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Smart Helmet using GPS and GSM modem

Ashwin M., Yashwanth Gowda S

ABSTRACT--- ***Motorcycle accidents are happening with alarming frequency and the number of fatalities is also increasing day by day. Currently there are no technological interventions being used to prevent such events. This paper proposes a Smart Helmet system using GPS and GSM modules which will help in avoiding such situations to a significant extent. The smart helmet has a module to detect whether the rider is wearing the helmet and also analyses the breath of the rider to check for consumption of alcohol. The rider will not be able to start the vehicle if the rider is drunk and is not wearing the helmet. The current situation is to take measures for the bike handlers who would loose their lives due to alcohol consumption and for not wearing the helmet. In order to overcome the death rate of the people due to this, we can use "Smart helmet which has automatic Alcohol detection and Accident detecting technique in it".***

Index Terms— GSM Modem, GPS Receiver, Alcohol Sensor, Vibrator Sensor, RF Encoder, RF Transmitter, DPDT Delay.

I. INTRODUCTION

Today, motorcycle has become a very common mode of transport for individual riders. Motorcycle gives the freedom and flexibility for the riders to move anywhere they want and at any time. Riders do not have to be dependent on the public transportation services, which in many cities and countries are extremely unreliable. However, motorcycle riding has its own risks involved, especially when the rider does not follow the rules and do not take the necessary precautions to avoid unfortunate situations, which can lead to accidents, which are sometimes fatal. Although there are laws related to safe operation of motorcycles most of the times the rules are not followed. The traffic police which is responsible for enforcing the laws on the riders find it very challenging due to rapid increase in the number of motorcycle riders and not having adequate manpower to monitor the situation. In March 2015 there were 154 million registered two wheelers operating on Indian roads [1]. In such circumstances technological innovations can significantly assist the traffic police in maintaining the rules on the road. There are many novel ideas proposed to tackle this problem. Cameras can be installed at important traffic junctions to monitor the traffic as well as to identify the traffic violators and issue appropriate fines to such riders [2]. Apart from jumping of traffic junctions or similar violations of the traffic laws one major issue with riders is not wearing the helmet while operating a motorcycle and another major problem is of drunk driving especially during night [3 – 10]. Here in this project the authors are proposing a novel concept of embedding sensors in the bike and the helmet to analyze the breath and the wearing of the helmet by the rider. If the rider is not following the rules the bike will not start.

The aim of the project is to provide reliability and soundness on the helmet to the bikers against road accidents. A Smart Helmet is innovative recommendation which make motor cycle driving safer than before, this is performed using GSM Modem and GPS receiver technology. The one more supremacy of this project is to know the alcohol level of drunken motorcyclist who is sitting on the bike. An embedded kit or an embedded system which consists of microcontroller, RF decoder and sensors, is incorporated in the helmet which monitor whether the biker is drunk or not and also some sensors to check whether the biker has worn the helmet or not. The alcohol level is determined and displayed on a LCD display. Whenever the alcohol is detected by the alcohol sensor in the helmet, the vehicle won't start and buzzer is blown and the respective authorized people will get the notification.

In today's world vehicles accidents are one of the main causes for increase in the death. This death rate can be reduced by forwarding a message and the location of the accident to the victim's family and concerned authorities who can take the necessary action in a timely manner. In many cases the delay in giving the appropriate medical treatment is the major cause of death after an accident. In this project a GPS and a GSM module is embedded in the helmet which can provide the exact location of the accident.

II. OPERATIONAL PRINCIPLE

The principle of operation is quite plain. If the biker had consumed the alcohol, the alcohol sensor placed near the front end of the helmet senses the alcohol and don't allow the biker to start the bike. The second purpose is when the biker meet with an accident the vibrator sensor in the bike receives the signal send a message and the location of accident to the family members. The third purpose is where the bike won't activate until the helmet is worn when RF decoder sends information to the microcontroller which allows the biker to start the bike.

Functional schematic diagram: vehicle unit

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***** Correspondence Author (s)
Ashwin M., Department of Electrical and Electronics Engineering, Vidyavardhaka College of Engineering, Mysuru, Karnataka 570002.
Yashwanth Gowda S, Department of Electrical and Electronics Engineering, Vidyavardhaka College of Engineering, Mysuru, Karnataka 570002.

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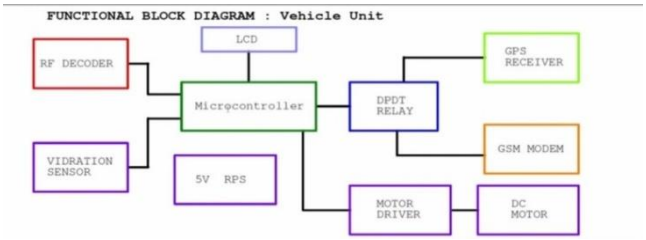

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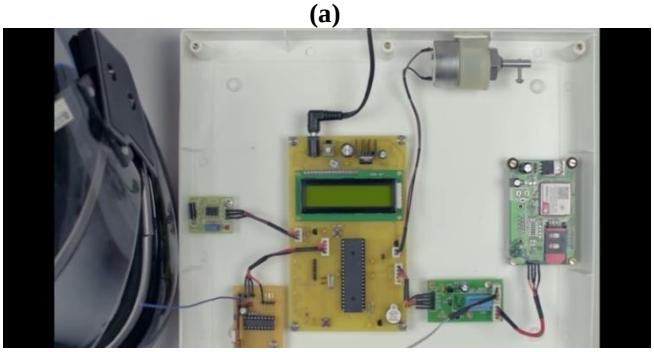


(b)

Fig. 1 (a) Schematic diagram of vehicle unit which incorporate GPS Receiver and GSM Modem. (b) Hardware components which is connected to the vehicle in the vehicle unit.

The Fig.1 (a) shows the schematic diagram of the vehicle unit, it has a microcontroller which helps in every process of operation.

It has a vibration sensor to detect accident that occurs. RF decoder is connected to helmet to receive the data from the helmet. It consists of 16x2 LCD to display the various information. DPDT relay is used to switch to GSM.

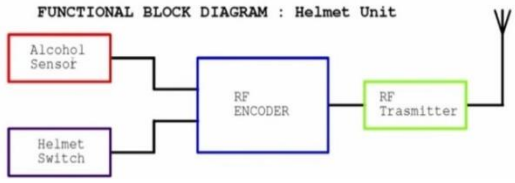
RF decoder: The capability of this device is, it can receive information from a long distance and it can be from the space too. And it has a DC driver which is used to drive the DC motor which acts as the vehicle or bike in this project.

The hardware part of the helmet mainly consists of ATmega32 Microcontroller running at 8MHz clock and operates at 5V power. It has a RF decoder which is connected to GPIO (general purpose input/output) pins. Microcontroller consists of interrupt pins and these pins connects to the helmet switch and the vibration sensor. The 16x2 LCD is configured to work on 4bit mode and is connected to the port C of microcontroller.

The LED and the buzzers are used for indication when there any uncertainties occur. The GPS and GSM Modem is connected to DPDT delay switch which in turn is connected from GPIO pins. The input port of the system is 9V since hardware requires 5V supply the 9V is converted to 5V using LM7805 Regulator.

As soon as the microcontroller is powered, the peripherals such as GPIO, TIMER are initialized. The RF decoder and the vibrator sensor is monitored by the microcontroller. The vehicle do not start because not wearing the helmet, once the helmet is worn the RF encoder sends the signal to the microcontroller and engine gets started.

functional schematic diagram: Helmet unit



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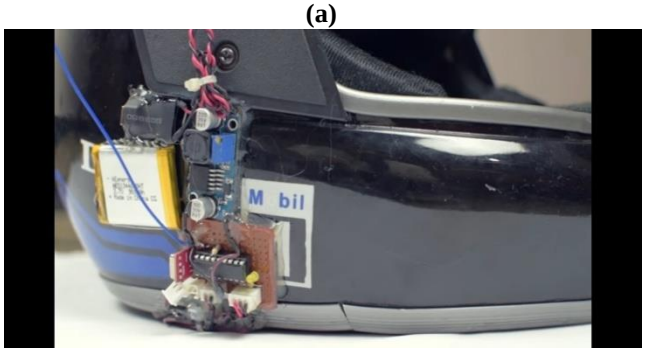

(b)

Fig. 2 (a) Schematic diagram of Helmet unit incorporating an Alcohol sensor and a Helmet switch. (b) Hardware components attached to the helmet.

Fig.2 shows the helmet unit, it has an alcohol sensor which senses if the biker is alcoholic and a helmet switch which interprets the message to the LCD display saying that the biker has not worn the helmet. The bike will not turn on until the biker wears the helmet.

The helmet consists of 3.6 V lithium battery and a battery charger. It also have A HT12E encoder, 434MHz RF Transmitter, Alcohol sensor and a Helmet switch and a boost

Convertor.

In HT12E encoder the 434MHz RF Transmitter is affixed to the encoder the alcohol sensor is bridged to data pin of the encoder and the helmet switch is attached to enable pin of the encoder. The input ports helmet is 3.7 V but it regulated to 5 V by using a boost convertor.

III. RESULTS

The Smart helmet system was tested and the resultant output was studied. Once the system is tested it can be integrated in a helmet and the bike. The first part was to test whether the biker is wearing the helmet. The system does not allow the biker to take vehicle until he has worn the helmet. As soon as the biker wears the system displays a message on the LCD screen saying that HELMET WEARED as shown in the fig 3.

Whenever the biker has consumed the alcohol the system does not allow vehicle to start and will send the message ALCOHOL CONSUMED in LCD display as shown in fig. 4

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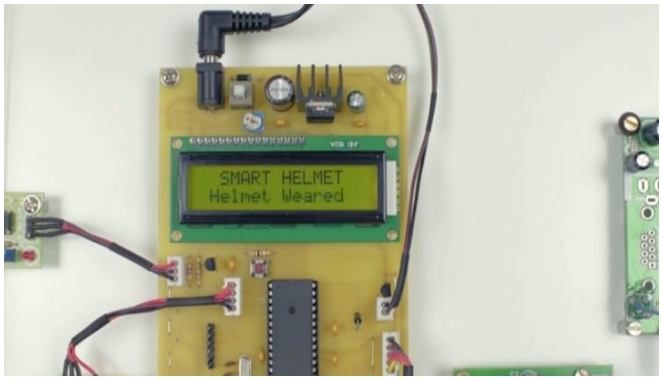

Fig. 3 LCD displaying the message of helmet worn.

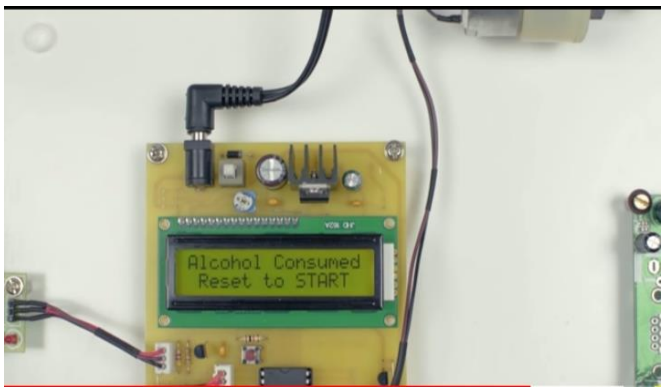

Fig. 4 Display showing the message that biker has consumed alcohol.

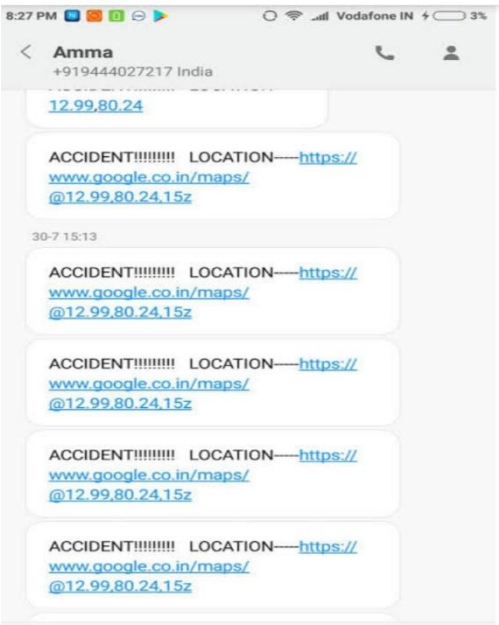

Fig. 5 Message received on a GSM mobile about the accident and its location.

Whenever biker meet with an accident the vibrator sensor senses it and sends the message to the number that is configured saying about the accident and sending a link which gives the location of the accident as shown in fig. 5.

IV. CONCLUSION

This paper aims at the benefits of the society by reducing the death rate caused due to not wearing the helmet and riding bike by consuming alcohol and providing the information to family about the accident and location of the same. A Smart helmet system is developed which has embedded systems which will monitor whether the rider is wearing a helmet and if the rider has consumed alcohol. In either of the cases the bike would not start and the rider would not be able to use it. This is a preventive method to reduce accidents and fatalities on the road. This system also has a GPS and GSM unit which will send a message and the location of the bike to the family members of the bike rider in the unfortunate event of an accident. This will help in providing timely help to the rider and reduce the fatalities.

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