DESIGN AND IMPLEMENTATION OF SMART HELMET USING IOT

A

Project Report Submitted to

BHILAI INSTITUTE OF TECHNOLOGY, DURG

An Autonomous Institute Affiliated to

Chhattisgarh Swami Vivekanand Technical University, Bhilai (CG)

In partial fulfilment of the requirements for the award of

Bachelor of Technology

in

Electrical and Electronics Engineering

By

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Year of Submission 2023-2024

DECLARATION BY THE CANDIDATES

We, the undersigned solemnly declare that the report of the project work entitled **Design and Implementation of Smart helmet using IoT** is based on our own work carried out during the course of our study under the supervision of **Dr. ANUP MISHRA**.

We assert that the statements made and conclusions drawn are an outcome of the project work. I further declare that to the best of my knowledge and belief that the report does not contain any part of any work which has been submitted for the award of any other degree. All helps received and citations used for the preparation of the dissertation have been duly acknowledged.

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To the best of my knowledge and belief the project report

• Embodies the work of the candidate him/herself,

• Has duly been completed,

• Is up to the desired standard both in respect of contents and language.

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ABSTRACT

According to the investigation in India, nearly 25% of the road accidents are caused by two wheelers. The foremost causes for the fatalities are due to drunken driving, rash driving, and drowsiness due to long drive. The aim is to build an interesting smart helmet that protects us from accidents and indicates the accident prone area. Here we are using various sensors to build the smart helmet. To detect alcohol consumption of the rider we use Alcohol sensors. In order to check a rider's helmet, an infrared sensor can be used. Vibration detector is also added to the helmet to indicate the harsh hitting of the helmet during an accident. When the two wheelers slide down due to road rashes, the GPS is used to identify the location of the accident spot and quickly sends messages (location) to police stations and hospitals nearby through GSM.

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INTRODUCTION

1.1 INTRODUCTION

Technology is the word where we hear every corner of the world, mainly in the fields of education, manufacturing of the products, transportation, communication and health. In the field of transportation industry was always an essential part of the economy, and a tool used by the government. We have different ways of transportation for moving around the world, but motorcycles are the craziest vehicle in the young generation and as well as to the world. Motorcycle safety related to different features of the vehicle such as equipment model, design of the vehicle and as well as operator skill is special for motorcycle rider has towards the motorbikes. But they are the most unsafe road users, without a protective body, even the slightest careless can have serious injuries or may lead to the death of the rider. Not only because of the careless, but the death of the people may occur due to over speed, rash driving, over consumption of alcohol and violation of traffic rules. But the main reason for brain damage and this leads to immediate death, was the absence of helmet on the person. If the rider wears the helmet, 80% chances for avoiding head injuries and we can save a life from accidents. With the help of new technologies such as IoT, dangerous traffic situations will not occur. And modelling the motorcycles with the sensors, alert system to the rider and surroundings by a sending message, and to make it mandatory for the bike rider to wear a helmet during his/her ride. In a recent survey, every hour 4 people die in road accidents, 70% due to not wearing a helmet..The idea of the Smart helmet is done completely for the betterment of society. Two wheelers should use this Smart helmet and it is developed such that without this helmet the vehicle's ignition will not start. So this will warn the rider at the very beginning of his journey! And in recent days helmets have become compulsory in accordance with the (section 129) Act of Motor vehicles. It has strictly stated that each and every person traveling on a two-wheeler must wear protective headgear. This protects the rider from at most carelessness like riding without proper knowledge-rules, no proper condition of the bike etc. One main reason the fatality rate in mishap is rising is due to the delay and lack of proper treatment in time and No immediate response from society to inform the police and the hospital. Many have lost their life in this case. Saving life in golden hours matters a lot here. So, we must not let time take any life. The Smart helmet also helps the traffic police and follows government regulations. The device is completely safe for use of two wheeler riders

1.2 OBJECTIVE

The objective of the smart helmet project is to revolutionize personal safety by integrating cutting-edge technology into the traditional helmet design. By combining features such as real-time monitoring of vital signs, impact detection sensors, hands-free communication systems, augmented reality displays, and smart phone integration, the smart helmet aims to provide a comprehensive solution for the modern-day wearer. Through these functionalities, the helmet seeks to enhance situational awareness, enable prompt emergency response in the event of accidents, and improve overall user experience. Ultimately, the goal is to create a safety accessory that not only offers superior protection but also serves as a platform for innovation, catering to the evolving needs of individuals across various activities and industries. The main objective design system that reduces number of accident due to the drink and drive and to ensure that the rider has were the helmet and also that reduces the loss of life due to late arrival of the ambulance

1. Safety Enhancement

Incorporating sensors to detect impacts or sudden changes in motion can help in triggering alerts or safety measures in case of accidents.

Integrating features like LED lights or indicators for visibility in low-light conditions to enhance safety for riders.

2. Real-Time Monitoring

Utilizing IoT connectivity to monitor vital signs of the wearer in real-time, such as heart rate and body temperature, to alert in case of health emergencies.

Monitoring environmental conditions like temperature, humidity, and pollution levels to provide warnings or suggest alternate routes.

CHAPTER-2

METHODOLOGY

2.1 WORKING PRINCIPLE

The aim of our smart helmet is to provide the safety to the bike rider and give information location of the accident to the ambulance and family member. This is done by using the GSM module. We are using SIM808 as the GSM module. But sending the message of that accident is not enough. We have to send the location of the accident. So we are using the SIM 808 as the GPS module it comes with the GNSS receiver. When the accident has happened the piezoelectric sensors sense the accident and give signal to the Arduino. Then Arduino will take location from the GPS and it will send the location of accident in the form of the latitude and longitude but normal user can't understand how get location from the latitude and longitude so we have implemented our system to send the google map link. Which will open in goggle maps and family members and the ambulance can take certain actions to save the bike rider life But we don't need to call ambulance every time sometimes the bike rider has minor injuries piezo electric sensor will sense that as accident. In that case bike rider can stop sending of the SMS this is done by using the switch to stop accident. Before sending the accident message to the ambulance and family members the buzzer will ring for the 40 seconds if the bike rider has minor injuries he/she can stop the sending of the SMS simply by pressing the switch on helmet. If he/she won't press switch the SMS will be send to ambulance and family members. Above system mentioned was for the accident reporting. Our system can also be used as accident prevention system. This is done by using the Alcoholic sensor and the Rider detection switch. Our system is designed to check the rider has worn helmet and he/she has non-alcoholic breath. If the both conditions are satisfied the Arduino will send signal to vehicle unit to start or stop vehicle via Bluetooth. The vehicle part contains the micro-controller and the relay to start or stop the ignition.

CHAPTER-3

IMPLEMENTATION

3.1 PROBLEM IDENTIFICATION

Identify if the helmet is worn-The project can use an infrared sensor (IR) to identify if helmet is worn. The ignition will only start if the helmet is worn

Detect if alcohol is consumed -The project can use an MQ-3 sensor to detect if alcohol is consumed. The project can also use sensors and a microcontroller to monitor the alcohol content and provide real-time feedback to the user,

Detect accidents-The project can use an accelerometer module to detect accidents by constantly monitoring the deviations from the normal conditions. The project can also use a vibration l sensor to sense an accident,

The project can use the Internet of Things to identify accidents and send alerts to nearby emergency services as well as medical facilities

3.2 EXPLAINATION OF COMPONENT

HELMET SECTION

This section comprises an alcohol sensor, switch, accelerometer, microcontroller and RF transmitter. The switch examines whether the rider is wearing a helmet or not and alcohol sensor senses the rider is intoxicated or not and transmits the signal through RF transmitter to the bike section.

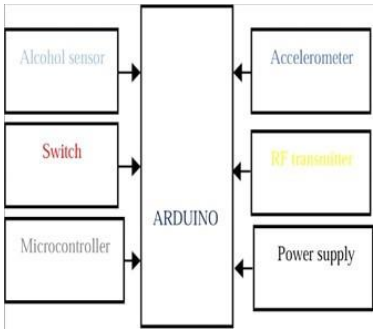

Fig 3.1.Block diagram of helmet

3.2.1 ALCOHOL SENSOR:

An alcohol sensor detects the attentiveness of ethanol in the air when the drunk person breathes near this sensor, it discloses the alcohol gas in his breath and obtains the output based on alcohol concentration. It is placed in the helmet such a way that it can easily sense the breath of the person

Fig 3.2 Alcohol sensor (MQ-3

Alcohol sensors are used in a variety of applications, including:

Breathalyzers: Breathalyzers are used by law enforcement to test drivers for blood alcohol content (BAC).

Workplace testing: Employers can use alcohol sensors to test employees for alcohol use.

Personal use: There are breathalyzers available for personal use that can be used to monitor your own BAC.

Interlock devices: Interlock devices are installed in the vehicles of people who have been convicted of drunk driving. The car will not start if the driver does not blow into the

3.2.2 Single channel relay module

A relay is an electrically operated switch. They commonly use an electromagnet (coil) to operate their internal mechanical switching mechanism (contacts). When a relay contact is open, this will switch power ON for a circuit when the coil is activated. The example relay diagrams below show how a relay works.

Fig 3.3 Single channel relay module

3.2.3 Jumper Wires:

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboardsand other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.Though jumper wires come in a variety of colors, the colors don't actually mean anything. This means that a red jumper wire is technically thesame as a black one. But the colors can be used to your advantage in order to differentiate between types of connections, such as ground or power.

Fig 3.4 . jumper wire

3.2.4 Arduino Uno:

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your Uno without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, nowevolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

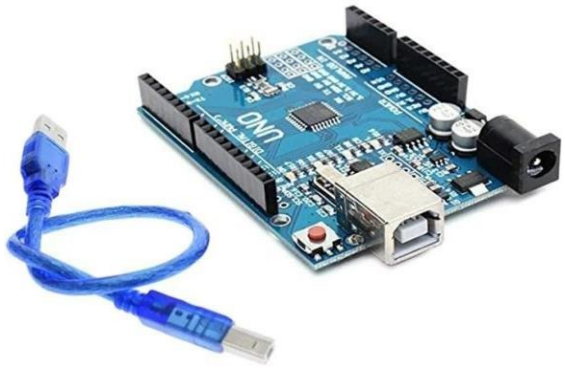

Fig.3.5 Arduino UNO

3.2.5 Eye Blink sensor :

This Eye Blink sensor senses the eyeblink using infrared. The Variation Across the eye will vary as per eye blink. If the eye is closed the output is high otherwise the output is low.

Eyeblink states are determined by providing a normalized average motion vector with standard deviation and time constraints to a state machine. Motion information is calculated between two frames; in later works, multiple timestamps' representation is used instead.

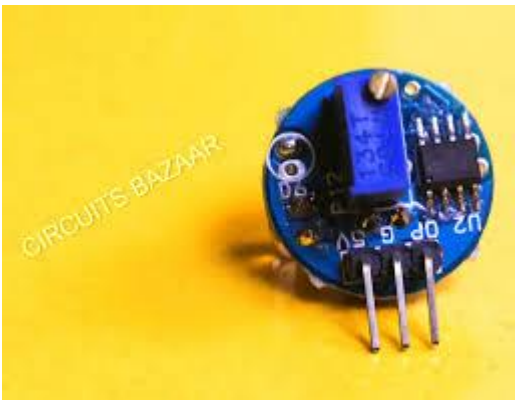

Fig 3.6 Eye Blink sensor

3.2.6 Switch:

Switch (ON/OFF button) A switch is an electric mechanism for ON/OFF the device, it is used to regulate the flow of electricity by interrupting or diverting the current from one conductor to another. This switch is placed inside on top of the helmet and it is pressed when the rider wears the helmet and it released when helmet takes off. Based on the switch condition the bike ignition key will be ON/OFF.

Fig 3.7 Switch

3.2.7 Arduino Nano

The Arduino Nano is a microcontroller-based device with 16 digital pins that can be used for various purposes. It can be used for almost every task, from minor to massive industrial-scale projects. It can also be used for prototyping and developing new applications

Fig 3.8 Arduino Nano

3.2.8 Buzzer

Piezo buzzers are simple electrical components designed to produce sound. They work by using piezoelectric materials that deform when an alternating voltage is applied across them. The voltage makes the material vibrate rapidly, producing sound

Fig 3.9 Buzzer

BIKE SECTION

This section comprises RF receiver, Microcontroller, Ignition key, GPS LCD, GSM modem and decoder. The RF receiver gets the signal from the helmet section and decodes signal using decoder if the person is over drunken then ignition will be automatically offed by the relay and if any accidents occur message will be sent using GSM modem

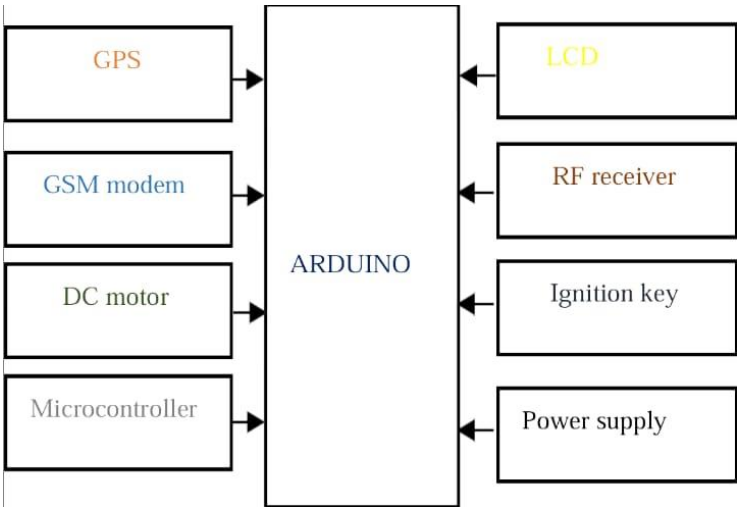

Fig 3.10 Block diagram of Bike

3.2.9 GPS Tracker

GPS stands for Global positioning system. GPS tracker is a navigation device, used for tracking the location of moving person, vehicle and animals. The information that is collected from the device is stored on the device inside and then is transmitted through a wireless network or cellular network. the information reported from the vehicle is the real-time location and is displayed on a map in near real-time. The software for tracking the

vehicle will be available on all smart phones.

Fig 3.11 GPS Tracker

3.2.10 DC gear motor

A gear motor is an all-in-one combination of a motor and gearbox. The addition of a gearbox to a motor reduces the speed while increasing the torque output. The most important parameters in regard to gear motors are speed (rpm), torque (lb-in) and efficiency (%).

Fig 3.12 DC gear motor

3.3 Working

The implementation of this system provides effective detection of accidents and is also low cost. This system provides safety measures in motorcycles and avoids road accidents. The

system “Smart Helmet” accomplishes the following objectives:

- Status of the rider wearing a helmet
- Alcohol content detection and
- Accident detection and location sharing

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 act as receiver.

A GPS sensor to locate the exact location of the worker and engineer, and two Arduino Uno boards are used on which codes are uploaded for the functioning of the helmet then two different buttons are used one for security as well as a smoke alert system.

MQ-3 Sensor is used in Smart Helmet to detect alcohol consumption. Once enough amount of alcohol gas is getting detected the smart helmet system sends data to the wirelessly connected vehicle ignition control system. Then it turn-off the ignition of the vehicle.

This Eye Blink sensor senses the eyeblink using infrared. The Variation Across the eye will vary as per eye blink. If the eye is closed the output is high otherwise the output is low.

The GPS tracking device is installed into a vehicle (or piece of equipment or asset) to gather real-time information including speed, idle time, diagnostics, etc. It uses Global Positioning Systems (GPS satellites) to know the vehicle or equipment’s location on Earth at all times. The information gathered from the vehicle is then stored on the device inside, sometimes on internal storage like a sim card while others send their data to a cloud-based system.

3.4 Advantages:

1. Enhanced Safety Features: Smart helmets can integrate sensors to detect accidents or impacts, triggering immediate alerts or emergency responses.
2. Real-Time Monitoring: IoT connectivity allows for real-time monitoring of vital signs like heart rate and temperature, providing early warning of potential health issues.

3. Navigation Assistance: Built-in GPS and AR displays can provide navigation assistance, improving situational awareness for riders.
4. Communication: Integrated communication systems enable hands-free calling, messaging, and even group communication among riders.
5. Data Logging: Smart helmets can collect data on riding patterns, routes, and conditions, which can be valuable for analysis, insurance purposes, and improving road safety.
6. Improved safety: Smart helmets can monitor vital signs, detect accidents, and send alerts for immediate assistance.
7. Real-time navigation: They provide turn-by-turn directions, helping riders reach their destination safely.
8. Weather updates: Smart helmets can provide real-time weather information, allowing riders to plan their routes accordingly.
9. Hands-free communication: With built-in microphones and speakers, riders can make calls or send voice commands without taking their hands off the handlebars.

3.5 Disadvantages

1. Cost: Smart helmets tend to be more expensive than traditional helmets due to the added technology and connectivity features.
2. Complexity: More features mean more potential points of failure, increasing the complexity of the helmet and potentially compromising reliability.
3. Dependency on Connectivity: IoT functionality relies on consistent internet connectivity, which may not always be available in remote or rural areas.
4. Privacy Concerns: Collecting and transmitting personal data raises privacy concerns, especially if the data is not adequately protected from unauthorized access.
5. Maintenance: Smart helmets require regular maintenance to ensure proper functioning of sensors, batteries, and connectivity components, adding to the overall cost of ownership.

CHAPTER-4

RESULT AND DISCUSSION

4.1 RESULT

The two-wheeler Safety System developed with IoT, Smart helmet is very safe and trustworthy. The main aim of this system prevention from injuries when a person wearing this helmet meets with an accident. It avoids Drink and Drive cases. The results can detect the accident and it sends the notification to the registered contact with 90% accurate location so that the guardians will get to know the condition of the person and can able to give the proper medical treatment. The detection of an accident is based upon the results of tilting of a helmet; it matches with the helmet fall value and the threshold value. The results show that the system detected the presence of alcohol in the breath of the rider if the rider is over drunken then bike will not start. This system will process completely based on rider activities.

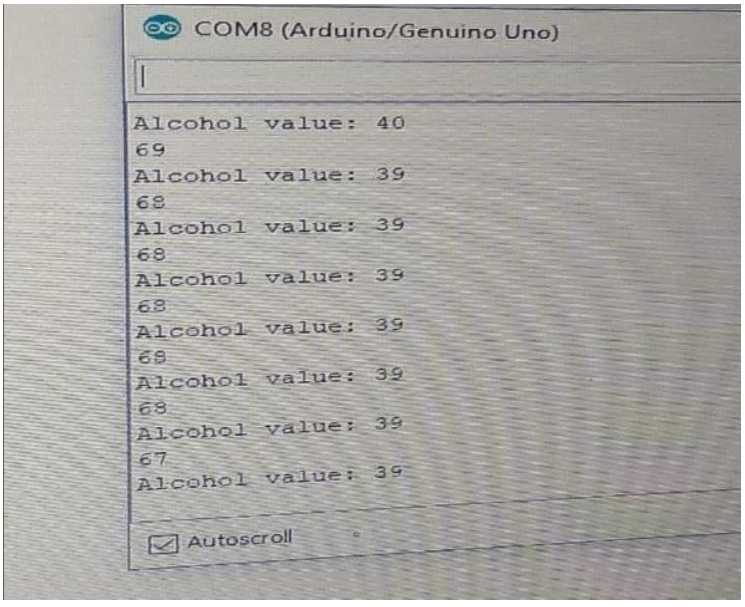

Fig.4.13 Alcohol Reading

Fig 4.14. Helmet Module

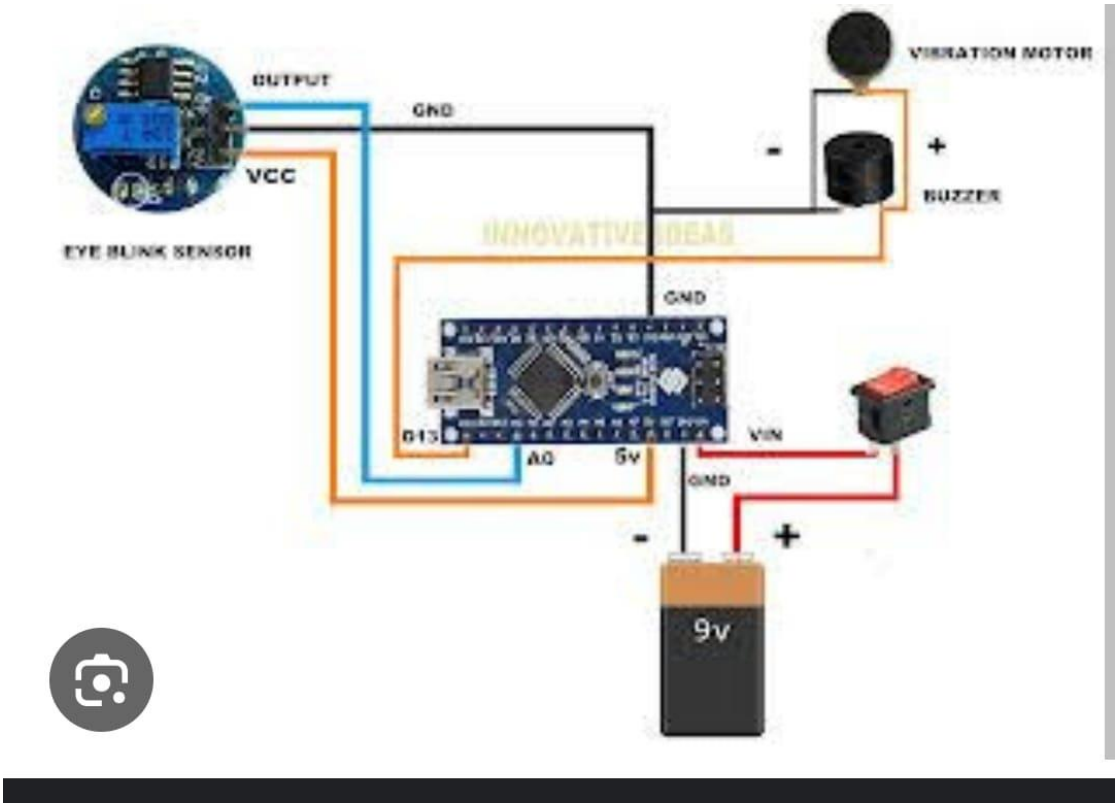

Fig.4.13 eye blink detection

4.2 DISCUSSION

The thought of developing this project comes from social responsibility towards the society. As we can see many accidents occurring around us, there is a lot of loss of life. According to a survey of India there are around 400 accidents occurring due to bike crashes per day. If accidents are one issue, lack of treatment in proper time is another reason for deaths. According to the same survey, nearly half the injured people die due to lack of treatment in proper time. So, a thought from taking responsibility of society came our project? SMART HELMET"

The best part about this project is that it doesn't work until it's worn since a limit switch has been added inside the helmet. Therefore it doesn't send messages if it thrown or falls down Also it's calibrated such that it won't send messages for values due to speed breaker's a other small knocks

CHAPTER-5

CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

The system designed provides safety of the riders, in case of accidents it will notify the registered contact and the location of the accident provides a timely safety measure. This also detects the consumption of alcohol and prevents drink and drive cases. This also ensures the person wears the helmet mandatorily

The conclusion of a project on a smart helmet using IoT would typically summarize the key findings and achievements of the project. It might discuss how the integration of IoT technology enhances safety features, provides real-time data monitoring, and improves overall user experience. Additionally, it could mention any challenges faced during the development process and potential avenues for future research or improvements. Overall, the conclusion should highlight the significance and potential impact of the smart helmet in enhancing safety for users in various environments.

5.2 FUTURE SCOPE

We can implement various bioelectric sensors on the helmet to measure various activities and we can view the statistics of the rider. We can use voice commands to control the basic bike functionalities. Now the rider can leave the helmet on the two-wheeler while parking, without any special actions or security measures. We can use solar energy on two-wheelers for charging the electric vehicles and for mobile devices. In the future self - driving motorbikes can be developed with artificial intelligence and the rider will be safe and no accidents will occur.

The future scope of smart helmets using IoT technology is vast and promising. Some potential avenues include:

1. Enhanced Safety Features: Continued development to incorporate more advanced sensors and algorithms for detecting and preventing accidents in real-time.

2. Health Monitoring: Integration of biometric sensors for monitoring the wearer's health parameters such as heart rate, body temperature, and hydration levels to ensure their well-being during activities.

3. Communication and Connectivity:Further integration with communication systems to enable seamless connectivity with other devices, emergency services, and fellow riders for enhanced communication and coordination.

4. Augmented Reality (AR) Integration: Integration with AR technology to provide users with real-time navigation, weather updates, and relevant information projected directly onto the helmet's visor.

5. Data Analytics:Utilizing the data collected from the helmet's sensors for analysis to identify patterns, trends, and insights related to safety, user behavior, and environmental conditions.

6. Customization and Personalization: Offering customizable features to cater to individual preferences and specific use cases, such as different modes for commuting, sports, or industrial work environments.

7.Integration with Smart Cities: Collaboration with urban infrastructure to create a networked ecosystem where smart helmets can interact with traffic signals, road signs, and other IoT devices to optimize safety and traffic flow.

8. Accessibility and Affordability: Continued efforts to make smart helmets more accessible and affordable to a wider range of users, potentially through advancements in manufacturing processes and materials

APPENDIX

6.1 Source Code

CODE FOR TRANSMITTER PART

```
#include <SPI.h>
#include <nRF24L01.h>
#include <RF24.h>
#include <TinyGPS.h>
#include <Servo.h>
 #include<SoftwareSerial.h>

RF24 radio(7, 8); // CE, CSN

const byte address[6] = "00001";


Servo myservo;

int pos = 0;




int state = 0;
const int pin = A1;
float gpslat, gpslon;

TinyGPS gps;
SoftwareSerial sgps(10, 11);
SoftwareSerial sgsm(2, 3);

void setup() {
```

```
  // put your setup code here, to run once:
pinMode(A0, INPUT_PULLUP);
pinMode(A1, INPUT_PULLUP);
pinMode(A2, INPUT_PULLUP);
pinMode(A3, INPUT_PULLUP);
 myservo.attach(9);

sgsm.begin(9600);
  sgps.begin(9600);

  radio.begin();
  radio.openWritingPipe(address);
  radio.setPALevel(RF24_PA_MIN);
  radio.stopListening();

Serial.begin(9600);
 myservo.write(180);
 delay(500);




}

void loop() {




  // put your main code here, to run repeatedly:
int m = analogRead(A0);
int n = analogRead(A1);
int o =digitalRead(A2);
int p =digitalRead(A3);
```

```
Serial.print(m);
Serial.print("    ");
Serial.print(o);
Serial.print("    ");
Serial.print(n);
Serial.print("    ");
Serial.println(p);
delay(100);

if(o==0)
{
  myservo.write(180);
 delay(500);


  }

  else if (p==0)

  {
     myservo.write(0);
 delay(500);

    }




sgps.listen();
  while (sgps.available())
  {
    int c = sgps.read();
    if (gps.encode(c))
    {
```

```
    gps.f_get_position(&gpslat, &gpslon);
   }
  }



if(m>=500)
{
  const char text[] = "H";
 radio.write(&text, sizeof(text));
 delay(100);

 }

 else
{
  const char text[] = "A";
 radio.write(&text, sizeof(text));
 delay(100);

 }

 if(n>=700)

 {

  sgsm.listen();
    sgsm.print("\r");
    delay(1000);
    sgsm.print("AT+CMGF=1\r");
    delay(1000);
    /*Replace XXXXXXXXXX to 10 digit mobile number &
      ZZ to 2 digit country code*/
```

```
    sgsm.print("AT+CMGS=\"+919179694677\"\r");
    delay(1000);
    //The text of the message to be sent.
    sgsm.print("Latitude :");
    sgsm.println(gpslat, 6);
    sgsm.print("Longitude:");
    sgsm.println(gpslon, 6);
    delay(1000);
    sgsm.write(0x1A);
    delay(4000);
  sgsm.println("ATD +919179694677;"); //replace x by your number
   delay(20000);
   //digitalWrite(5,HIGH);  // LED1 ON
   sgsm.println("ATH");
   delay(2000);
   Serial.println("calling.....");


   }

   else
   {
    Serial.print("");

    }
```

CODE FOR RECEIVER PART

```
    #include <SPI.h>
    #include <nRF24L01.h>
```

```
#include <RF24.h>

RF24 radio(7, 8); // CE, CSN

const byte address[6] = "00001";

void setup() {
  pinMode(6, OUTPUT);
   pinMode(3, INPUT_PULLUP);
  Serial.begin(9600);
  radio.begin();
  radio.openReadingPipe(0, address);
  radio.setPALevel(RF24_PA_MIN);
  radio.startListening();
}

void loop() {

  int c= digitalRead(3);
  if(c==0)

  {

    while(1)
    {
  if (radio.available()) {

    char m;
    radio.read(&m, sizeof(m));
    Serial.println(m);
    //char m = text;


    if(m=='H')
```

```
  {
    while(1)
    {
    digitalWrite(6, HIGH );
  delay(200);

int c= digitalRead(3);
 if(c==0)
 {



  break;}



    }

    }


    else if(m=='A')
{

    digitalWrite(6, LOW );
  delay(200);


    }

 }
  }

 }
```

```
        else

        {


            digitalWrite(6, HIGH );
          delay(200);
         }



}
```

REFRENCE

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Design And Implementation Of Smart Helmet

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Abstract

The major aim of this project is to prevent road accidents, detection and notification. Many road accidents are occurring because violating the traffic rules and regulations, rash driving, drunk and drive and using mobile phones while driving. Many people lose their lives because of triple riding and the report of accident place is not easily track by the people. 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) hasbeen 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, and other cost effective sensors like an Alcohol 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.By using IOT the data of user can send to cloud for monitoring of activities like wearing of helmet, alcoholic and accident condition.

***KEY Words**: Arduino Atmega328P, GPS, Sensors and IOT.*

1. Introduction

Working on the software part is initiated when the driver switches on the GPS module. The server starts storing the time track of the GPS every time, defining the current status of the helmet. Then, by writing the code algorithm for alcohol sensing and alcohol limit, it generates an indication called the alcohol indicator. After that, the GPS mode is activated and it extracts the full details of the coordinates of the last location. These coordinate points are then placed and overlapped on the Google Map. Using the Google Maps API, the nearest location on the map is searched, which gives us the accident location. Since the information about alcohol is already taken out, we don't have to take any additional specifications for the person getting too drunk. It only generates an indication for the person by reading out the status of the helmet. Lastly, if the person gets too drunk or drives too fast, the administrator is messaged on his mobile and the system gets switched off.

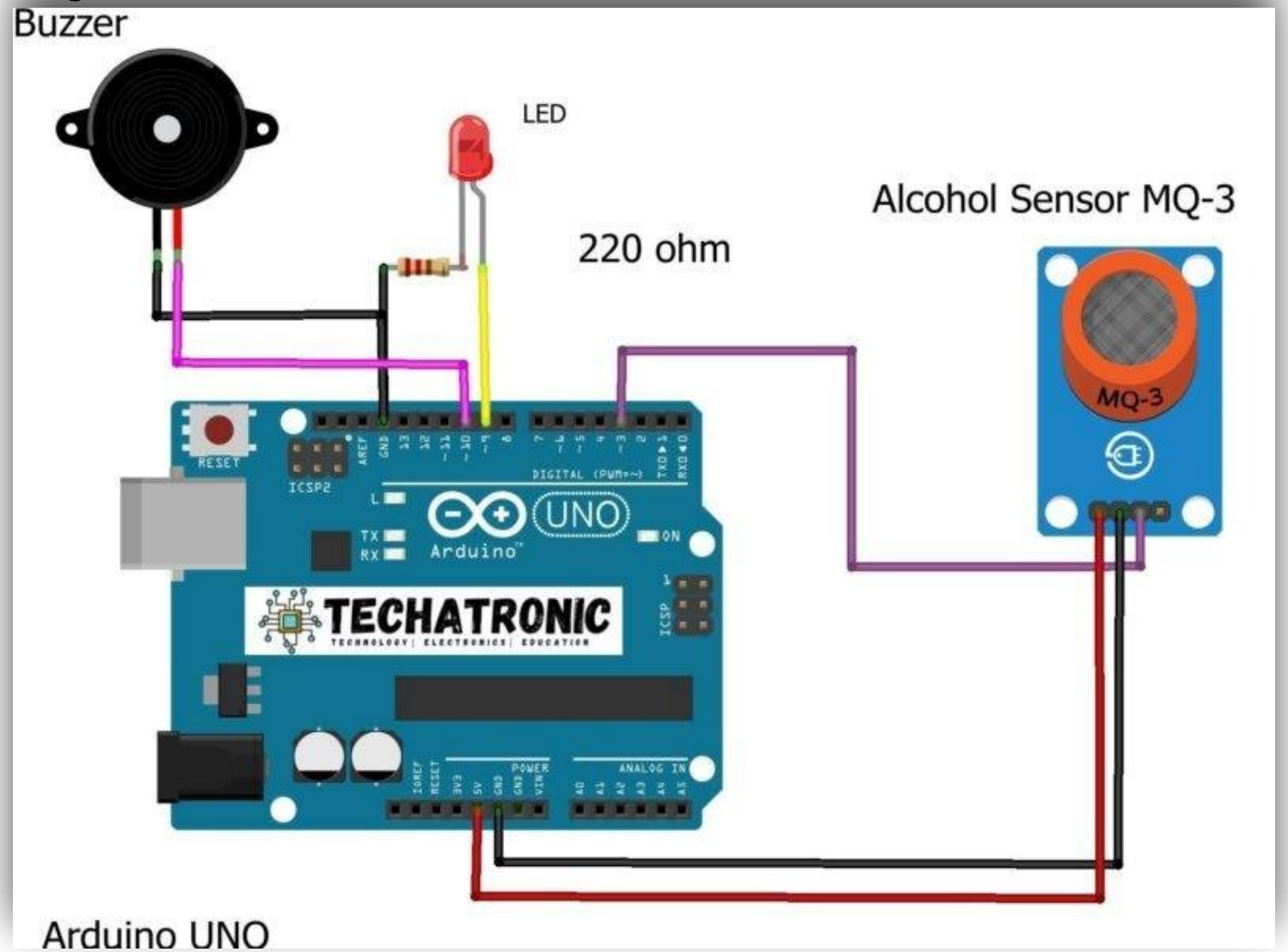
A smart helmet with alcohol sensing and speed monitoring is a useful, unique, advanced, and low-cost microcontroller-based system that assures greater security for bike riders. The main aim of this project is to reduce the accident rate in our country. Considering the hardware part, it consists of an alcohol sensing unit, an eye blink sensor unit, an RF transmitter, and a GPS module. To incorporate it into the helmet, we have to make certain modifications in the overall design. At the back side of the helmet, we have to fit three units: the alcohol sensing unit, the eye blink sensor unit, and the RF transmitter.

2. Literature Survey

By similarity with other vehicles, two wheelers are having less importance in increasing of their safety levels. Comparing with other vehicles the danger is very high for the motor cycle riders. The smart helmet is even used in the mining industries for their risk and work. GPS and GSM are used for identification of the precise location and something about rider. If the user is fell down then the helmet hits and damages then there is a cause occur to the user .When there is a high harm to the person immediately there is delivery of messages for the contact members. For transferring of information wireless communications like Zig -Bee and radio frequency etc; are used. In the middle of helmet and bike various types of wireless communication systems are used. There are various features such as temperature sensor, accelerometer, ultrasonic sensor, force sensing resistor, vibration sensor, push buttons are used for their protection. Based on applications and cost types of microcontrollers like arduino UNO and ESP32 are used. Regards to the Research paper in 2016 titled 'Smart Helmet' in this paper the aim of the author is to wear helmet for bike rider is compulsory for safety of life.

In this aggressive world one of the survey says that many of death and accidents are occurring because not presence of helmet. Traffic police cannot cover remote areas like cities and other places where there are people are heavy. It is very difficult to them to check each and every motor cycle rider. So 'Smart Helmet' is very useful for many conditions for traffic police to see the activities of motor cycleriders.

Diagram



3. Methodology

Choose appropriate sensors based on the requirements (e.g., accelerometer, gyroscope, temperature sensor, GPS).

Sensors can monitor factors like speed, impact, temperature, and location.

Select an IoT platform or framework to connect and manage the helmet's data.

Popular platforms include AWS IoT, Microsoft Azure IoT, and Google Cloud IoT Core.

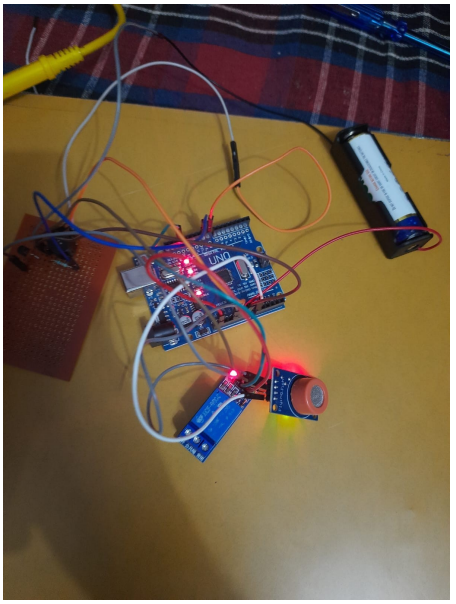
- Integrate the helmet with wireless communication protocols (e.g., Wi-Fi, Bluetooth, LoRaWAN) for data transmission.
- Ensure reliable connectivity for real-time monitoring and control.
- Establish communication between the helmet and the IoT platform.
- Send sensor data securely to the cloud for storage, analysis, and visualization.

This system contains three modules are explained below Helmet detection – Accident Prevention, Vehicle detection and Accident and fall detection.The smart helmet system mainly consists of 2 modules; helmet module and the bike module. Helmet contains switches which are connected with a microcontroller unit. Sensors like alcohol sensor, and Eye blink sensor tag are placed on the helmet.

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

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

1. Arduino UNO
2. MQ-3 Alcohol sensor
3. GPS Neo 6m
4. Eye Blink sensor
5. DC Gear Motor
6. 5v Relay module
7. Li-ion Battery
8. Buzzer
9. BC546 Transistor
10. Jumper wires & PCB board



5. Advantages

- Detection of accident in remote area can be easily detected andmedical services provided in short time.
- Simply avoiding drunken drive by using alcohol detector. it willreduces the probability of accident
- Operates on solar as well as battery supply.
- If helmet was stolen then we can start the bike by the password.
- Less power consuming safety system.
- Security system for motorcycles.
- Decrease in death rates due to head injuries.

6. Applications

- It can be used in real time safety system.
- We can implement the whole circuit into small module later.
- Less power consuming safety system.
- This safety system technology can further be enhanced in car and also by replacing the helmet withseatbelt.

- Can be used in construction sites and mining areas to accumulate real time data analysis to lowerjob-related risks and enhance safety.

7. Future scope

- We can implement various bioelectric sensors on the helmet to measure various activity.
- We can use small camera for the recording the drivers activity.
- It can be used for passing message from the one vehicle to another vehicle by using wirelesstransmitter.
- We have used solar panel for helmet power supply by using same power supply we can chargeourmobile.
- We can also use cooling fan inside the helmet.
- We can also use GSM Module for notifications using android application.

8. Conclusion

The outcomes of the project have showed that the bike ignition will start if the helmet is worn. So, it will automatically decrease the effect from accident and it can avoid bike from being stolen. Arduino UNO is good in controlling all the system and the sensors. Executing the wireless system which Radio Frequency Module to send signal from helmet unit to the bike unit. Due to this wireless connection is better than wired link. Ultimately, the System is focused on the safety of riders, byobligatory use of safety equipment.Additionally, it provides certainty of non-consumption of alcohol throughout ride. The ignitionsystem prevent rider to start a bike when riderviolate any of security rules.

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These references cover various aspects of smart helmets using IoT, including design, implementation, safety features, accident detection, and communication capabilities.