

Smart Helmet for Accident Detection and Prevention

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Abstract

A smart helmet is a system which makes motorcycle driving safer than before. It prevents starting of vehicle if the driver does not wear or even if the driver is boozed. In addition, our system has a unique feature of detecting exact location of accidents and informing specific persons the location and speed of the bike immediately after accident occurs via SMS with the help of GPS-GSM based tracking system, thus aiding ambulance to reach the correct location. We have mounted all the sensors within the helmet, which senses and sends the information wirelessly to the module placed on the bike engine.

This Smart Bike Helmet system has two modules, one placed on the helmet and another one on the bike. Alcohol sensor and helmet sensor (i.e. limit switch) are attached to the helmet module and vibration sensor, GPS and GSM are connected to the module placed on the bike. These two modules communicate with each other wirelessly using RF transmitter and receiver with encoder HT12E and decoder HT12D pair. The entire system is controlled by ATMEGA 328P microcontroller

Keywords: *Biker's safety, Accident detection and prevention system, Smart helmet, Alcohol detection.*

1. Introduction

As we all know that we all going to die one day or the other and the cause of death can be anything from a health diseases or a fatal accidents or a natural death. According to the survey of The Hindustan Times which had listed top 10 causes of death in India which included causes of death due to heart disease, chronic obstructive pulmonary disease, Diarrhea, Stroke, Lower Respiratory infection, tuberculosis, neonatal preterm birth, self-harm, Road injuries, other neonatal conditions. Road accidents were the major cause of deaths. So as engineering student we opted for designing a system which can prevent accidents and if it occurs, inform about it so as to get an early help to avoid deaths.

The proposed project work presents the smart helmet that ensures that the rider cannot start the bike without wearing it. This helmet uses simple cable replacement for wirelessly switching on a bike, so that the bike would not start without both the key and the helmet. Also, whenever the driver starts ignition, the alcohol sensor measures the content of the alcohol in his breath and automatically switches off the bike if he is drunken.

2. Literature Survey

Drunken driving is one of the major reason for road accidents reference 4 gives the solution over it by implementing a system which will efficiently checks the wearing of

helmet and drunken driving the system also indicates the parking areas and if the accident occur it would sent the message to the friends continuously till anyone riches the rider.[4]

Reference 5 has been developed to provide security while driving vehicle. System can senses the toxic gases inside the vehicle and intimates the person presence inside the vehicle it can also detect the obstacles or static object front of vehicle. The system provides the vehicle safety development from being theft. [5]

As most of the people in India prefer two-wheeler compared to other form of vehicle. Therefore considering the safety issue the helmet is designed with wireless bike authentication and traffic adaptive mp3 playback proposed system will encourage the people to wear helmet so that we can prevent some extent of accidents. [3]

As accidents and lack of treatment in proper time is one of the reason for deaths considering this problems safety measure for two wheelers by smart helmets and 4 wheelers by vehicle communication is proposed this will consist information whether the rider wears helmet, whether rider is drunken, whether he met with an accident or not through GSM. [1]

There are many countries that have a law to make it compulsion for motorcycle rider to wear helmet. Malaysia is an example of it. Motorcyclist will alarmed when the speed limit is exceeded more than required limit. A led will also flash informing that the speed is exceeded over 100km/hour. [2]

3. Working

Transmitter section (Helmet Unit): If the switch is pressed after wearing the helmet, it feeds a logic level 1 to the input of the transmitter through an encoder ht12e. If alcohol is detected in mq3 alcohol sensor, it feeds a logic level 0 and that 0 logic level is received by the receiver.

Receiver Section (Vehicle Unit): When the biker wears the helmet and ON the switch, the logic level 1 is received by the receiver which gets decoded by the ht12d decoder and triggers the microcontroller and the motor gets on. When alcohol is detected the logic level 0 ta received and motor gets off. When the vibration sensor gets triggered for an accident, GPS and GSM both gets ON and SMS is sent along with the biker's location.

Atmega 328P Microcontroller: In microcontroller, when logic signal 1 is triggered the transistor BS170 makes the motor on. When vibration sensor is triggered, the microcontroller is executed. GPS and GSM then get on and send message with Google maps link.

3.1. Block Diagram of Helmet Unit

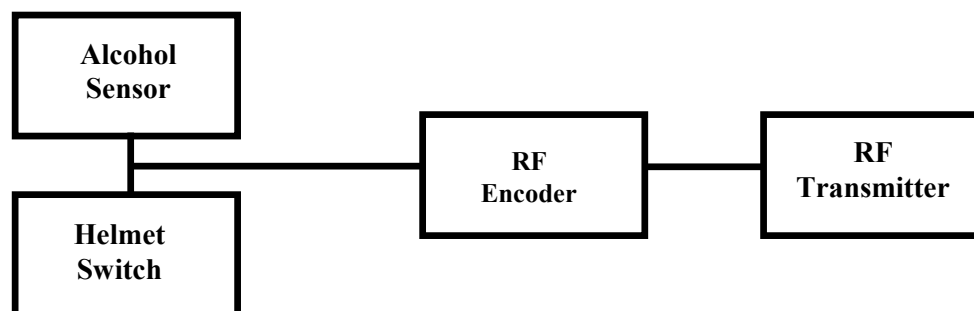


Figure 1 Transmission Section (Helmet Unit)

3.2. Block Diagram of Vehicle Unit

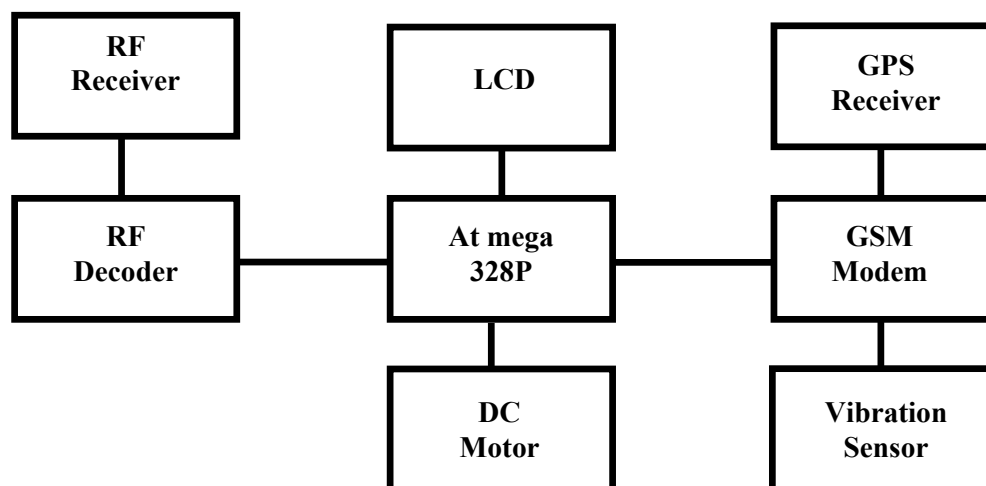
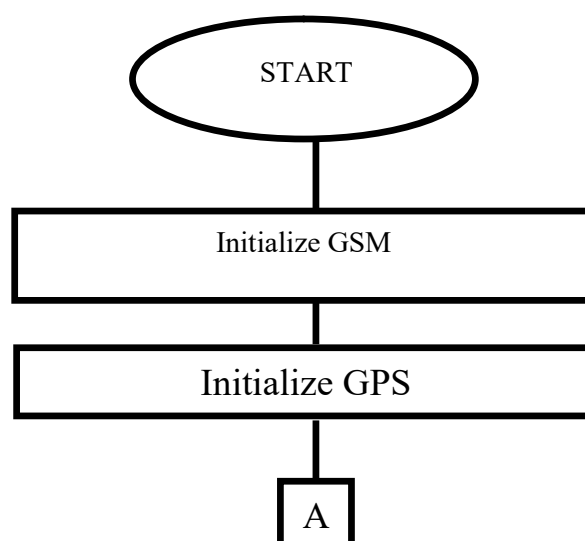
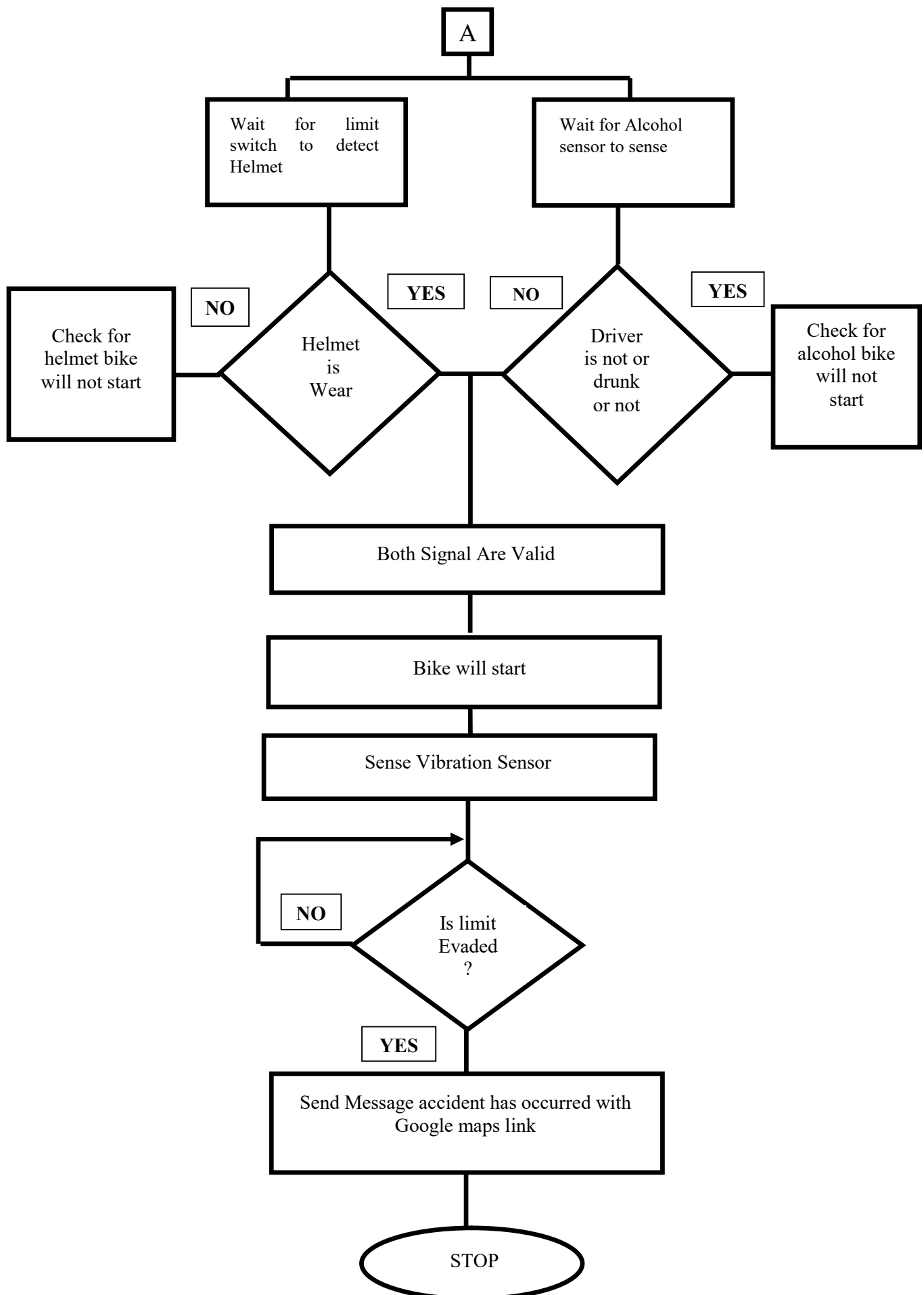


Figure 2 Receiver Section (Vehicle Unit)

3.3. Flowchart

The first step of project is to initialize all the port such as GSM and GPS and second step is, wait till the driver wears the helmet and check for alcohol. Third step is to start the bike if both the signals are valid. Fourth step is to detect vibration from vibration sensor and if vibration is detected. Next step is to check the condition of getting the location at where the accident has taken place. The sixth step, gives the Google maps link in the message.





3.4 Implementation

The project “Smart helmet for Accident Detection and Prevention” best suits to accomplish the following objectives:-

- 1) Status of rider wearing helmet
- 2) Alcohol content test
- 3) Accident detection
- 4) Accident location

- 1) Status of rider wearing helmet:

If the rider wears the helmet the limit switch gets pressed, and only then the bike ignition will start else the ignition system will remain off. The same is displayed on LCD as shown in Figure 4 “VEHICLE ON”

- 2) Alcohol content test:

Illegal consumption of alcohol at the time of driving is 0.08mg/L as per government act. But for demonstration purpose it is programmed to the threshold limit 0.04 mg/L. If the sensitivity of MQ-3 is more than 0.04mg/L in breathe then the driver can't drive the bike. As shown in Figure 3.

- 3) Accident detection:

A range of frequency generated depending upon vibration produced due to accident or obstacle. If frequency is greater than the threshold value then the vehicle unit shows accident detected. As shown in Figure 5

- 4) Accident location:

Once, vehicle unit shows “Accident Detected” then GSM sends the location of accident with the help of GPS. It sends latitude and longitude continuously to saved sim numbers till ignition system is turned OFF. As shown in Figure 6.

3.5 Result

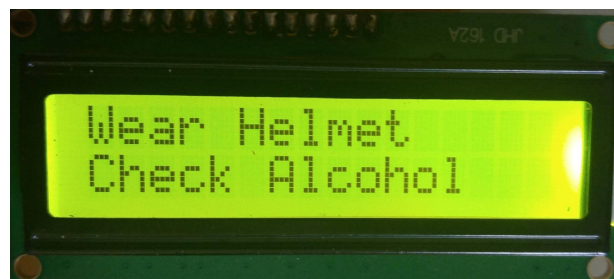


Figure 3 This message is displayed on the vehicle unit indicating the driver to wear the helmet



Figure 4 After the Drive worn the helmet this message is displayed on the screen.



Figure 5 When the vibration sensor senses the vibration of the accident this is been displayed on the screen

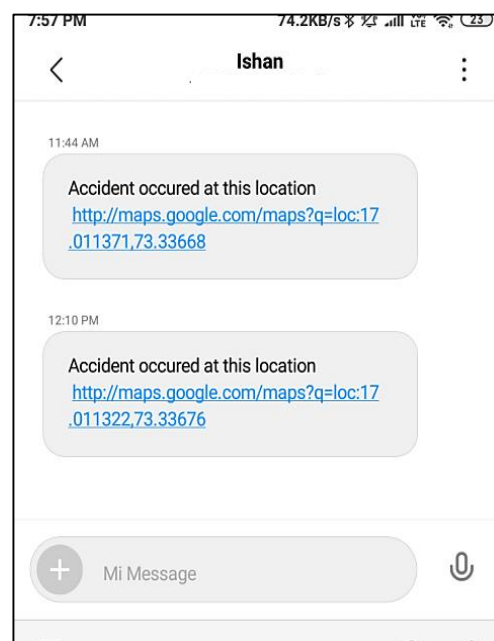
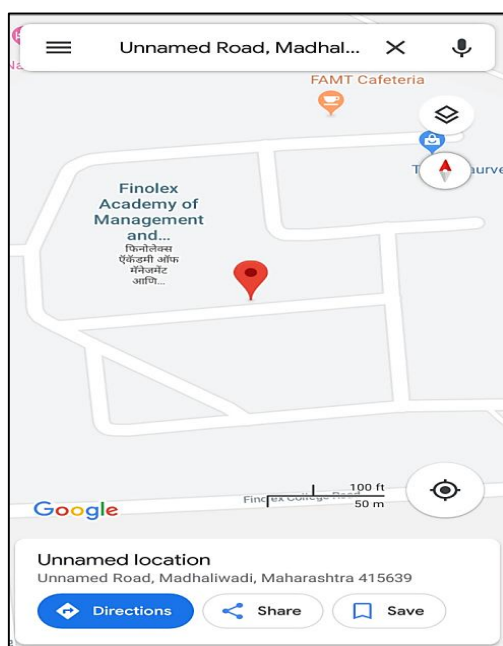


Figure 6 This Message is Send to recipients containing the Google maps link of the place where the accident has occurred.

4. Advantages, Applications and Future Scope

4.1 Advantages:

- i. Detection of accident in remote area can be easily detected and medical services provided in short time.
- ii. Simply avoiding drunken drive by using alcohol detector. it will reduces the probability of accident

4.2 Application:

- i. It can be used in real time safety systems.
- ii. We can break-up the system in to smaller modules that can work independently as a separate system.
- iii. Less power consuming safety system.
- iv. This safety system technology can further be enhanced in car and also by replacing the helmet with seat belt.

4.2 Future Scope:

- i. We can implement various bioelectric sensors on the helmet to measure various activities such as sleep tracking.
- ii. We can use small camera for the recording the drivers activity.
- iii. It can be used for passing message from the one vehicle to another vehicle by using wireless transmitter.
- iv. We have used solar panel for helmet power supply by using same power supply we can charge our mobile.

5. Conclusion

This project has a good real life scope, if it is implemented by the government. It can help to reduce lot of road accidents of two wheelers as it is the major cause of deaths in the whole world. It can also help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory Helmet protection and detection of alcohol content during the starting on of the bike. This project here is undertaken keeping in view of traffic, the traffic rules and also the safety of people. Implementation of this type of project by the government saves a lot of time for the traffic police and most importantly saves the precious life of a person as one cannot run a motor vehicle once he is drunk and if the helmet is not present. Family members will be informed as well.

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