

Smart Helmet Project – IoT & Safety Innovation

The **Smart Helmet** is an innovative project designed to **improve road safety** for bike riders. It uses **sensors, IoT, and wireless technology** to ensure the rider wears the helmet properly and detects accidents in real time. By integrating **alcohol detection, fall detection, and accident alerts**, the smart helmet can save lives by sending emergency messages instantly.

“Smart Helmets ensure safety by combining IoT, accident detection, and real-time alerts — a step towards safer roads.”

Why Build a Smart Helmet?

- Ensures helmet is worn before starting bike (safety lock system)
- Detects accidents using accelerometer/impact sensor
- Alcohol detection prevents drunk driving
- Sends GPS-based accident alerts to emergency contacts
- Promotes road safety and reduces fatalities

Key Features

- Helmet-wear detection using IR/Proximity sensor
- Alcohol detection using MQ-3 sensor
- Accident detection via accelerometer/gyroscope
- GPS + GSM module for location tracking & SMS alerts
- Microcontroller: ESP32/Arduino for IoT connectivity

Example Code: Helmet Wear Detection (IR Sensor)

```
int irSensor = 2;
int buzzer = 13;
int sensorValue = 0;

void setup() {
  pinMode(irSensor, INPUT);
  pinMode(buzzer, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  sensorValue = digitalRead(irSensor);
  if(sensorValue == LOW) {
    Serial.println("Helmet Not Worn!");
    digitalWrite(buzzer, HIGH); // Alarm ON
  } else {
    Serial.println("Helmet Worn");
    digitalWrite(buzzer, LOW); // Alarm OFF
  }
  delay(500);
}
```

}

Learning Outcomes

- Learn how to interface IR and alcohol sensors with microcontrollers
- Understand GSM/GPS module integration for IoT alerts
- Build a real-time accident detection system
- Develop life-saving smart IoT applications

Applications

- Personal safety for bike riders
- College-level IoT and embedded projects
- Advanced road safety solutions
- Emergency response systems

■ Diagram: Smart Helmet Block Diagram (Sensors + ESP32 + GSM + GPS)

■ Diagram: Accident Detection & Alert Flowchart