International Journal of Research in Engineering, Science and Management
Volume-3, Issue-2, February-2020
www.ijresm.com | ISSN (Online): 2581-5792

Smart Helmet on IoT Technology for Safety and Accident Detection

S. Swathi[1], R. Navya[2], Deepshika[3]
[1]*Associate Professor, Department of Computer Science and Engineering, Nagarjuna College of Engineering and Technology, Bangalore, India*
[2,3]*Student, Department of Computer Science and Engineering, Nagarjuna College of Engineering and Technology, Bangalore, India*

***Abstract*: The main purpose of this paper is mainly to built a safety system which is integrated with the smart helmet and to reduce the probability of two wheeler accidents and drunk drive cases. We have used pressure sensor which will check whether the rider had wore helmet or not. Gas sensor (alcohol sensor) detect the alcoholic content in rider's breath. If the rider is not wearing helmet or if the rider is drunk the ignition will get off and hence the engine wont start. The bike will start only when the rider had wore the helmet and not alcoholic. When the rider meets with the accident, helmet hits the ground and the pressure sensor will detect the motion and report the occurrence of the accident. It will send the information of the corresponding location to the registered number.**

***Keywords*: IoT, Smart helmet.**

1. Introduction

The probability of two wheeler accidents is increasing day by day this is due to the rider's carelessness of not wearing helmet and not following traffic rules. Now a days wearing helmet has become compulsory during riding in order to prevent from accidents in almost every state. Because of fast increasing population there is a lot of traffic and due to this people prefer two wheelers more as compared to the four wheeler. The main aim of this project is to build a smart and safety system which is integrated with the smart helmet to reduce the chances of two wheeler accidents .If any accidents occurs there's no one to give information to the ambulance or relatives .This is the situation we observe in our day to day life. A thought of finding some solution to resolve this problem come up with this idea of giving the information about accidents as soon as possible and in time. Smart helmet focuses on three major applications. At first and most importantly is that the ignition won't start if the rider is not wearing the helmet. Secondly, if the rider is alcoholic the bike will not start so in this case alcoholic driving is not possible by using this smart helmet. Third application is accident detection when the rider met with an accident there's no one to call or inform the ambulance or relatives about the accident at the right time.

Various technologies are now available for bike rider safety Wireless communication between bike to helmet and bike to traffic signals and speed breaker .The system will be comprised of the module including stereo speakers and microphone, and a bike mounted base unit .The system will make use of different wireless communication protocols including zigbee and other radio frequency protocols when the rider driving the bike he will come to know where the speed breaker are there through RF technology. Smart helmet using GSM (global system for mobile communication) and GPS (global positioning system).

GSM is used to establish connection and sends messages through sim to the registered number when the rider met with the accident GPS is a navigation system which is used to detect the location of the person where accident had taken place. It tracks the latitude and longitude of the place and then send the message to the GSM module. We have vibration sensor all around the helmet which are connected to microcontroller board so when the rider crashes and the helmet hits the ground these sensors sense and the controller extracts GPS data and when these data exceeds the minimum stress level then GSM module automatically sends messages to ambulance or family members.

2. Technical studies

A. Force Sensing Resistor (FSR)

A force sensing resistor is a material whose resistance changes when a force, pressure or mechanical stress is applied. Force sensing resistors are commonly used to create pressure sensing" buttons". It is placed inside the helmet where human touch can be sensed and thus determines whether the rider is wearing the helmet or not. FSR is also known as strong polymer thick film (PTF) device that resistance is inversely to the force applied to the sensor. This sensor is a two-wired sensor that can change the applied force with a resistance. The RM resistor can be applied to minimize the required sensitivity force range and also to limit the current. This sensor is used as human touch control in many applications.

B. MQ-3 Alcohol Sensor

Alcohol sensor is a device which is used to measure the level of alcohol in the rider's breath. It will be placed near the mouth

of rider as to detect whether the riders are drunk or not. This sensitivity of the sensor can be adjusted by using potentiometer the concentration of gas due to its fast response time and high sensitivity measurements can be taken as soon as possible. This sensor provides an analog resistive output based on alcohol concentration. The sensor has four pins they are as GND, V_{CC}, A_{out} and D_{out}. It supports both analog and digital output.

C. RF Communication circuit

An RF module is a small electronic device used to transmit and receive radio signals between two devices since our project SMART HELMET is divided into two parts, the bike unit and the helmet unit. So the communication between the bike unit and the helmet unit takes place via the RF Modules. The helmet unit also the transmitter unit act as the Transmitting the signals to the bike unit (receiver Unit). The RF Module is often used alone with a pair of encoder /decoder.

D. Accelerometer ADXL335

The accelerometer ADXL335 is a small, thin, low power, tri–axis accelerometer sensor with signal conditioned voltage output. It can measure the static acceleration of gravity in tilt-sensing applications and also dynamic acceleration resulting from vibration, motion, shock. It is a device which measures the acceleration force. Acceleration is the measurement of the change in velocity, or speed divided by time.

E. Node MCU

Node MCU is an open source firmware and development kit that helps to prototype or build IoT project. It is low cost and Wi-Fi model chip that can be configured to connect to IOT and similar technology. This model can be used to send the message when the person met with an accident using Arduino uno.

3. Construction

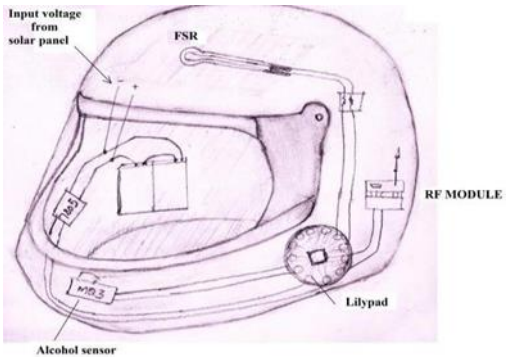

Fig. 1. Helmet unit

The project smart helmet is basically divided into two parts the helmet unit and the bike unit. The helmet unit or the transmitter unit transmits the signal from helmet unit to the receiver unit also called as bike unit with the help of RF transmitter. The RF transmitter sends signals from the helmet unit to the bike unit. The helmet unit consists of the pressure sensor which is mounted on top of the helmet. When the rider wears the helmet the pressure sensor on top of the helmet gets pressed. If the helmet is wore by the rider then the ignition will start.

RF transmitter: The RF transmitter sends signals from the helmet unit to the bike unit. The helmet unit consists of the pressure sensor which is mounted on top of the helmet. When the rider wears the helmet the pressure sensor on top of the helmet gets pressed. Alcohol sensor which is placed infront of the rider's mouth so that it can easily sense whether the rider has drunk or not. Solar panel is placed on the upper side of the helmet so that it can get direct sunlight and the battery are fixed inside the helmet. RF transmitter and other sensors are also placed inside the helmet. The bike unit has the RF receiver is placed in the receiver unit, it takes data from the RF transmitter module placed inside the helmet unit. It also has accelerometer, GPS and GSM module which track the location of the rider and sends the message to the registered mobile number in case of accident occurrence.

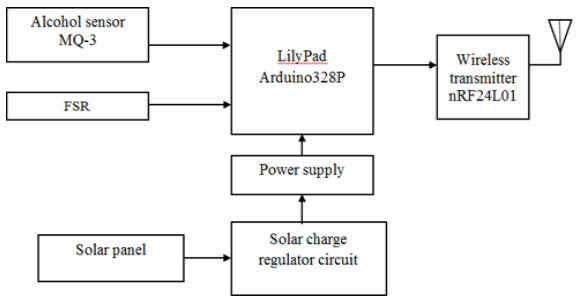

Fig. 2. Helmet unit

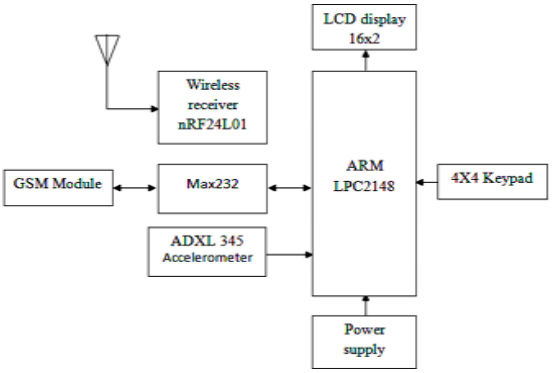

Fig. 3. Bike unit

4. Flowchart and representation

The working of the project smart helmet is as follows:

1. The first step is to check whether the rider is wearing helmet or not, for this we have a pressure sensor or switch present at the top of the helmet.
2. The second step is to check whether the rider is alcoholic or not. This will be done by the alcoholic sensor which is present near the rider's mouth.
3. The third step is The ignition or engine will start only

when the above two steps are verified.

4. The fourth step is when the rider met with an accident (helmet hits the ground) the vibration sensor gets active and due to that GPS and GSM also gets active and a message is send to the registered number.

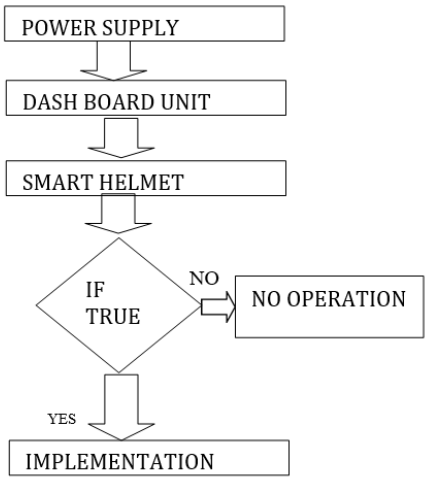

Fig. 4. Flowchart

5. Advantages, application and future scope

A. *Advantages*

When accident occurs its sends a message and location for quick medical services. Though the bike won't start if the rider is drunken as it will also prevent from accident. When accident occurs relatives will come to know the location through the message and the rider life can be saved. We can also make use of solar panel and can charge the mobile in emergency.

B. *Application*

- It reduces the probability of two wheeler accidents.
- It enhances the rider to wear helmet.
- It reduces the probability of two wheeler accidents. This project can also be enhanced in cars by replacing the helmet with the seat belt for protection.

C. *Future Scope*

We can implement cooling sensors on the helmet to make the rider comfortable wearing helmet. We can place camera which records driver's activity. We can use Inqscribe sensor to translate voice message to text message. We can use solar panel to charge our mobile.

6. Result

If the rider is not wearing helmet the ignition won't start, then the message will be displayed as:

The gas sensor will measure the concentration of alcohol level present in rider's breath. if it is beyond certain limit then the engine won't start and will get message as displayed,

Fig. 5. Messgae about drunk and drive

When accident occur (bike fallen) then with the help of GPS and GSM it sends the message and location to the registered number and message will be displayed:

Fig. 6. Message sent on mobile for Accident

7. Conclusion

The conclusion of the project is that the bike ignition will start only if the helmet is worn and the rider is not alcoholic. This will automatically decrease the probability of accident. GPS and GSM will control the sending of messages and will track the location of the rider. The signals are sent from helmet unit to the bike unit using Radio Frequency Module. Due to this wireless connection is better than wired connection.

References

[1] Manjesh N, Sudarshan Raju C. H., "Safety measures for Two wheelers by Smart Helmet and Four wheelers by Vehicular Communication," International Journal of Engineering Research and Applications, 2015.
[2] Mohd Khairul, Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari, "Smart Helmet with Sensors for Accident Prevention."

[3] P. Dileep Kumar, G. N. Kodanda Ramaiah, A. Subramanyam, M. Dharani, "A Solar Powered Smart Helmet with Multifeatures," International Journal of Engineering Inventions, Volume 4, Issue 10, pp. 6-11, June 2015.
[4] Ping Li, Ramy Meziane, Martin J. D. Otis, Hassan Ezzaidi, "A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection," IJEETC, vol. 4, no. 2, April 2015.
[5] Sudarsan K and Kumaraguru Diderot P., (2014), "Helmet for Road Hazard Warning with Wireless Bike Authentication and Traffic Adaptive Mp3 Playback", International Journal of Science and Research, Vol. 3, No. 3.
[6] Vijay J, Saritha B, Priyadharshini B, Deepeka S and Laxmi R (2011), "Drunken Drive Protection System", International Journal of Scientific & Engineering Research, Vol. 2, No. 12.
[7] Harish Chandra Mohanta, Rajat Kumar Mahapatra and Jyotirmayee Muduli (2014)", Anti-Theft Mechanism System with Accidental Avoidance and Cabin Safety System for Automobiles", International Refereed Journal of Engineering and Science, Vol. 3, No. 4, pp. 56- 62.