



## IOT BASED SMART HELMET TO DETECT THE HAZARDOUS SITUATIONS AND ACCIDENT ALERTS

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**Abstract:** At present, India is the biggest marketplace for 2- Wheeler's (China being 2d) within the global. further India is still developing country ac coring to mining industry lots of injuries happens while in working. this leads to sometime serious issue and deaths also. the main reason of both domains are not Warring the helmets properly. Therefore helmets must be used while riding the motor cycle and working in mining industry. by using this a person or victims get some proper medical help and delivering the alert message to registered mobile number. so for this am developing the smart helmet to make the journey and working safer and more comfortable. Smart helmet provides the complete safety measures while include both accident detection and mining industry purpose also. smart helmet consist of sensors GSM, GPS module, crush sensor strap switch, MQ3 and MQ7 sensors each of sensors does there jobs independently generates SOS messages. smart helmet promotes the user by its features like connectivity with a phone using GSM technology and detecting hazardous situations,gases,CO2 percentage, crush of an object, strap status,. Etc

**Keywords:** WI-FI, IOT, IR sensor, GSM, GPS, MASTER and SLAVE, SOS, ESP32, MQ3, MQ7, CRUSH, STRAP etc

## I. INTRODUCTION

The iot (internet of things) is a device of interrelated computing devices that could incorporates mechanical, and virtual machines gadgets and animals or peoples. These are contains with UIN device and the potential to transfer the facts over the network. As a society we're blessed to enjoy the various benefits that enterprise proper products provide us by processing these raw materials. Operating within the earth provides many security and health dangers. The mines which can be deeper, the greater dangerous it may be to be walking jobs. There's oxygen leak this is restrained, in addition to transporting also, traffic injuries in India have improved 12 months by using 12 months. Person who works in planning dual steps unit in Ministry of Works stated that, the boom of street accidents is in link with the rapid increase in population, monetary improvement, industrialization and motorization encountered through the United States. As of from 1981-2019 September 15th India has over 3 hundred Billion Tones coal holds. Technology of coal in the yr 2012 and 2018 remained at five hundred and forty Million Tones and five hundred and fifty seven Million Tones and 1981-2018 India has 2.5 million accidents by way of without the use of the helmets.

motor cycle racing is a habit for the boys now a days in India. its one type of fashion. The rider his all ways

Warring the helmet and belt also. This leads to accidents rates low. if not death rate is high gradually. here my smart helmet provides some safety measure to rider while in riding the motor cycle. Mining is a job that also requiring the helmets. in mining the work is very hard and used the some rough elopements to progress there work. a miner using a smart helmet he can easily detect the CO2 range and O2 level and

head of an injury and crushes .smart helmet provides these all facilities to miner and rider also.

## II. LITERATURE SURVEY

Here all slaves acts as a sensors and one-of-a-kind modules like accelerometer, proximity sensor, mic,

audio system, virtual dig cam, etc. here used the ,master and salve pro- cedure. wifi acts as a master and all sensors acts as a salves. the drawback of this technology is communication between multiple sensors become complex and force sensing resisters sometimes generates the wrong accidents alerts.[1] this technology is a recent technology for accident detection and it is domain dependent. its works only for accident detection[1].

My second paper proposed a smart system principal contribution methodology right here is in case if car robbery the automobile may be tracked via sending the message to the quantity gift within the GSM sim slot, and if the car has met with an accident then the strain sensor within the sensors generates stress and message through the GSM is dispatched to the registered mobile and location details using GPS module[2].the methodology for this technology is GSM technology . The future work of this idea is the developed system efficiently ensures that the rider is wearing helmet throughout the ride. Rider will not be under the influence of alcohol while riding. Better sensors can be used to detect the alcoholic signals, and sensors are not proper [2].

Hazardous gases detection for mining industry labored out of Implementation consists of two modules- the helmet module and reporting (or tracking) module. The helmet module includes ARM7 microcontroller at the aspect of several sensors and ZigBee, even as reporting module that consists of ZigBee technology at the receiving end and

raspberry pi controller. an automated email alert generation device is also evolved in a reporting module of proposed system, it generates and can offer an automatic alert future work of this idea is machine can be superior by using adding more measuring device to test the worker's heart rate and blood pleasure[3].

A good idea include safety helmet for miners based on ZigBee wireless technology [4]. gas concentration, humidity and temperature of the surrounding are monitored area. The sensed facts are transmitted witlessly through ZigBee technology to destination centre. While the sensed information is out of everyday values the alert is sent through ZigBee with the aid of lights up distinctive LED's and blowing up alarm [4]. The trouble of this machine is that it will be just most effectively view the actual-time facts and there is no data facts logging mechanism and we cannot become aware of which miner has skilled in problems. And ZigBee era is acts like a Bluetooth covers handiest 100m. Constrained distance [4].

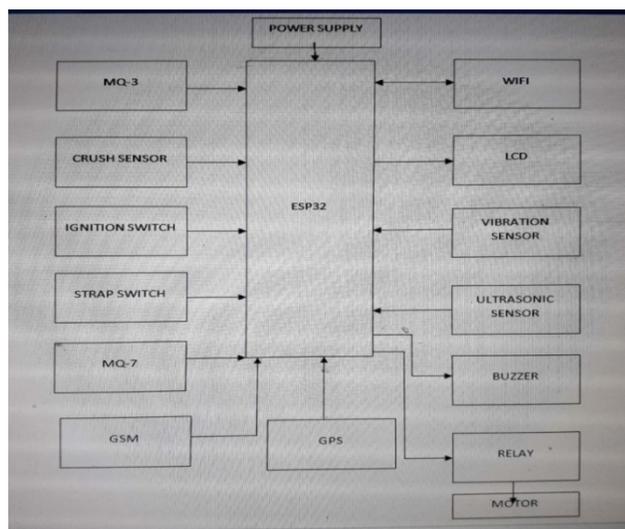


Fig. 1. Block diagram of smart helmet to detect the hazardous situations and accident alerts

## PROPOSED WORK

The bellow figure include ESO-32 microcontroller. it basically encompass 36 pins and helps for each analog and virtual output pins. and built in WIFI module is gain of this. MQ-3 sensor and MQ-7 sensor for alcohol detection and CO2 degree detection correspondingly. Crush sensor is used for locate the crushes for accident. Ignition sensor is used for checking ignition degree and take a look at whether safe force or no longer. Strap switch is used for detecting whether rider or miner is wearing the helmet and tied the belt nicely. Those two switches include virtual values. And GSM and GPS module for sim detection and place detection. And

electronic mail to authorized employees, if a miner has professional risky occasion[3].

display the alert messages. WIFI module is used for the Wi-Fi transmission. LCD is used for show the alert messages. Vibration sensor is used for checking the vibration degree or speed of the vehicle. Ultrasonic sensor is used for detection of distance between the vehicles at the same time as in riding. Relaxation battery for connection purpose and motor for bike.

### A. ESP-32

The ESP32 is basically dual core, this means it has 2 processors. one advantage of this is it has Wi-Fi and Bluetooth built-in so we can use it in our project development easily. It can support 32 bit programs. The RAM supports can go up to 240MHz and it has a 512 kb RAM. This board contains 30 or 36 pins, 15pins in each row. It also supports to wide variety of peripherals devices, like: capacitive touch, ADCs, DACs, UART, SPI, I2C and much more. It can also contains built-in Hall Effect sensor and built-in temperature sensor.

### B. GPS MODULE

Name contains Quad Band GSM/GPRS: 850 / 900 / 1800 / 1900 MHz it has built in RS232 to TTL or vice versa Logic Converter (MAX232) for conversion from a log to digital and vice versa. it is Configurable for Baud Rate. it can also supports to SMA (Sub Miniature version A) connector with GSM L Type Antenna for wireless transmission. it can also contains Built in SIM (Subscriber Identity Module) Card holder and Built in Network Status LED for displaying purpose. It supports Inbuilt Powerful TCP / IP (Transfer Control Protocol / Internet Protocol) stack for internet data transfer through GPRS (General Packet Radio Service) for internet transfer applications. it can also supports to Audio Interface Connectors (Audio in and Audio out) for calls. all ways comfortable with Most Status and Controlling pins. it supports Normal Operation Temperature : -20 C to +55 C and Input Voltage : 5V to 12V DC for interfacing purpose it contains LDB9 connector (Serial Port) and provided for easy interfacing methodology.

### C. Ultrasonic Ranging Module HC - SR04

The Ultrasonic ranging measurements module starts off evolved specifically HC - SR04 that may gives 2cm - 400cm non-contact measurements feature for measurements its ranging accuracy can reach up to 3mm. The three module includes name accordingly ul-transonic transmitters, receiver and control circuit. The basic principle of work is given bellow: (1) firstly IO trigger for at least 10us high level signal, (2) Then the Module

automatically sends eight 40 kHz and detect whether there is a pulse signal back if yes. (3)after that IF the signal back, through high level ,then time of high output for IO duration is the time from sending ultrasonic to returning as a output. Example Test distance = (high level time velocity of sound (340M/S) / 2.

#### D. Pressure sensor

Stress sensor will collect the pressure charge whilst miner is using the mining sportive devices to work on mining lactation. here measuring the full height, density and gravity by using unit PSI.

#### E. Speed sensor

Speed sensor will collect the velocity rate when rider is driving the motorcycle on road to particular lactation. Right here am measuring the entire time and distance by means of measuring unit is kilometer in line with hour.

#### F. Led bulb detect sensor

It mainly automatic light. It can convert any ordinary light to automatic, for this no extra fixture required. Primarily based on human movement sensor. Turns 'ON' after detecting motion at some point of the dark, Turns 'OFF' routinely accordingly. if no motion is detected for a hundred and eighty seconds lengthy service lifestyles, after that make certain the ordinary use of more than 30,000 hours, 10 instances longer than incandescent lamps strength consumption evaluation of the same brightness: three.5W ( same as this LED bulb) = 25W (incandescent) = 8W (regular strength-saving lamps/CFL ).

#### G. MQ-3 GAS SENSOR

The Alcohol fuel Sensor MQ3. it is a low fee semiconductor sensor which can hit upon the presence of alcohol gases at concentrations from zero.05 mg/L to 10 mg/L. The touchy cloth used for this sensor is SnO<sub>2</sub>, whose conductivity is decrease in smooth air. It's conductivity increases because the awareness of alcohol gases increases. It has high sensitivity to alcohol and has a terrific resistance to disturbances because of smoke, vapor and fuel. This module presents both digital and analog outputs. MQ3 alcohol sensor module may be without difficulty interfaced with Micro controllers, Arduino forums, Raspberry Pi and so forth. This alcohol sensor is good for detecting alcohol concentration on our breath, as like much your breather not unusual breathalyzer. It has a high sensitivity and speedy reaction time. Sensor affords an analog resistive output primarily based on alcohol attention. The power circuit is very simple; all it wishes is one resistor. A easy interface might be a zero-three.3V ADC.

#### H.

#### I. NEO 6 GPS

The NEO-6 module series is a family of stand-alone GPS receiver's family the features it provides the high performance u-blox 6 positioning engine for execution. And these are very flexible and price powerful receivers can offer many connectivity alternatives in a miniature the given 16 x 12.2 x 2.4 mm package deal for execution and it consist the one of a kind structure and strength, space options that to make NEO-6 module to best for battery operated cell devices with minimum value and area measurements.

This 50-channel u-blox 6 mapping engine boasts the Time to First Fix of less than 1 second. and it gives the supports dedicated acquisition engine, with 2 million correlates for execution, and also it supports of massive parallel time or frequency space searches foe experiments and it may supports enabling technology for satellites in- scantly. Further it can also support Innovative design and technology

Suppresses for jamming sources and mitigates multi path effects, and it also giving NEO-6 GPS receivers for excellent navigation performance even in the most challenging environments.

#### J. RELAY MODULE

The relay module is an electrically operated transfer that allows you to turn on or off a circuit the use of voltage and/or modern tons better than a micro controller may want to handle. There is no connection among the low voltage circuit operated by using the micro-controller and the excessive strength circuit. The relay protects each circuit from each other. The every channel in the module has 3 connections named NC, COM, and NO. Depending on the enter signal cause mode, the jumper cap can be positioned at high level powerful mode which 'closes' the generally open (NO) switch at excessive stage enter and at low stage powerful mode which operates the same but at low stage input.

#### K. MQ7 SENSOR

The MQ7 is a sensor that cans easy-to-use Carbon Monoxide (CO) detection to appropriate for sensing CO concentrations inside the air quality. it is able to discover CO-fuel concentrations everywhere from 20 to 2000ppm. The sensitivity can be adjusted by using the potentiometer.

#### PROPOSED SYSTEM DATA FLOW DIAGRAM

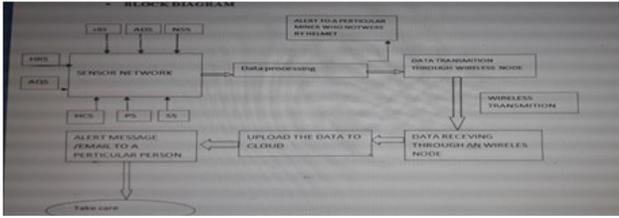


Fig. 2. Data flow diagram of smart helmet to detect the hazardous situations and accident alerts

A. SENSORS USED

III. IMPLEMENTATION SCHEME

The project “Smart helmet for motor cycles and mining” best suits to accomplish the following objectives

1. on GPS positioning system:
2. find out the location:
3. send the alert message with location to registered sim or mobile:
4. take care of patients:
5. stop

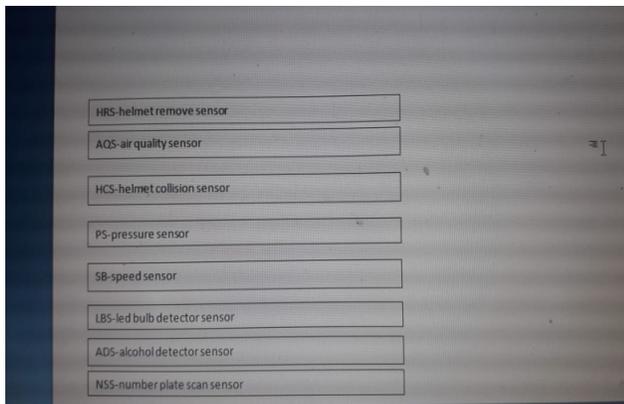


Fig. 3. Sensors details

- A. status of rider or worker wearing the helmet
- B. alcohol content detection
- C. carbon monoxide content level
- D. accident detection(rider and mining worker)
- E. accident location alert

If the rider wears the helmet and locks the strap then only the ignition of the vehicle will be started without wearing the helmet and locking the strap the ignition of the vehicle will not be started and if any alcohol content is detected above the threshold value then vehicle ignition is disabled and while driving if any vehicle comes close contact with the vehicle less than 15 cm then the user is alerted using a buzzer and in

case of accident, location of the user if fetched using GPS and alert message is sent to the concerned person using a GSM module and in case of mining worker mq7 sensor is used to detect carbon monoxide level in the air if the carbon monoxide levels are more than the threshold value then the environment is very dangerous to the worker to breath in such cases worker is alert via a buzzer indicating the danger and while working with industrial machine chances of falling debris on the worker can sometime lead a major problem and sometimes even death a vibration sensor is used on the helmet to detect these vibration and in case any vibrations level above the threshold than an SMS is sent the concerned person with the location of the mining worker so that immediate actions can be taken.

F. IMPLEMENTATION work flow steps

start the work of mining or riding the bike:

- 1) initialize the sensors:
- 2) collect the information from the sensors:
- 3) check whether mining domain or accident detection :
- 4) encode the information:
- 5) transmit using the wireless node:
- 6) receives by wireless node :
- 7) decode the information:
- 8) check if system is normal or not:
- 9) if normal go back to starting state continue the work:
- 10) if not normal means found the rate of hazardous gases and events and accident events:

IV. IMPLEMENTATION RESULTS

For accident detection i got the alert message with time and location.

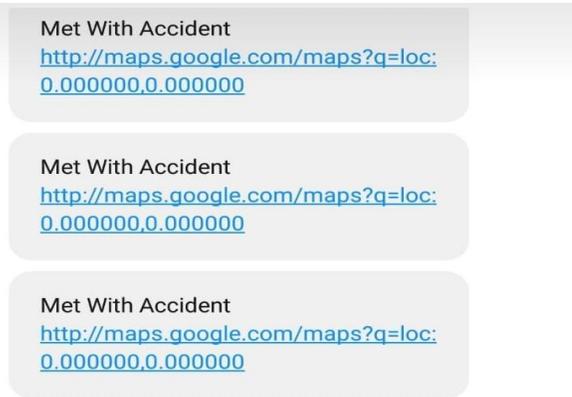


Fig. 4. alert message for accident with location

For mining purpose i got the alert message result with time and GPS location.

2-16 8:27 PM

I'M IN TROUBLE

<http://maps.google.com/maps?q=loc:13.096365,77.578079>

I'M IN TROUBLE

<http://maps.google.com/maps?q=loc:13.096448,77.578102>

Fig. 5. Alert message for mining with location

Software code for smart helmet to detect the hazardous situations and accident alerts. This is the simulation block diagram output of my current project. i got the simulation results for smart helmet.

## V. CONCLUSIONS

Iot technology has been used for smart helmets. it is a big utilization of features involved in smart helmet for two domains mainly mining and accident detection purpose. it helps in riding purpose rider safety also considered. Here my implementation mainly considered about CO2 level and alcoholic detection and pressure and speed and vibration levels also. It can be applicable both accident detection and mining purpose also. Here am fully utilized iot technology for developing the smart helmet to both mining and accident detection purpose.

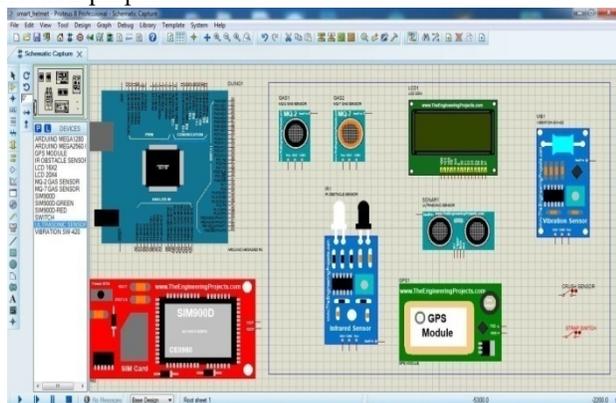


Fig. 6. Software details for smart helmet

## VI. FUTURE WORK

This can be extended to by checking the blood pressure rate and heart rate for accident detection and mining domains. LED light reflection can be implemented for future work. Solar panel also can be implemented for backups.

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