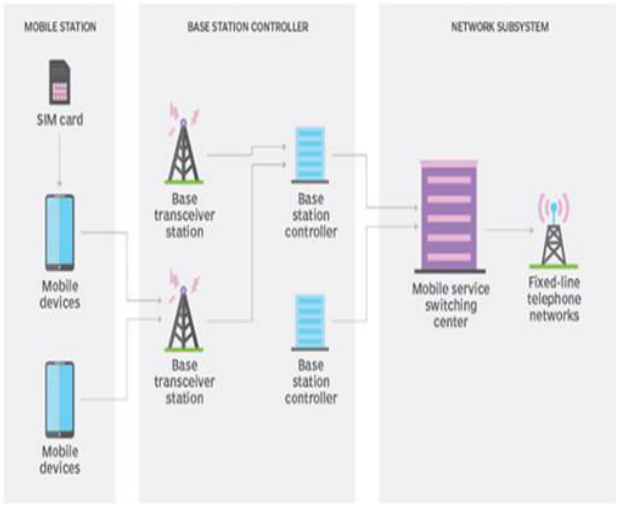


Fig -9: Picture of network stations

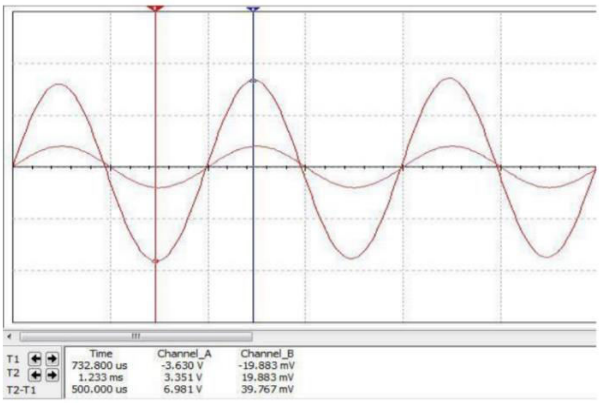


Fig -10: Graph of alcohol detection and consumption

The graph and process flow given here shows the outputs of Accident detecting and alcohol consumption.

4. CONCLUSIONS

This project efficiently ensures: Rider is wearing helmet throughout the ride, Rider should not be under the influence of alcohol and Accident detection.

By implementing this project, a safe two-wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike after consuming alcohol. The helmet may not be a 100% foolproof but is definitely the first line of defense for the rider in case of an accident to prevent fatal injuries and it additionally ensures the importance of wearing helmet, since it's not just helmet but a lifesaving tool for the riders.

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