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IoT BASED SMART HELMET

Dr. S.Sekar[1], L.Jaivenkatesh[2], S.Aravind Kumar[3], K.Dinesh Kumar[4], N.Jeevanantham[5]

[1]Assistant Professor (Sel.G), Department of IT, SRM Valliammai Engineering College Chennai, India
[2,3,4,5] Student, Department of Information Technology, SRM Valliammai Engineering College Chennai, India

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Abstract - *Accidents are increasing day by day, also there is many laws and regulations are posed by government in order to avoid this road accidents. Accidents can be the unplanned event or the mistake that may occur resulting in injury and sometimes it also leads to death. The accidents occur in two wheelers are more compared to other vehicles. Although enough road rules and regulations are made by the government to avoid accidents, but the accident rate is increasing day by day. This may be avoided by wearing helmets and riding vehicles carefully. However wearing helmet can reduce the risk of accidents majorly. In this smart helmet system is providing safety to the rider in a most effective and technological way using Internet of Things (IoT) has been implemented for accident prevention, accident detection and also quick GPS location recovery system. This proposal also helps to understand IoT technology which is being emerged now a day's .From the method proposed using Arduino UNO, MEGA and other cost effective sensors like an IR sensor. The bike engine will start only when the rider will worn the helmet. It detects the head of the bike rider within the range. A Radio Frequency (RF) Module is used for wireless communication between helmet unit as transmitter and bike unit as receiver. Ultrasonic senor used to detect nearby approaching vehicle's and send voice alerts to rider by speakers, Most important utility of this method is that fall detection using Vibrator Sensor and GSM & GPS module system is included so that emergency medical service can easily track the location of the incident occurs and also sending SMS message alert to the emergency number of the rider stored. Smart helmet system helps to provide accident detection, safety and security to the two wheeler riders.*

Key Words: Prevention, Detection, Recovery, Smart helmet, IoT, GSM GPS location, Sensors.

1. INTRODUCTION

India is the one of the densely most populated country. This exponential raise in the population and due to the recent pandemic many people did not prefer to use public transport to go to their work and to travel this increased sales of the motor cycles rapidly compared to 2019, the sales has been doubled in 2022 this increase the traffic among the Indian roads and increase in the number of road accidents according to the 2019 report 42% of accidents occur in India are because of motorcycles. There are several causes for road accidents in India the major cause for road accidents are given below.

Over speeding: Most of the accidents are occur due to the over speeding it is the natural psychology of humans to excel and to win, if there is a chance human will go to infinity in speed. But as the speed thrills it also kills, faster vehicles riders are more prone to accident.

Drunken Driving: Consumption of alcohol to celebrate any instance is very common. But when it is mixed with driving it turns enjoyment to misery. Alcohol can reduces concentration of riding. It decreases reaction time of a rider body. Hands and legs take more time to react. It suppress vision due to dizziness. Alcohol dampens fear and incite humans to take risks. All these factors while driving cause accident.

Avoiding safety gears and helmet: Most of the motor cycle riders doesn't wear helmet while driving the motor cycle many studies have shown that helmets and other safety gears reduce the impact of the accident to a great extend but many did not wear even though it is made into law.

1.1 Statement of Problem

In the time of study for the project we considered various scenarios the accidents in case of two wheelers are more compared to other vehicles. Although enough road rules and regulations are made by the government to avoid accidents, but the accident rate is increasing day by day when occurring at remote places are becoming fatal due to the slow reach of treatment sometimes the person only gets the medical assistance after 6 to 7 hours this increases the death rate on an accident and it is evident that when an accident occurred in the city, they got medical help or assistance within 30 minutes. Riding without proper helmet equipment and consumption of alcohol mostly ends with road accident. Also not following government road rules and regulation, reckless driving can also cause accident. These can be reduced or solved by using the Smart helmet system which helps to provide accident detection, safety and security to the bike riders.

1.2 Aim and Objectives of the project:

The main objectives of the project are:

- To develop a smart system that provides safety to motorcycle riders.

- To design a model that reduces the road accidents.
- To design a smart system in which the ignition starts only when the helmet is worn properly and alcohol is not detected.
- To design a smart system which recognize and respond, the vehicles coming from sides of the rider.
- To design a system that alerts the family members/friends by giving information about the accidents.

To develop a program for detecting accidents and sending an alert message with current location to nearby ambulance and family member automatically.

2. RELATED WORK

This lecture survey presents previous work related to our proposed system. Many great contributors had placed a significant sign in the field of IoT and Knowledge-based expert systems. We have highlighted some of them to identify the significant attributes of these systems.

Mohammad Ehsanul Alim et.al [1] has given an approach Arduino NANO and Arduino Mega-2560 are microcontrollers which control the entire components of the system. Two 2.4 GHZ nRF24L01 for communication between sender and receiver. MQ-3 alcohol sensor is used which can detect whether the bike rider is consumed alcohol or not. If the bike rider is alcoholic, then the MQ3 sensor detects it and turn off engine. A Sharp IR sensor detects the head of the rider within the specified range. The Bike rider's engine will start only when the rider will buckle the helmet. GPS & GSM Technology is used for tracking the location of the bike rider and sending text message to the family members of the Bike rider when an accident occurs.

Dhruvesh H. Patelhas et.al [2] proposed an approach which the System is plan and implemented such a way that the bike will not ignite until the rider wear helmet and pass an alcohol test, this will help to solve the problem of 'drink and drive'. It consists of GSM GPS technology which sends the message to the family member as well as hospital with the current location at the time of an accident.

Saima Siddique Tashfia et.al [3] has proposed scheme reflects on the embodiment of a smart helmet, having an alcohol detection sensor to diagnose if the rider wears a helmet or is drunk. The expert system processes the information about bike speed, engine temperature, distance with the nearby vehicle, and location tracking. In the case of an accident, the system immediately sends an SMS, including GPS location to the emergency contacts. The proposed Expert System which analyzes IoT cloud data and gives a possible solution to identified problems.

Sandhya.A.Kulkarni et.al [4] has proposed the smart helmet system is equipped with advanced alcohol sensing, potholes, speed breakers and fall detection modules. The bikes ignition will be avoided, if the rider has consumed alcohol the system not letting the rider to ride bike. The proposed system is detecting alcohol concentration from 0.05 mg/l to 10 mg/l by using MQ-3 alcohol sensor, able to identify potholes and humps within range of 2cm-400cm. Global System for Mobile Communication and Global Positioning System are used to send the information to the registered number, if the biker meets with accident.

Pranav Pathak et.al [5] has proposed a smart helmet system has two units, the helmet unit (HU) and a motorbike unit (MU). Both the parts linked radio frequency (RF). The helmet has the sensors to detect the pulse of the human, the alcohol content in breath of the rider, and the intensity of vibration. The pulse sensor is used to detect helmet worn or not. The GPS and GSM module are used to share location and to send message. Accelerometer used for detecting accident. The sensor on bike helps to ensure that the rider is in perfect riding position, if accident detected send message to emergency contact. A LIDAR sensor used to detect vehicles approaching behind. Force-sensitive resistors are used to detect perfect riding position.

Keesari Shravya [6] has proposed a system to identify whether the rider worn the helmet or not. If the rider worn the helmet then ignition will start the engine otherwise it remains off. For this, Force Sensing Sensor sensor is used. The second step is alcohol detection [2]. Alcohol sensor is used to detect the presence of alcohol in rider's breath and if it detects ignition cannot start.

Navya Sri K [7] proposed a system with GPS and GSM for accident detection. It uses push button to detect an accident and if the accident occurs location will be sent to the contact list saved in EEPROM.

H.C. Impana [8] has given a method method proposed using microcontroller RF transmitter and other sensors is cost effective but we find the system proposed using Raspberry pi module, Pi camera, Pressure Sensor, GPS system which uses image processing algorithms is most useful since the image processing is included so that we can easily detect the helmet from the rider.

Souhardya Das et.al [9] the smart helmet is providing safety to the rider. This is developed using the method of alcohol detection, accident detection, get real time location, and fall detection .The rider should wear safety equipment otherwise engine will not start. An RF Module is used as a communication link between helmet unit and bike unit. If the rider is drunk the ignition gets automatically locked, and sends information to a contact number with the current location.

3. PROPOSED SYSTEM

The first issue concentrates to prevent not wearing helmet and detect the rider is drunken drive these factors are the main reason for the accident cause. If the helmet is not worn properly the ignition of the bike is blocked and will not start and when the helmet is worn by the rider it will also check for alcohol condition if the rider consumed any alcohol, it will detect and the ignition will automatically stop for this module IR sensor and MQ-3 sensors are used. The IR sensor is fitted inside the helmet so it can detect the rider head. This eliminates the case of the rider keep the helmet on the top of bike fuel tank. The MQ-3 gas sensor is fitted in front of the rider mouth of the helmet. It detects the alcohol and set the value to HIGH means the alcohol is detected and bike ignition will stop. A Radio Frequency (RF) Module is used for wireless communication between helmet unit as transmitter and bike unit as receiver. The second issue is while riding a motorcycle there are many blind spots so the rider doesn't know whether a vehicle is approaching or not this cause major accident to the riders who follow the rules to overcome this issue ultrasonic sensors are placed in the all three side (Left, Right, Back) to intimate about the vehicles approaching the rider using the voice module and speakers. The final issue is when a rider met with an accident it takes more time to get medical help and rider's friend and family doesn't know about what has happened to him, to overcome this issue GSM and GPS modules are used to detect the location where the accidents occur and send the location to the emergency contacts saved inside the device Fig-1. Shows the overall architecture overview of our proposed system.

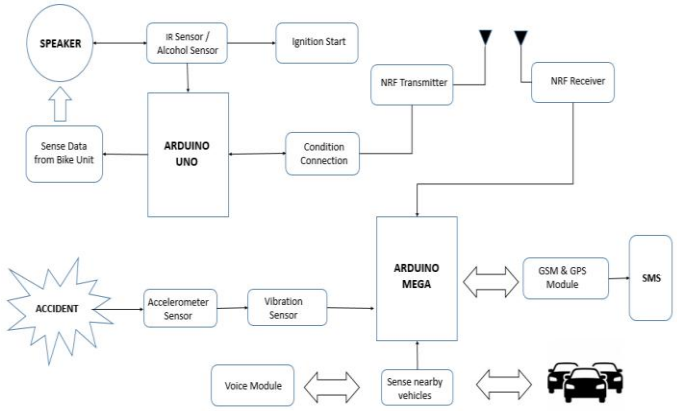

Fig-1: System Architecture of complete system

The system is consist of two units are Bike Unit and Helmet Unit in which the helmet unit contains Arduino UNO , IR sensor for detection of rider head, MQ-3 sensor for alcohol detection, and NRF24L01 transmitter and receiver to establish wireless communication between helmet unit and bike unit. Fig-2. Represent the flow diagram of the Helmet unit implemented.

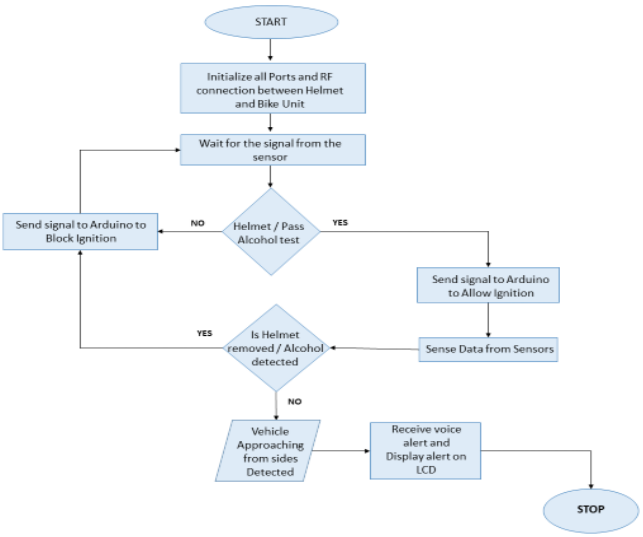

Fig-2: Flow chart for the Helmet Unit

In Helmet unit the system initialize all ports and establish connection between RF (Radio Frequency) transmitters to receiver. The system checks the condition whether the helmet is worn properly and check consumption of alcohol. If the above condition satisfy then the RF sends signal to Bike unit to start the ignition otherwise the engine won't start it shows alert in LCD display.

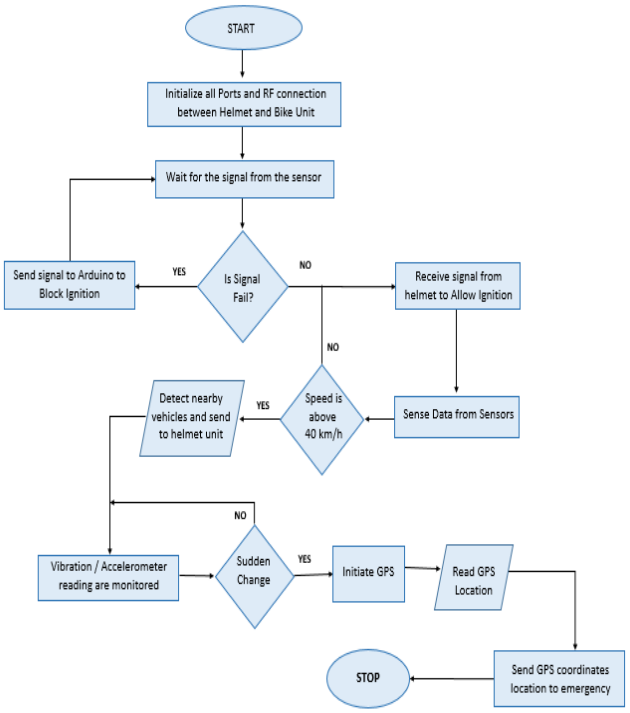

Fig-3: Flow diagram for the Bike Unit

In Bike unit is consist of Arduino MEGA,Ultrasonic Sensor (HC-SR04) for surrounding vehicle detection,GSM SIM800L modules are used to send notification alert SMS and to

emergency contacts. GPS Neo 6m fetch the accident location transferred to SIM800L. Accelerometer Sensor, Vibrator Sensor are used to detect the axis change and vibration during accident Fig-3. Represent the flow diagram of the Bike unit. When the RF get the signal from the helmet unit the bike engine start and even the bike start it continuously detecting the helmet unit. The system detects the nearby vehicle if only the rider reach the over speed above 40kmph, the ultrasonic sensors detects the vehicle within the range of 30cm from the three sides. If the vehicle approach the rider left side, the system sends the voice alert to helmet unit via bluetooth speakers are placed inside the helmet. i.e. "Vehicle on Left". Then there is any sudden changes in axis readings of the bike it check the vibration value. If the accident occurs GPS location coordinates fetched and stored in GSM module it send the immediate SMS to emergency ambulance and as well as family members. So this system reduce the time taken to reach the accident location and they got medical help or assistance soon.

4. METHODOLOGY

The methodology of the proposed IoT based Smart Helmet system contains two interconnected units that is separated using wireless communication between the Helmet Unit (Arduino UNO) act as transmitter and the Bike Unit (Arduino MEGA) act as receiver. NRF24L01 Transmitter & Receiver Module is used to establish these two wireless connection. Smart helmet system is planned and implemented in such a way that the two-wheeler will not ignite until the rider wear worn the helmet properly using IR sensor and pass an alcohol test by MQ-3 sensor which will help to solve the problem of drink and drive. To prevent accident by alerting the rider of nearby vehicles coming using Ultrasonic Sensor. Detecting the accident and tracking the location of the accident using GPS neo6m and sends SMS to emergency contact by GSM800L.This system contains three modules are explained below Helmet detection – Accident Prevention, Vehicle detection and Accident and fall detection.

4.1 Helmet detection - Accident Prevention

To check whether the rider wear the helmet properly or not. By the IR – Infrared Sensor placed inside the helmet in position located in-front of the rider head it confirms the helmet worn properly. It eliminates the rider to keep the helmet on the top of fuel tank of the bike. This sensor detects the head of the rider between 5 cm and 30 cm away. IR sensor sends the signal to check whether rider consumed alcohol or not by MQ-3 Gas sensor. The gas sensor continuously checking the alcohol values, the condition in checked the alcohol value by varying in values. Alcohol gas value is different from normal gas. If the rider worn the helmet properly but consumed alcohol means its lock the engine ignition. Both the condition needs to satisfy in order to ignite the bike engine. When the bike ignition lock is opened the RF receiver will wait for the signal from the helmet unit. When the rider wears the helmet and not consumed alcohol the transmitter will send the signal to the receiver so that bike can be started. If the bike rider doesn't wear the helmet properly the ignition won't get start.

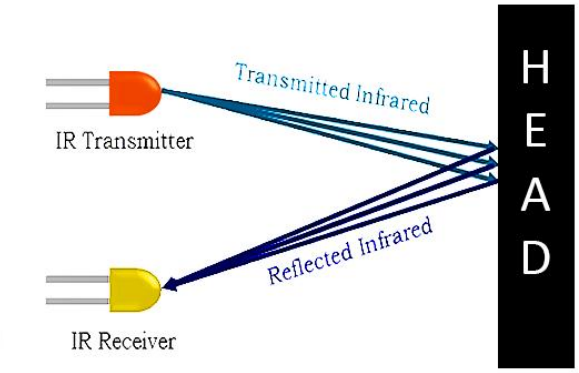

Fig-4: IR Sensor

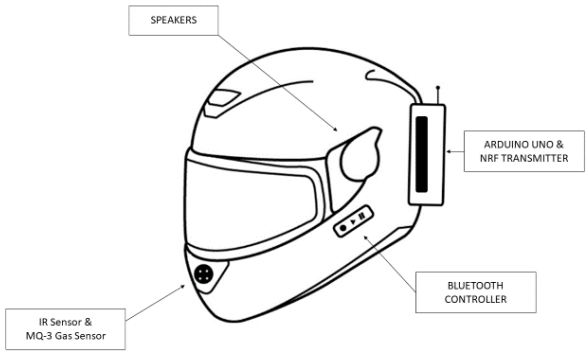

Fig-5: Helmet Unit Structure

4.2 Vehicle detection

For vehicle detection in the bike unit, IR sensor is also used for measuring the rpm speed of the bike. If rider reach the over speed above 40Kmph the bike unit starts detecting the nearby vehicle using 3-Ultrasonic Sensor placed in the three directions like left, right and back side and it sends voice alerts to helmet speakers by wireless Bluetooth connection. The Ultrasonic sensor gives the distance value of how far the object is moving. APR33a3 Voice module is used for recording voice alerts. The system eliminates the chances in order to the accident occur. The rider will not irritate by voice alerts when the other vehicle passing them continuously for example in Traffic jam. The bike unit only detects the nearly vehicle in the range below < 30cm and the system alerts only once at a time.

4.3 Accident and fall detection

The bike unit will detect the crash or accident by using the ADXL3xx accelerometer sensor and vibrator sensor. If there

is any sudden changes in accelerometer readings then it verify the vibrator value system will beep continuously and will shows alert in LCD. If accident occurred then the GPS neo6m module fetch the location coordinates. The information and location link will be sent to emergency contacts stored in memory using GSM SIM800L module. It sends the SMS to emergency contact as well as a family member with the current location of an accident.

5. HARDWARE AND SOFTWARE COMPONENTS USED IN IOT BASED SMART HELMET

The following section is used to describe about the components used in this system.

5.1 Arduino UNO

Arduino Uno microcontroller is used in helmet unit (HU). It's a microcontroller board based on the ATmega328P. It has 14 digital Input/output pins of which 6 can be used as PWM outputs, 16 MHz quartz crystal oscillator, six analog inputs, USB connection, 12V power jack, an ICSP header. It's small in size and portable.

5.2 Arduino MEGA

The Arduino Mega 2560 is used in Bike unit. It's a microcontroller board based on the ATmega2560. It has 54 digital Input/output pins of 15 can be used as PWM outputs, 16 analog inputs, four UARTs (hardware serial ports), a 16 MHz quartz crystal oscillator, USB connection, 12V power jack and ICSP header. It contains more digital pins compared to UNO.

5.3 MQ-3 Gas sensor

This Alcohol Gas Sensor MQ3 is used to detect alcohol gas. It is an efficient semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L and low cost. The alcohol gas unit is measured by Parts-per-million (ppm).

5.4 APR33a3 Voice module

APR33A3 is a module can record 8 Voice Channel and Audio playback board integrated with APR33A series IC which is a significant audio microprocessor along with high-performance audio converters. It's used to record voice alerts of nearby vehicles.

5.5 IR Sensor

An infrared sensor (IR sensor) is used to detect the rider head and also measure the rpm speed of the bike. It's a radiation-sensitive optoelectronic component with a spectral sensitivity in the infrared wavelength range 780 nm 50 µm. IR sensors are now widely used in anti—theft motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests.

5.6 NRF24L01 Transmitter & Receiver Module

The nRF24L01 is widely used in the wireless control applications. This used for the wireless communication between the helmet unit and bike unit. They are bi-directional so transceivers which this means the module can transmit and receive data. Low power consumption with long range access.

5.7 Vibrator Sensor

Vibration sensors are piezoelectric accelerometers that sense vibration. They are used for measuring fluctuating accelerations or vibration produced during the accident or for normal vibration measurement. This sensors now used by maintenance professional's use the sensors in order to predict the need of maintenance of the machinery.

5.8 ADXL3xx Accelerometer Sensor

Accelerometer sensors are ICs that measure acceleration in which is the change in speed (velocity) per unit time. Measuring acceleration makes it possible to obtain information about the axis. M/s2 unit for acceleration. Gravity (G) is also used as a unit for acceleration, relative to standard gravity (1g = 9.80665m/s2).Other usage include to measure tilt axis of the bike.

5.9 GSM SIM800L Module

SIM800L is a miniature 2G cellular module which allows for GPRS transmission, sending and receiving SMS and making and receiving voice calls. Long range connectivity with low cost and quad band frequency support make this module perfect solution for any project. Here it is used to send alert SMS.

5.10 GPS Neo 6m

The NEO-6M GPS module is used to detect the accident location which can connect upto 22 satellites. The GPS module is well-performing complete GPS receiver with a ceramic antenna, which provides a strong satellite search capability and accurate location with date, time. Its low consumption of 3.3v only required.

5.11 Ultrasonic Sensor (HC-SR04)

The HC-SR04 Ultrasonic Distance Sensor is a sensor used for detecting the vehicle to a rider using sonar waves. It measures using the echo and triggers the distance between the two objects. These are used to detect the nearby vehicles.

5.12 Bluetooth Transmitter and Receiver

Bluetooth which can operates in 2.4 GHz wireless communication channel. These are used to establish wireless audio alerts transfer seamlessly and consumption of power less and low cost.

6. EXPERIMENT AND RESULT

In this experiment, results of our implemented system as well as the relevant details. This system can be divided into four consecutive parts which work together:

A) Detecting the rider status.

B) Detecting the nearby vehicles.

C) Location tracking.

D) Analyzing the accidental situation.

6.1 Detecting the rider status:

The system is proposed detecting whether the rider wears a helmet or not and sensing consumption of the alcohol level. The first step of system is it initializes all the port and first step is to check weather helmet is wear or not. If Helmet is not worn then display alert in LCD Fig-8 will be displayed. Next step is to check the condition of alcohol, if rider is drunk, Fig-6 MQ3 check the reading values and send signals.

The bike unit RF receiver block the engine ignition and stop the bike.

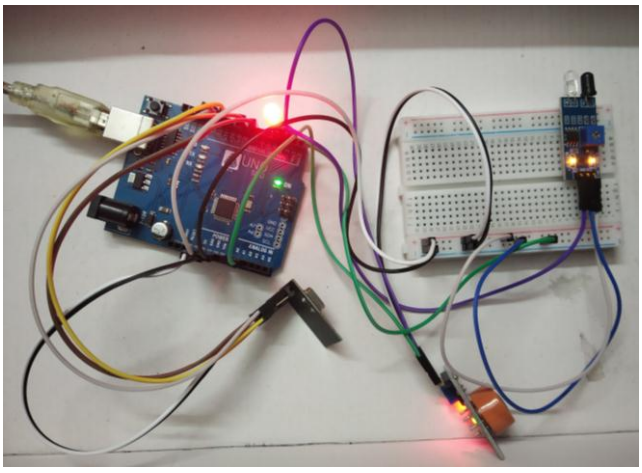

Fig-6: Helmet Unit Connection

Both two conditions are being checked continuously-

1) Whether the rider worn a helmet or not and

2) Whether the rider is drunk or not.

By using IR sensor for sensing the presence of helmet on their head and MQ-3 gas sensor detects the alcohol level. According to the IR and MQ3 reading values in Table-1,

IR sensor is positioned inside the helmet range is lesser than equal to 20cm in order to detect the rider head otherwise the helmet is not detected. Alcohol detect in clean air is 0.04 mg/L. In our readout analog value must be below 800 after analyse the normal breath range is from 100 to 800. When the sensor detected the alcohol it set range value above 800 so the rider is drunk and engine will stop.

Table-1: Reading Values of IR and MQ3 Sensor

SI.	IR sensor (range <=20cm)	Helmet	Alcohol detect (Drunk >= 800ppm)	Signal Engine
1.	5	YES	820	OFF
2.	2	YES	500	ON
3.	10	YES	300	ON
4.	15	NO	200	OFF
5.	30	NO	250	OFF

6.2 Detecting nearby vehicle:

To prevent the accidents and at a same time helmet act as an assistant during the ride. At night rider can't see the nearby vehicle approaching them. In that situation one voice alert can save his life to avoid accident. This unique feature implemented in Bike unit by using Ultrasonic sensors in three sides of the blind spots.

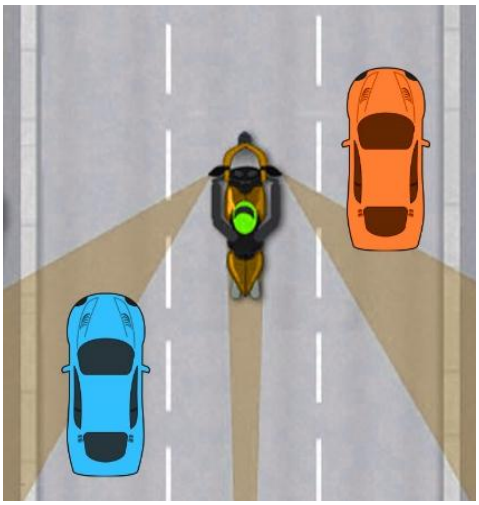

Fig-7: Bike rider blind spots

Table-2: Readings Value of Ultrasonic Voice Alerts

	ULTRASONIC SENSOR			VOICE ALERT		
SI.	**LEFT (range <=30cm)**	**RIGHT (range <=30cm)**	**BACK (range <=30cm)**	**Left Alert**	**Right Alert**	**Back Alert**
1.	25	0	50	YES	NO	NO
2.	40	10	50	NO	YES	NO
3.	50	0	30	NO	NO	YES
4.	15	40	20	YES	NO	YES
5.	30	15	40	YES	YES	NO
6.	40	10	20	NO	YES	YES
7.	10	20	30	YES	YES	YES

In bike unit, ultrasonic sensor from sides starts detecting the nearby vehicle only when the rider reach the over speed above 40kmph. Table-2, shows the distance range of the approaching vehicle is detected by Ultrasonic.

If the vehicle distance lesser than or equal to 30cm the bike unit sends the voice alerts from ARP33a3 voice module to Bluetooth transmitter. The receiver in helmet transfers the voice into speakers inside helmet. I.e. voice alert also LCD displays "VEHICLE ON LEFT". The system stop detecting the nearby vehicle when speed is low in traffic jam situation.

The voice alert occurs only once at per vehicle passed so it can't irritate the rider by voice.

Table- 3: Voice Alert Commands

SI.	VOICE ALERTS	COMMANDS
1.	LEFT	Vehicle On Left
2.	RIGHT	Vehicle On Right
3.	BACK	Vehicle On Back
4.	LEFT RIGHT	Vehicle On Left Right
5.	LEFT BACK	Vehicle On Left Back
6.	RIGHT BACK	Vehicle On Right Back
7.	ALL SIDE	Vehicle On All side

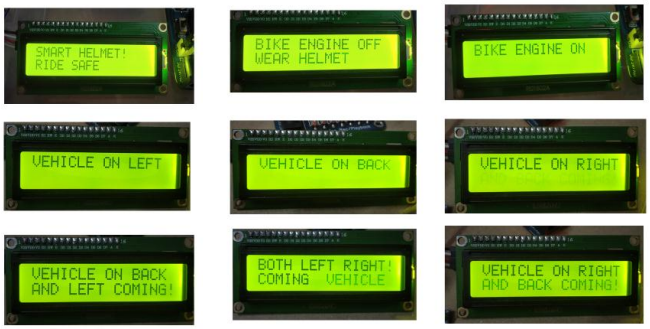

Fig-8: Display alerts

Table-3. Shows the voice alerts and the sides of the vehicle approaching the bike rider.

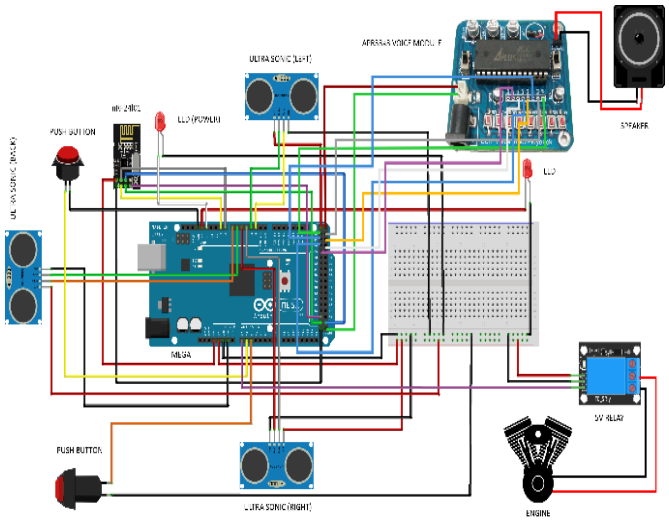

Fig-9: Bike Unit Connections

6.3 Location tracking

The bike unit Fig-9.controls the both vehicle detection and accident detection. Location tracking using GPS coordinates neo6m module used for tracking the biker's real-time location, GSM SIM800L module is used to send the SMS location coordinates to the emergency number are stored and ambulance in the hospital. Whenever the bike system detects an accident, an alert message displays, including real-time location coordinates with Google Map link, is sent to the emergency number. Using the geographical position longitude and latitude values, the authorized person can find the exact location of the rider.

6.4 Analyzing the accidental situation:

Analyzing the Accelerometer sensor (ADXL3xx) data for detecting accidental situation in the bike. Vibration is common in bikes so it cannot be determined the accident is occurred so that the bike has two condition need to be true:

1) Whether any changes in position of bike axis

2) Check whether the reading increasing values in vibrator

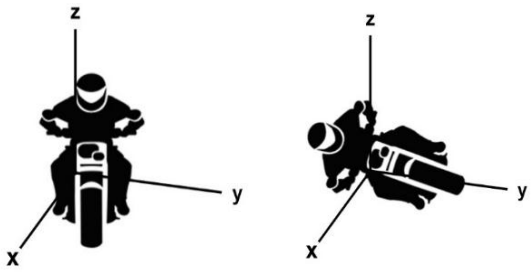

Fig-10: Axis position change in Accelerometer sensor

If there is any sudden changes in bike axis is detected by Accelerometer sensor to check tilt angle then the vibrator sensor check the vibration values. In accelerometer has three reading values are x-axis, y-axis, and z-axis.Fig-10. Shows the representation of bike axis is changed. These sensor detects the fallen bike by changes in axis position values to detect accident condition show in Table-4.

Above table shows the bike in stable normal position and after the accident is occurred. Next step the vibration value is checked whether the value is above 7000 means strong vibration. If the both conditions are true then the alert display and the GPS location is fetched sent to emergency number stored in GSM module via SMS. Also it sends the SMS to rider family member.

Table-4: Accident Detection Readings

	ACCELEROMETER			VIBRATOR	SMS ALERT
SI	X-axis (-250 to +350)	Y-axis (-260 to +330)	Z-axis (-275 to +410)	Range >=7000	
1.	329	326	404	4000	NO
2.	340	269	337	7500	YES
3.	266	325	348	8000	YES
4.	328	329	405	5000	NO

If accident occurs and bike falls, then it displays the alert message on LCD and sends an SMS to the emergency number with the current google map location link, accident occurred date will be shown.

7. CONCLUSIONS AND FUTURE ENHANCEMENT

Ultimately, the System is focused on the safety of riders, by obligatory use of safety equipment. Additionally, it provides certainty of non-consumption of alcohol throughout ride. The ignition system prevent rider to start a bike when rider violate any of security rules. This system overcomes many condition faced in previous system. The Unique feature in helmet unit is system act as an assistant when the limit speed reached by the bike, it start detecting the nearby vehicles and give voice alert to the rider. Furthermore, reporting system helps to inform family member for immediate treatment via SMS with location in case of accident occurs. Hence the cost is very low. In future we can improve the vehicle detection model to detect the potholes and speed brakes in the road. To reduce the sensor processing time load on the microcontroller by developing a dedicated embedded system for this purpose. Using Raspberry Pi with the Pi camera module and adjust its position in such a way that you could observe the projection on the mirror of the helmet and Small solar panels can also be attached on the top and backside of the helmet so that the need for the battery is minimized and the weight of the circuitry can further be reduced.

REFERENCES

[1] Mohammad Ehsanul Alim, Sarosh Ahmad, Marzieh Naghdi Dorabati, Ihab Hassoun"Design & Implementation of IoT Based Smart Helmet for Road Accident Detection". ISBN:978-1-7281-8416-6
DOI. 10.1109/IEMCON51383.2020.9284820.

[2] Dhruvesh H. Patel, Parth Sadatiya, Dhruvbhai K. Patel, Prasann Barot " IoT based Obligatory usage of Safety Equipment for Alcohol and Accident Detection". ISBN:978-1-7281-0166-8
DOI. 10.1109/ICECA.2019.8822104.

[3] Saima Siddique Tashfia, Rahabul Islam, Sadee Ibn Sultan, Md. Wahidur Rahman, Md. Ahsan Habib, Lubna Yasmin Pinky " Intelligent Motorcyle Monitoring Scheme using IoT with Expert System in Bangladesh". DOI. 10.1109/ICCIT51783.2020.9392675.

[4] Sandhya.A.Kulkarni, Sowmya C S, Subhalaskmi P, Tejashwini S A, V R Sanusha, Amitha S and Vandana Jha" Design and Development of Smart Helmet Using IoT" ISBN:978-1-6654-4668-6
DOI. 10.1109/iSSSC50941.2020.9358838.

[5] Pranav Pathak "IoT based Smart Helmet with Motorbike Unit for Enhanced Safety " ISBN:978-1-7281-83381.
DOI.10.1109/ICACCCN51052.2020.9362986.

[6] Keesari Shravya, Yamini Mandapati , Donuru Keerthi , Kothapu Harika , and Ranjan K. Senapati"Smart helmet for safe driving Smart helmet for safe driving". DOI.10.1051/e3sconf/20198701023.

[7] Navya Sri K, M Pavan Reddy , G Lavan Kumar"Smart Helmet with Accident Detection".
ISBN:978-1-5386-2045-8
DOI. 10.1109/CSITSS.2017.8447702.

[8] H.C. Impana , M. Hamsaveni and H.T. Chethana "A Review on Smart Helmet for Accident Detection using IOT".DOI.10.4108/eai.13-7-2018.164559.

[9] Souhardya Das,Sahadeb Santra,Sanket Sinha" Smart Helmet with Quick Ambulance Response System". Paper ID: IJERTV10IS080210.