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SMART HELMET CONTROLLED VEHICLE

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Abstract - *Smart Helmet Controlled Vehicle is a project undertaken to increase the rate of road safety among motorcyclists. Several countries like India enforcing regulations to wear a helmet while riding. The idea is obtained when the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. The accident detection system communicates the vibration values to the processor which continuously monitors for erratic variations. When an accident occurs, the related details are sent to the emergency contacts by utilizing a SMS alert. Using the Global Positioning system the vehicle location is obtained.*

Key Words: Automation system, Smart Helmet, Accident detection, Helmet detection, SMS alert.

1. INTRODUCTION

Helmets for riders are extremely important and many lives can be saved by the use of these Helmets in the event of accidents. Motorcyclists have a perception that wearing a helmet causes discomfort and they do not appreciate its importance, especially the youth. And perhaps the most misleading idea is that short trips do not involve any risk. Smart helmet helps to curb "riding without helmet" by ensuring that the rider mandatorily wears the Helmet while driving. The system is designed in such a way that if the rider does not wear his/her helmet the bike's ignition is turned off. It also has emergency features which come in need during mishaps. With the implementation of this concept, we would like to make commuting safe and reduce the number of motorcycle accidents. The design also has pollution information gathering technology where the sensor records the "ppm" of various greenhouse gases and with respect to the location, the information is updated on the cloud. Wearing a helmet reduces the risk and increases the chances of survival. A helmet is lined with polystyrene and, on hard impact absorbs the shock. The government has been working on this situation and has come up with road laws. The domain of safety has a wide scope for development and a number of research papers have been published has built a system using encoders, RF transmitters and receivers to improve the safety and use of a helmet while commuting on a two wheeler. This was further improvised by where the safety helmet system included a vibration sensor, GSM and GPS modules that could track the person and send a distress call upon hard impact.

1.1 Proposed System

The Automation system is used for the safety of a person, it has been developed to tackle the shortcomings faced by the preceding systems. There is no need for manual control. For perfect detection of accidental conditions, the vibrational sensors and IR sensors should be used. As the whole system will be embedded inside the helmet and vehicle, it will be easier to detect the occurrence of an accident. The vibrational sensors will be helpful in detection of an accident. The IR sensor must be fitted inside the helmet and vibrational sensors will be fitted on the helmet as well as on the vehicle. IR sensors are used to detect whether the rider wears the helmet or not. ZigBee XBee modules are used as wireless communication between the boards, without any wired connection between them. The master part of the system will decide about sending the longitude and latitude of the location to the predefined number using the GSM module. Then the computer receives the GPS location through short messaging service (SMS). Using IoT module all the information is stored on the cloud.

2. LITERATURE SURVEY

2.1 Smart Helmet Using GSM and GPS Technology

The Author has discussed safety and security of the bikers against road accident. Smart helmet has special idea which makes motorcycle driving safety than before, this is implemented using GSM and GPs technology. Other advantages of this project is to measure the alcohol level of the drunken people who is riding the bike. Whenever the alcohol level crosses the predefined value, the alarm starts and get notification about the drunken driver. The author have also discussed about the accident detector and the sensor will active the GPS and find the location and further SMS will send to ambulance or family members.

As they have used microcontroller for controlling their overall operation due to that the project will might be fail to upgrade newer versions.

2.2 Helmet using GSM and GPS technology for accident detection and reporting system

According to the author this project is specially developed to improve the safety of the motorcycle's rider. The objective of this project is to study and understand the concept of RF transmitter and RF receiver circuit. The project uses ARM7, GSM and GPS module. The project also uses buzzer for indication purpose. This project is only concentrated on only

one specific purpose that is an accident. Whenever the accident will occur then accident spot will be noted down and information will send out on the noted mobile number.

The major disadvantage of this project is they are not using any display device for showing the current status. Also the cost of helmet is still high since helmet is designed for only one purpose.

2.3 Microcontroller based smart wear for driver safety

In this paper author has discussed on the speed of the vehicle. In this application the project will be monitoring the areas in which the vehicle will be passing. On entering any cautionary areas like schools, the speed of the vehicle will be controlled to a predefined limit. He worked on the phenomenon of speed of vehicle along with some security factor. LCD is used for showing the various types of messages after wearing the helmet.

The author has worked only on the phenomenon of accident which is generally happens due to drunk and drive. But as we know that the accident in the area is not happens only due to consuming alcohol but also other parameters are also responsible.

2.4 Smart Helmet(March 2016)

In this paper the prime objective of author is to force the rider to wear the helmet throughout. Considering the increasing number of motorcycle riders in our country and the number of accident happening each year. In this competitive world one of the survey says that the death tolls due to motor bike accidents are increasing day by day out of which most of these casualties occurs because of the absence of helmet. Traffic police cannot cover remote roads of city. Thats why over primary target is to make the usage of the helmet for two wheelers "compulsory " .Thus ,no one other than the owner himself ,who doesn't have "password" which would have been created by the owner, can use the bike. In this author has proposed the feature that the bike will not start unless the helmet is not worn by the rider .The other this module basically deals with the checksum of rider if he is wearing the helmet or not on first place to achieve this ultrasonic sensor is been used .based on this the signal are been sent to the next module voice recognition module use for authentication purpose. Arduino is also used in this project which is an open source tool for making computer that can sense and control more of physical world than your desktop computer.

Hence they have use ultrasonic sensor it is very expensive and the microcontroller is been used it may have major drawback in future as it is not able cope up with highly updated world in future .

2.5 Smart Helmet (May 2015)

In this project the author has proposed the smart helmet because of growing bike accident now a days .people get injured or might be dead and one of the reason is not wearing helmet. Continuously road rules are violated .so as to overcome these problem this helmet is been proposed .The craze of motor bike is really remarkable .the middle class families prefer to buy motor bike over four wheelers ,because of the low prices , various variety available in the market ,due to cut-throat completion between two wheeler company and durability . Author has also used encoder IC receives parallel data in form of address bits and control bits the other author has used smart system for helmet.

But in this project author have not focused on the major issue that will occur in future regarding the alcohol and many other.

3. TECHNICAL STUDIES

3.1 ESP-12E Based NodeMCU

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained Wi-Fi networking solution offering as a bridge from existing micro controller to Wi-Fi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Fig -1: ESP8266 – IoT module

3.2 GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means ATtention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon.

The AT commands are given to the GSM modem with the help of PC or controller. The GSM modem is serially interfaced with the controller with the help of MAX 232. Here max 232 acts as driver which converts TTL levels to the RS 232 levels. For serial interface GSM modem requires the signal based on RS 232 levels. The T1_OUT and R1_IN pin of MAX 232 is connected to the TX and RX pin of GSM modem.

Fig -2: GSM Modem

4. CONSTRUCTION

Our project is divided into two unit namely helmet and vehicle section.

4.1 Helmet Section

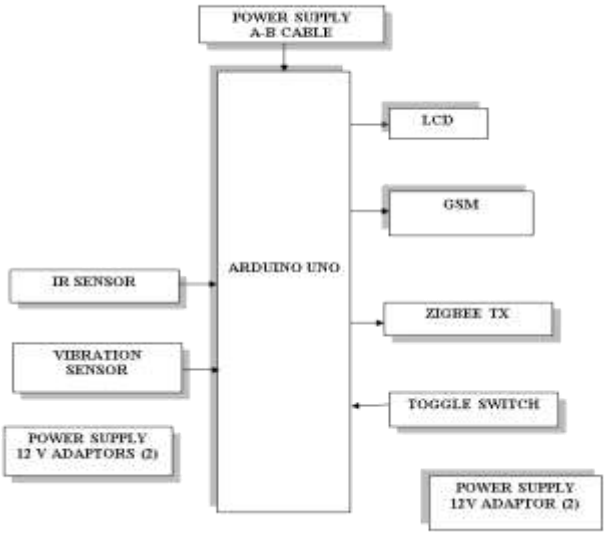


Fig -3: Block diagram of helmet section

Helmet unit consists of two sensors which is monitored by Arduino UNO. IR sensor is placed on inside upper part of the helmet where actually head was touched with sensor surface. And Vibration sensor is place outside the helmet. So that whenever the accident occurs, Zigbee transmitter sends the signal to the receiver. Eventually the vehicle stops and the message is sent to the registered number. GSM modem is used to find the latitude and longitude. This information is sent through SMS. And the battery and regular circuits can be fixed inside or even outside the helmet.

4.2 Vehicle Section

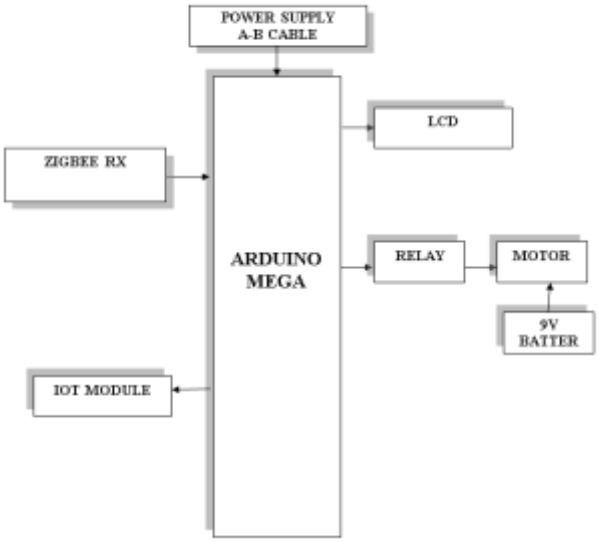
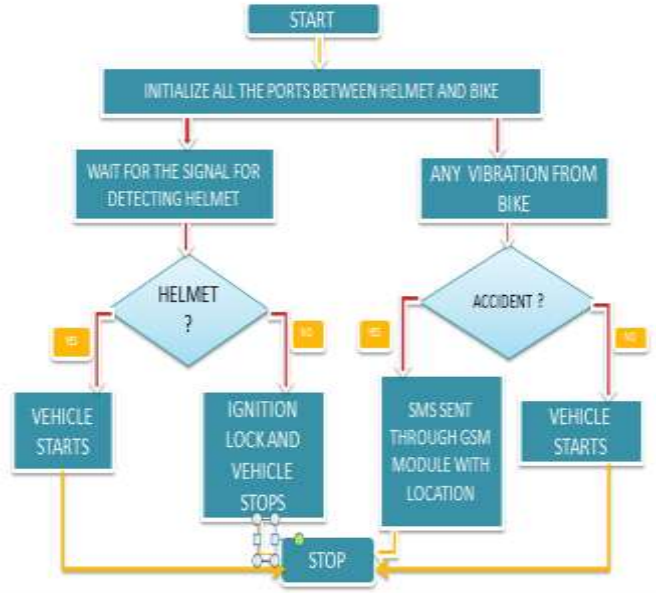


Fig -4: Block diagram of vehicle section

The vehicle unit is mounted on actual bike. Our main controller is positioned in to storage case of bike. And the vibrational sensor in the helmet section is used to detect the accidents. And the Zigbee receiver receives the signal from the Zigbee transmitter which is in the helmet section and immediately it stops the vehicle. And the SMS containing the information about latitude and longitude is sent through SMS. Even the information is stored on the cloud using IoT module.

5. FLOWCHART



1. The first step of project is to check the initialization of all the ports.

2. The next step is to check whether the rider wears the helmet or not. If the rider wears the helmet, then the vehicle

starts. If the condition fails means the rider does not wears the helmet then the ignition locks and vehicle stops.

3. Accident Detection is also featured in the project. If accident is detected, immediately the signal is sent using wireless communication to the vehicle. And the vehicle is stopped and the message is sent to the registered number with location in terms of latitude and longitude positions. And if the condition fails then the vehicle moves on.

4. Even the whole information is stored on the cloud.

6. WORKING PRINCIPLE

In this proposed method, the helmet mechanism contains **ARDUINO MEGA** microcontroller, which continuously monitors the sensor values. The **IR sensor** is used to detect whether the person wear the helmet or not. If the person wears the helmet, the controller detects and transmits the **START** signal to the vehicle section and turns **ON** the vehicle. If the person removes the helmet, the controller sends the **STOP** signal to the vehicle and turns **OFF** the vehicle. The helmet also detects the vibration level and if there is any abnormal vibration is detected it gets the location of the person and transmits the emergency alert through SMS for the rescue persons. The **IoT ESP8266-12E** module is used for live tracking and the vehicle can be controlled from cloud. The software used in this project are **Arduino IDE** and **Embedded c.**

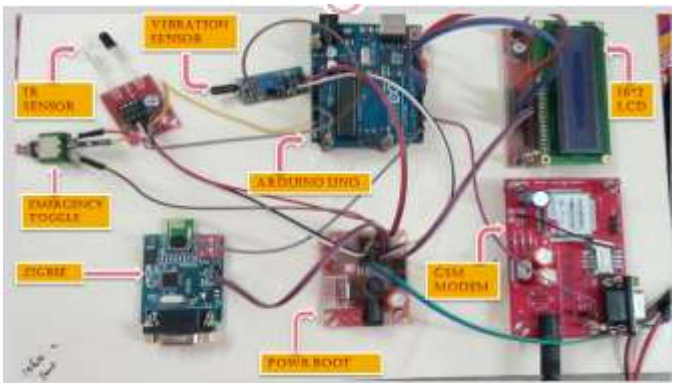


Fig -5: Helmet section

The hardware used in the helmet section are IR sensor, Vibration Sensor, Arduino UNO, GSM modem, 16*2 LCD, Power Boot, Zigbee, Emergency Toggle Switch. Except IR sensor all other devices can be embedded inside or outside the helmet. But IR sensor must be inside the helmet to check whether the rider wears the helmet or not. Even in the vehicle section consists of the devices such as Arduin uno and Zigbee. The IoT module ESP8266-12E is used in the vehicle section to store the information on the cloud. The DC motor resembles the vehicle.

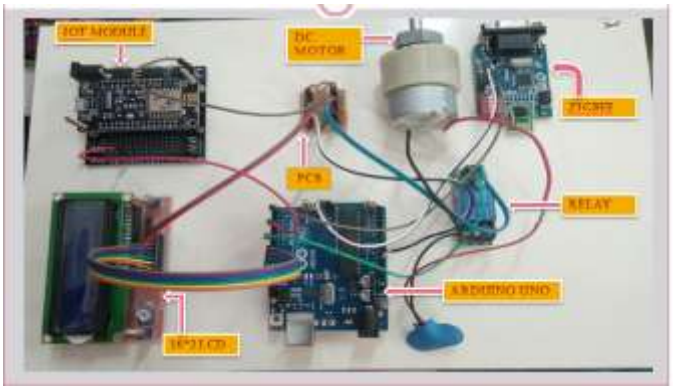


Fig -6: Vehicle section

7. RESULTS

7.1 Helmet Section

7.1.1 If the rider wears the helmet, then the vehicle starts. And the LCD displays the messageas **"ENGINE START".**

7.1.2 If the rider does not wears the helmet, then the vehicle does not start. And the LCD displays the message as **"ENGINE STOP".**

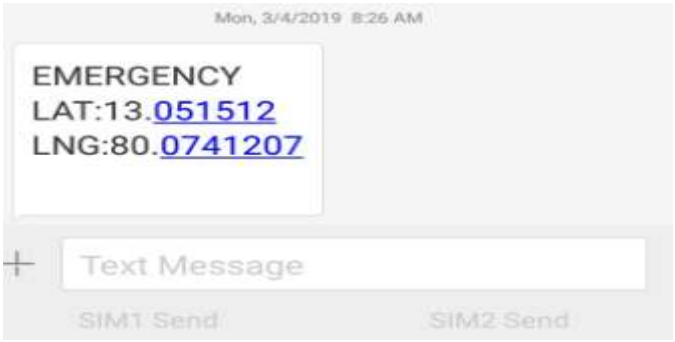
7.2 Vehicle Section

7.2.1 If accident occurs, the vehicle is stopped. Then the message is displayed on the LCD as **"Emergency".** And it also sends the SMS to register number with their current geographical location.

7.2.2 To alert the rider the message displayed on the LCD as **"SAFE".**

7.2.3 When the vehicle is stopped due to accident the message displayed on the LCD as **" ENGINE STOP".**

7.2.4 The SMS is sent to the registered number.



7.3 Cloud Storage

http://www.iotclouddata.tech/527/index.html

http://www.iotclouddata.tech/527/readalltable/readalltable.php

The IoT module ESP8266-12E is used in the vehicle section to store the information on the cloud.

8. ADVANTAGES

- Detection of accident in remote area can be easily detected and medical services provided in short time.
- Simply it will reduces the probability of accident.
- It can be used in real time safety system.
- We can implement the whole circuit into small module later.
- Less power consuming safety system.

- This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.

9. FUTURE SCOPE

The project can be enhanced by adding Google Glass Technology. Through this technology, biker can see the upcoming road before reaching that particular place. Also, biker can see navigation on it and can alert him while taking sharp turns.

10. CONCLUSIONS

The system implemented is very useful and advantageous application for two wheelers or with some modification even cars. Implementation of this system by manufactures or by individuals will decrease the deaths ratio from accidents.

The medical staff will be well prepared than an emergency case and will efficiently treat the casualty.

Hence it can be inferred that the SMART HELMET CONTROLLED VEHICLE is a flexible system to operate and remarkable improve the life expectance of the victim.

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