SMART HELMET USING IOT

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ABSTRACT

Now a day's road accidents are increasing in our country due to the violations of traffic rules like drink and drive, not wearing helmet, over speeding which may leads to severe head injuries and death. By considering all these issues the idea of smart helmet came into our mind which will ensure the safety of biker. The main idea behind this is to provide protective headgear for the riders to make their driving safer than before. This can be implemented by using advanced features like alcohol detection, accident identification, location tracking, and fall detection. This makes it not only a smart helmet but also a feature of smart bike.

Keywords: Headgear, Alcohol Detection, Location Tracking, Fall Detection.

I. INTRODUCTION

As per the WHO Global Report on road safety 2018, India accounts for almost 11% of the accident related deaths in the world. A total 4, 67,044 road accidents have been reported by States and Union Territories in the calendar year 2018. To reduce the road accidents ratio, Government of India made every biker compulsory to wear a helmet as per Section 129 of Motor Vehicle Act, 1988. Also drink and drive under the influence (DUI) is a criminal offence according to a motor vehicle act 1939 as mentioned by author in [1].

To ensure that the bikers should follow the traffic rules we propose "Smart Helmet Using IOT" for supporting the policies of the Government. The main motive behind our work is to make it mandatory for biker to wear a helmet during ride and prevent drink and drive scenario. One more feature of this system is to notify the concerned people about the accident of biker along with the location. The system will start the bike ignition on two conditions:

1] Push button should be pressed.

2] Biker should not consume alcohol.

II. LITERATURE REVIEW

1. "Smart Helmet for safe drive", system proposed by Keesari Shravya et al. in which they have used Force Sensing Resistors (FSR) which is placed inside the helmet which is used to recognize whether the helmet is worn or not before the bike is start. FSR are strong polymer thick film devices whose resistance is inversely proportional to force apply to the face of sensor.
2. Akshatha et al. had developed a system consists of microcontroller which makes the system hardware based; we are replacing it with Arduino to make it IoT.
3. For accident detection K Venkata Rao et al. presented a smart helmet in which there is no storing of biker's location data due to which they cannot be able to keep the track of their location history.
4. Bluetooth speaker with microphone is one of the features added by Ainapurapu

Manoj et al. in their system which are used to play the songs which leads to the safety issue and can caused the accidents.

5. As FSR increases the cost of system, so to overcome this we are replacing FSR with push button. GPS module used for transferring the location message is comparatively slower than Wi-Fi module which we are using in our system. We are using cloud storage to store the location history which will be act as a surveillance feature. We removed Bluetooth speaker with microphone feature from our system for safety reasons.

This project is aimed at building a system which will detect the consumption of alcohol by a suspect and display a digital reading indicating the level of alcoholic consumption this display on bike section module and also will check whether the push button inside the helmet is pressed or not which will indicate that helmet is worn by the biker.

The MQ-3 sensor is used to detect alcohol level. The sensor detects the alcohol consumption by the smell of the breath. If driver is drunk then bike ignition will not start. The vibration sensor is used to detect the accident and SMS containing location of biker will generated through cloud server which will send to the family members or registered number.

III. METHODOLOGY

This system contains different sensors and a transmitter Circuitry with two different sections, first is bike section and another is helmet section. The helmet section comprises of Arduino along with two sensors namely an alcohol sensor and a vibration sensor. The Alcohol sensor has been utilized to recognize the alcohol focus through rider's breath. It will be put close to the mouth of the rider, inside the helmet. The Vibration sensor is utilized for crash location. A RF transmitter which can transmit information from any controller or standard Encode IC has been utilized to transmit the information from Arduino ESP 8266 on the helmet side to the recipient on the bike side through transmit antenna.

The driver's condition is derived in real time environment base on IoT technology. Detection of alcohol is proposed using alcohol detector i.e. MQ-3 sensor connected to Arduino such that when the level of alcohol crosses a permissible limit which will display a digital reading indicating the level of alcoholic consumption on the LCD display in bike section will kept the ignition off. The pressing of push button is also checked for making sure that rider is wearing the helmet before bike engine ignited. The vibration sensor is used to detect the accident and it will send the SMS generated through cloud server, containing the location of biker to the family members or registered number.

IV. PROPOSED SYSTEM

The system mainly consists of following two major units:

- Helmet unit
- Bike unit

Helmet Unit

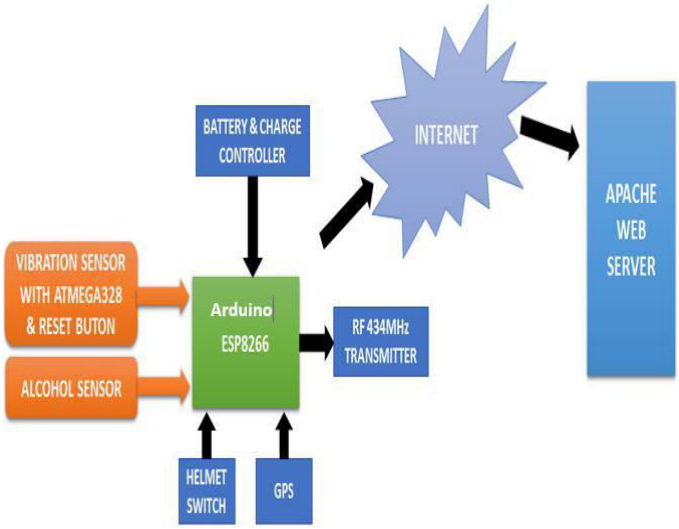

Fig. 1: Block diagram of helmet unit

The Fig. 1 shows that helmet unit composed of the components including Arduino ESP8266, push button, vibration sensor,

alcohol sensor, GPS and RF transmitter. MQ-3 alcohol sensor is used here which capable of detecting the alcohol consumed by the rider through his breath. And the helmet detection key i.e. push button identify the wearing if helmet. The GPS is utilized to get the location if the rider for safety purpose. All these data values are sent to the bike unit using RF transmitter.

Bike Unit

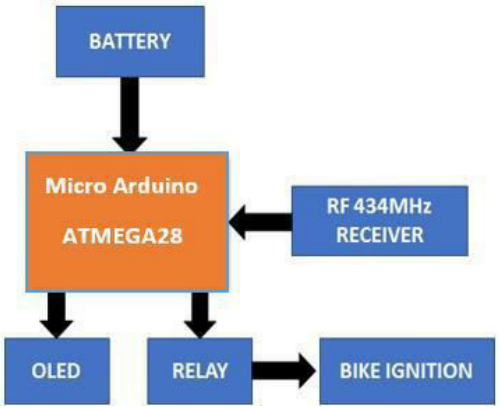

Fig. 2: Block diagram of bike unit

The bike unit comprises of a Micro Arduino, LCD, RF recipient, Relay module, and DC motor. This works with wireless communication. Receive antenna receives information sent by the transmit antenna of helmet unit which is then sent to the RF receiver for forwarding it to the Arduino present in bike unit for further processing.

V. Implementation

Both the Helmet unit and Bike unit connected through the air by using RF transmitter and RF receiver. Each section has its own ESP 8266 for processing of the data values. The ignition is controlled by the Arduino through the relay circuit and relay circuit is connected to the bike engine. Even if the ignition key is turned on, the on signal is given only to Arduino which in turns check for the safety of rider. If the rider founds to be drunk or has not worn the helmet, in either of the cases, the controller will tell the relay not to turn on the ignition.

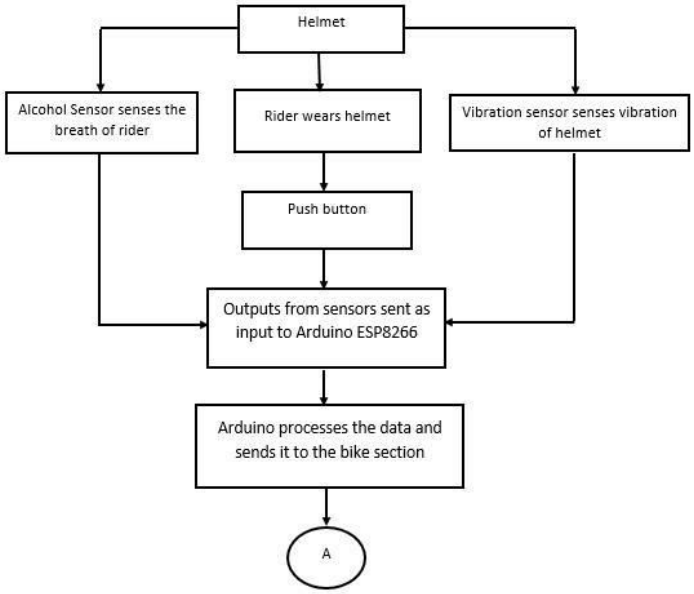

Fig. 3 (a): Data Flow of Helmet Section

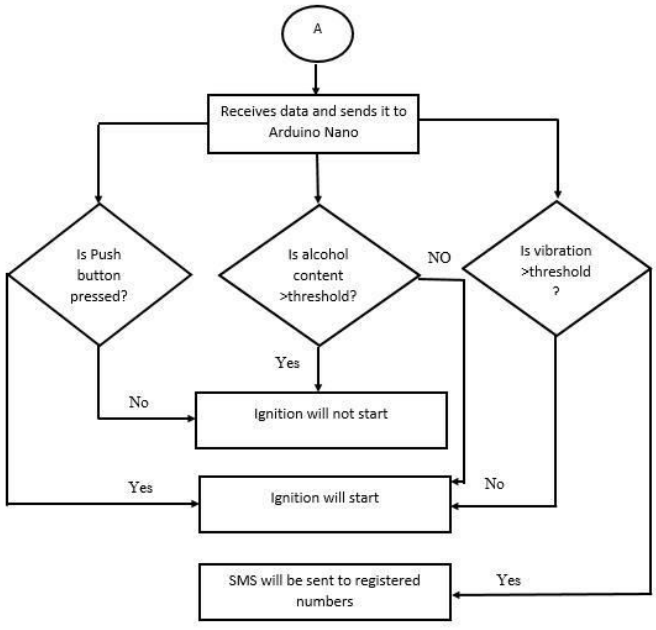

Fig. 3(b): Data Flow of Bike Section

Fig. 3(a) and Fig. 3(b) shows the flowchart of the proposed system. The flowchart describes the functionality of the "Accident Detection, SMS getaway, Theft detection and drive protection using smart IoT base helmet". The helmet unit conditionally checks "Helmet

Wearing" and "Alcohol Sensing". If condition is met then helmet unit sends affirmative signal to bike unit through RF communication .There after the vehicle start moving.

VI. RESULTS AND DISCUSSIONS

Helmet Section:

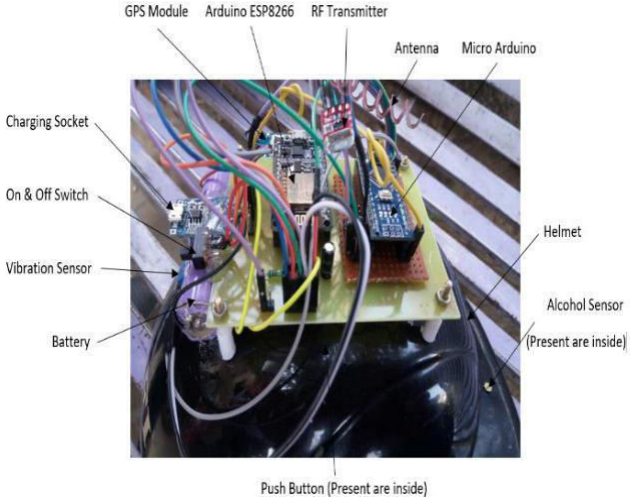

Fig. 4: Helmet Section

When the rider has worn the helmet as shown in above Fig. 4, the push button is pressed. Alcohol sensor measures the presence of alcohol in rider's breath. Vibration sensor measures tilting of the helmet. The output of these components will act as input for ESP8266 which is on the helmet. The ESP8266 processes the data and sends it to the bike section using RF transmitter.

Bike Section

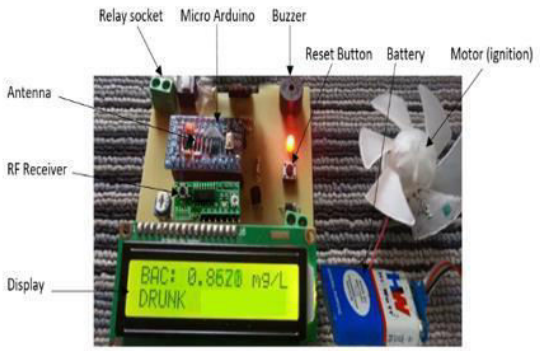

Fig. 5: Bike Section

RF receiver receives the data and the data is transmitted to the ESP8266 which makes the decision according to the output of the helmet section.

There are two conditions must be satisfied to start bike ignition:

Push button should be pressed when a rider wears the helmet.
Rider should not be alcoholic.

If the output of the helmet section matches these two conditions, then the bike ignition will start.

Alcohol Detection:

Fig. 6: Alcohol Detection Result

Illegal consumption of alcohol during driving is 0.08 mg/L as per the government act but for demonstration purpose, it is programed to the threshold limit 0.04 mg/L. threshold can be adjusted using potentiometer. If sensitivity of MQ-3 is more than 0.04 mg/L of alcohol in breath then the helmet unit will communicate with bike unit and show "Driver is drunken" thereafter the ignition system get switched off as shown in Fig. 6.

Accident Detection:

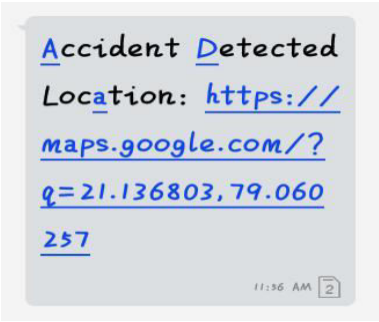

Fig. 7: Accident Detection Result

When a vibration sensor measures the vibration is greater than threshold, it means an accident is occurred. Once the system detects that accident happen, immediately the accident notification will be sends to the registered contact number. It will send the location of accident with the help of GPS .That is the latitude and longitude will be sent to the saved SIM number as shown in figure.7.

If the accident is minor then the rider can abort the accident notification to the registered number via Reset Button.

V. CONCLUSION

The "Smart Helmet using IoT" system will overcome above mentioned issues and will provide the safety to the biker and reduces the after effects of the accident, notifying about the accident. Our system is cheaper than previously existing systems. The surveillance feature in the system is helpful for parents for keeping the track of their children's location. As we are using Wi-Fi module it will send the SMS faster than GSM module.

VI. REFERENCES

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