

SMART HELMET

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Abstract : A large number of people die everyday in the world due to road accidents. Our project Smart Helmet is an effective approach made to solve this problem of road accidents, which makes the biker more safe. Limit switch which is placed inside the helmet will detect whether the rider has worn the helmet on bike or not. If the biker has worn the helmet the bike will start and if not the bike will not start. Smart helmet uses GSM and GPS technology and provides help in case of accident. Nowadays bike riders in our country are increasing due to which many casualties occur due to negligence of wearing helmet. Our project makes compulsory to wear the helmet. If the biker is met with an accident then a SMS along with the location is sent to family members and ambulance in order to rescue him. Our project also aims at intelligence security providing awareness for wearing helmet and also provides prevention for human life safety. There is craze for motorbikes in today's young generation. Due to low prices middle class family prefer buying two wheelers rather than cars. As the two wheelers in our country are increasing, the road accidents are also increasing day by day, due to which many deaths occur, most of which occur due to most common negligence of not wearing a helmet. According to a survey of India, there are around 720 accidents occurring due to bike accidents per year. Not only accidents but also lack of proper treatment is another reason for deaths. In India out of the bike accidents deaths occurring annually, nearly half of the people die due to lack of treatment in proper time. The reasons for these deaths are late arrival of an ambulance, no person at the place of accident to call an ambulance etc. The objective of our work is that a bike rider must wear a helmet in order to start up his bike, otherwise the bike won't start. It also gives information about the location of accident with the help of GSM module to family and friends through a SMS. But only sending an SMS won't help the biker unless exact location of accident is also known. So as to know the location of an accident, we have used a GPS module which will send exact location of the accident through a SMS to family, friends or an ambulance using a microcontroller.

I. INTRODUCTION

Nowadays road accidents are the leading cause of human deaths. A report of the World Health Organization says that road traffic injuries caused around 1.24 million deaths in the year 2010, which is slightly down from 1.26 million deaths in the year 2000. This report concludes that a person is killed every 27 seconds in a road accident. Out of the entire world, only 28 countries, which have 7% of the world's population have adequate laws which address the risk factors such as speed, drink, and drive, helmets, seat-belts, child restraints. World Health Organization revealed the first ever Global status report that said road accidents in India have earned distinct hesitation. India has overtaken China and now has the worst road traffic accidents worldwide with 130,000 deaths annually. Speed, drink and drive and very low use of helmet, seat-belts and child restraints in the vehicle were the main factors which were pointed in the report. Around the world, 40 people under the age of 25 die in road accidents. World Health Organization say that road accident is the second most important cause of death for the age group of 8 to 35 years. National Crime Records Bureau (NCRB) in their latest studies have stated that the total number of deaths every year due to road accidents has now passed the mark of 135,000. It further says that the drink and drive is one of the major reasons for road accidents. There is no check on drunken driving fatal accidents that occur outside the cities. When fully drunk unfortunately some drivers think they are capable of driving the vehicle. Unless the government comes up with a new set of rules of checking drunkenness on the road, these fatalities cannot be reduced. There is no effect of campaigns against drink and drive. 30 mg/100ml is the legal limit according to the Indian Motor Vehicle Act and recommends fines and/ or imprisonment for transgression. However due to poor implementation, and the little enforcement is non-visible, non-random in geographical coverage, and non-uniform. Very little attention has been given to the view of early detection and brief intervention. There is negligence at the level of primary health care providers, emergency facilities or the police.

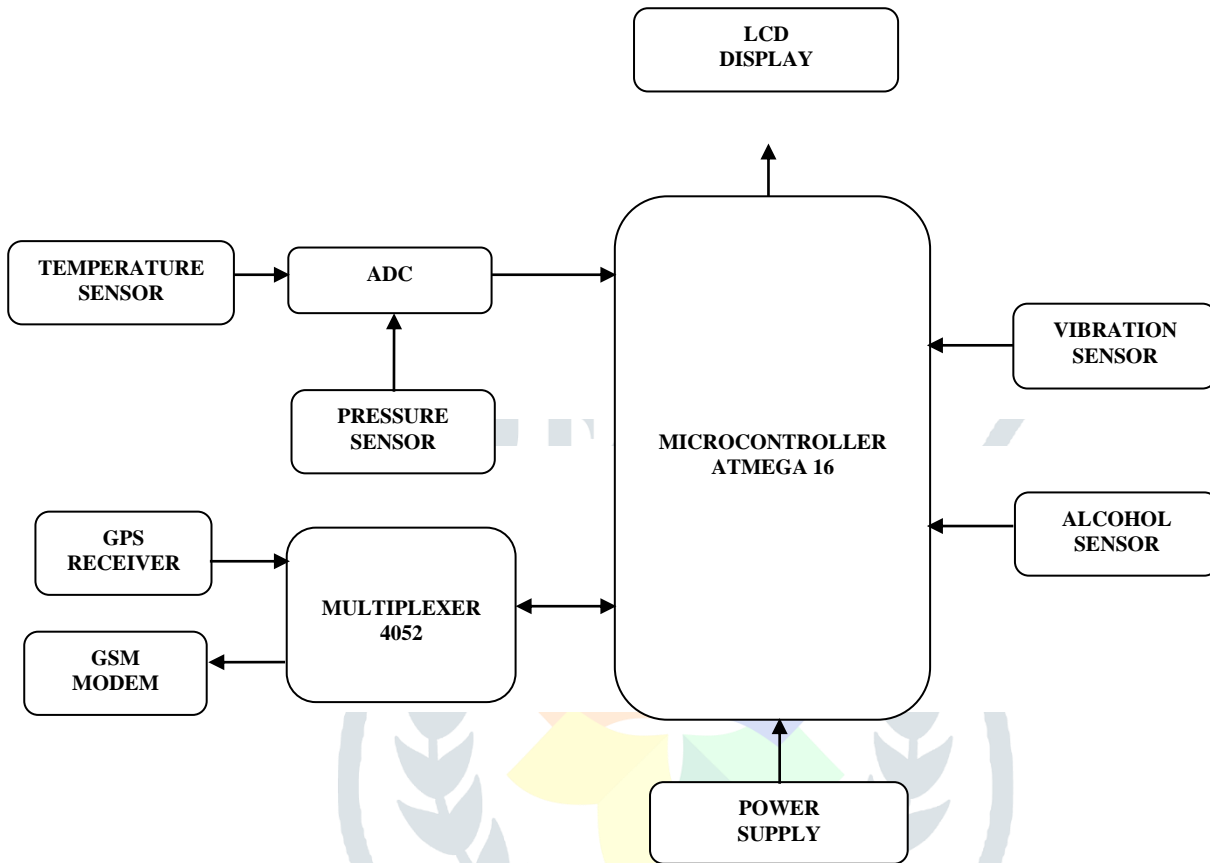
An electronic application is very much popular in the field of the automobile. Motorbikes are preferred over cars by the people because of various reasons such as lower prices of the components used and varieties available in the market. Hence there is a lot of concern and also becomes the major issue about road safety. Therefore to avoid drink and drive, the wearing of helmet must be the basic rule and should be made mandatory. We are designing a system which checks two conditions before the bike engine is turned ON. The system includes Helmet sensing switch which is used to detect whether the biker is wearing a helmet or not. The system also includes an alcohol sensor which gives output to the MCU that whether the biker is drunk or not. A GSM module sends a message to the concerned person regarding his drunken condition if the biker is drunk. The engine will not turn ON if any of the two conditions is violated. In this system, we have used GSM module to send SMS to the family members, if in case the person meets to an accident and also to inform ambulance and police for the investigation of the accident. The basic idea is to inform about the rider wearing a helmet or not, whether the rider is drunk or not, and about the accident.

We have used GSM technology to give information by sending SMS, using GSM module which has a SIM card slot to place the SIM and send SMS. In case of accident sending message only will not help the driver, where will the ambulance go to rescue the rider without knowing the location of the accident. So to overcome the problem we have also used the GPS module which gives it location to the microcontroller and the message is sent to the family members, ambulance and police along with the longitude and latitude of the location of the accident. Using this concept we can find the accurate position of the accident place and rescue the concerned person.

II. MODELLING OF THE SYSTEM

It is an innovative concept which shuns out the possibility of starting a bike without wearing the helmet and avoid drunk driving. The helmet also acts as the second key to a biker. Besides, the smart helmet also incorporates the advanced technologies of accident sensing which informs the friends and family of the biker if, in case, he meets an accident and enables prompt medical attention to the victim.

A. BLOCK DIAGRAM REPRESENTATION:



B. WORKING PRINCIPLE :

In this smart helmet system Arduino Microcontroller is used. When the system is switched on, LED will become ON indicating that power is supplied to the circuit. The RF is used for start the bike which will first check whether the driver is drunken or not, if drunken it will not allow to start the bike. The small voltage of ignition of the bike is grounded. In normal condition when the helmet is worn the pressure sensor senses pressure and the RF transmitter radiates the FM modulated signal. The RF receiver is connected with the bike which receives the radiated signal and activates the relay. The relay removes the ignition wire from the ground and connects with the starter which starts the bike. When driver meets with an accident, the vibration sensor sends message to the microcontroller. The GPS module receives the exact location of the vehicle and gives the information back. This information will be sent to a mobile number through a message. This message will be received using GSM modem present in the circuit which will give information of longitude and latitude values. Using these values the position of the vehicle can be estimated. To run the GPS and GSM module, the Atmega 16 microcontroller is a very user friendly device which can be easily interfaced with any sensors or modules and is very compact in size.

Some questions may strike the mind like, how will the system send the SMS using the GSM module and by keeping the GPS location in the SMS which is obtained from the GPS module. But when should all this is done? When accident occurs, how will the microcontroller detect the accident? This will be done by using a vibration sensor which is placed in the helmet. The vibration sensor is placed in the helmet to detect vibrations of the helmet. When the rider crashes, the helmet hits the ground and the vibration sensor detects the vibrations that are created when the helmet hits the ground and then the microcontroller detect the accident and it will send an SMS containing information about the accident and location of accident using GSM and GPS modules. Alcohol sensor senses the alcoholic content whether the rider drunken or not, if he drunken bike will not start showing as alcohol detected on LCD display.

III. HARDWARE ANALYSIS

The hardware setup includes the transmitter and receiver sections. The transmitter section has alcohol sensor, operational amplifier IC LM358, variable resistors, antenna and a RF transmitter module which contains microcontroller, encoder HT12 E, switches and two wires. The receiver section has a RF receiver module containing antenna, decoder HT12D, microcontroller Atmega16 unit, GSM module, GPS module, LCD display, power supply circuit etc.

Accelerometer (GY-61): An accelerometer is a device that senses changes in 3-axes x,y and z. Any change in the orientation of the sensor results in different readings from the accelerometer. Thus, this sensor will be mounted on the helmet and in case of an accident, it will get tilted along with the helmet sideways resulting in different readings than normal. These readings can be used to detect an impact or an accident. This module needs 5V power supply.

GSM Module (SIM900A): This module will be responsible for sending an alert SMS to a predefined contact in any case of an accident. It needs a SIM Card to be inserted to work, and also the SIM card needs to be in a proper coverage area. Any basic plan should be subscribed on the SIM card to make it able to send an SMS. This module needs 5V supply to function.

GPS Module (Neo 6M) :GPS module will collect the appropriate co-ordinates of the location in terms of latitude and longitude in case of a mishap. These co-ordinates will be sent to the microcontroller and to the GSM module to be inserted in the SMS, to send to the user. This module needs to be in a proper outdoor area to be in contact with the communication satellites. It needs 3.3 - 5V to function.

LCD Module (1602) : LCD module will be used to display the co-ordinates from the GPS module and to display the ambient temperature on it. It is 16 characters wide with 2 rows. It works in 4/8 bit parallel interface. It also has one backlight of any color (Green/Yellow/Blue/etc.). It needs a VCC of 5V.

Atmega 16F: It is an 8 bit microcontroller. It has 4 ports, one port for analog and the other three are for digital. It operates on 2.7V to 5.5V. It is a 40 pin controller with various other features such as on-chip timers, comparators, ADC, JTAG, etc

MQ-3 Alcohol Sensor: MQ-3 gas sensor is used for identifying the alcohol content from breath. It can be positioned just in front of the face which responds to various gases. It determines whether the biker is drunk or not. MQ-3 sensor has potentiometer to adjusting different concentration of gases. We calibrate the detector for 0.4mg/L of Alcohol concentration in air and use value of resistance as 200 KΩ. MQ-3 supports for both analog and digital. MQ-3 alcohol sensor has a 4 pins namely GND, VCC, A out, D out. Here we use digital output of this sensor which is gives output in terms of high or low. It is decided by our smart helmet system whether the biker is drunk or not.

III. CONCLUSION AND FUTURE WORK

In this project we have successfully designed a smart helmet system using GSM and GPS technology. The system makes compulsion of wearing helmet to start the ignition of vehicle. While riding if there is any sudden change in velocity then accelerometer will monitor the change and a message with the location of rider will be send to the predefined number using GSM module. The outcome of the project have showed that the bike ignition will start if the helmet is worn. Therefore it will automatically decrease the effect from accident and it can avoid bike thefts . Arduino Lilypad is good in controlling all the system and the sensors. Executing the wireless system which uses Radio Frequency Module to send signal from helmet unit to the bike unit which is better than wired link.

The propose methodology can be further extended by adding the following features

- a) An alcohol sensor can be installed to ensure that the biker would not able to start the bike if he is drunk.
- b) Overspeed limiting devices can be installed which would restrict the biker from over speeding. In case the biker over speeds, his registration number would be sent to the traffic regulatory authorities for necessary actions to be taken.
- c)To increase the sensitivity of the skin potential, a mind wave kit can be employed to read the brain waves for attention and meditation.
- d)We can implement various bioelectric sensors on the helmet to measure various activities.
- e) We can use small cameras for the recording the driver's activity.
- f) It can be used for sending message from the one bike to another bike by using wireless transmitter.
- g) We can use solar panel for helmet power supply and by using same power supply we can charge our mobile phone batteries.

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