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# Enhanced Smart Helmet: Real Time Safety Alerty System with Alcohol Detection

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**ABSTRACT—**

Road safety for motorcyclists is a key global issue, especially as the number of incredible accidents continues to grow. The problem is exacerbated as many drivers do not wear helmets or drive under the influence of alcohol. To issue this concern, we propose the development of smart helmets equipped with integrated IoT sensors to improve driver safety. Safety when driving is essential for everyone. Determining the driver's location can be difficult in many accident situations. In other words, the need for improved security measures is even more urgent.

It is important to recognize the importance of helmets to protect your head from serious injuries. Our smart helmets need to be aware of whether it is being carried correctly and whether the driver is under the influence of alcohol.

Our system uses an ESP32 microcontroller, infrared (IR) sensors, and alleyways. Alleys are alcohol sensors that recognize the presence of alcohol in the driver's breathing. The IR sensor ensures that the helmet is worn out properly. Otherwise, smart helmets will prevent motorcycles.

***Keywords- ESP32 microcontroller, gas sensor, IR sensor, IOT, DC motor, Arduino, LCD.***

## I.INTRODUCTION:

Motorcycles typically use less fuel than cars and offer several benefits, including cost-effectiveness, as they require lower maintenance. Additionally, it improves traffic maneuverability, allowing drivers to navigate overloaded areas more efficiently than larger vehicles. The parking space requirements have also been reduced, making it even more convenient. It also offers practical transportation solutions in areas where public transport options are limited. The use of helmets is regulated in our country. However, compliance remains an issue as some people refuse to maintain this regulation. To clear this concern, an intelligent helmet has been developed that allows the motorcycle to start only when the driver is carrying correctly and not under the influence of alcohol.

Wearing a helmet while driving has many benefits that improve driver safety in the event of an accident. Its main function is to protect the head and brain from injuries sustained during a collision. Helmets absorb the effects of accidents and significantly reduce the risk of serious damage. It also provides facial and neck protection, helping to reduce the chances of serious injuries. Plus, wearing a helmet gives the driver a sense of trust and security. Alcohol affects adjustments and response times, making it difficult for drivers to get control of the bike. Furthermore, this leads to poor judgment and poor decisions, leading to unnecessary risks and ultimately accidents.

Motorcyclists' road safety is a serious issue around the world, with a considerable number of accidents with drivers, and they do not wear helmets or drive under the influence of alcohol. To address these challenges, the proposed project focuses on the development of intelligent wireless helmets with integrated IoT sensors, including alcohol and IR sensors, for driver safety. The helmet contains an alcohol sensor that recognizes the presence of alcohol in the driver's breathing. If the alcohol mirror exceeds a predefined threshold, the system will prevent the bike from starting and send an alert to the driver or responsible authorities. Additionally, the helmet has an IR sensor that ensures that the helmet is carried properly by the driver.

## II.MODELLING OF THE SYSTEM

The proposed system is intended to reduce the chances of an accident and protect the driver from serious injuries. Our intelligent helmets include IR sensors, alcohol sensors, IoT connections, LCDs and drivers. These sensors continuously monitor the driver's condition.

The helmet's IR sensors will tell you whether the helmet is being carried correctly. Once the helmet is worn, the bike will begin. Otherwise, the bike will remain disabled and the message will be sent to the connected website. The alcohol sensor is calibrated at a 0.50% BAC threshold. The bike will only start if this condition is also met. If any of these conditions are violated, the bike's engine will remain disabled to prevent unnecessary movement. The microcontroller processes the data and checks whether the conditions are met. If conditions are not met, we will invite this information to the website, including the location of the vehicle. The microcontroller also signals the driver circle to start the engine only if the helmet is worn out and alcohol consumption is below the defined threshold. If these conditions are not met, the LCD will provide relevant information such as alcohol levels and warnings that the helmet is not worn out. All data will be transferred to the website to allow the driver and his family to monitor the situation.

The ESP32 microcontroller is equipped with an integrated WLAN, allowing you to connect to mobile hotspots. After creating a connection, the LCD will display the message "connect". Next, two sensors begin to monitor whether the driver is wearing a helmet and whether there are any signs of the effects of alcohol. If any of these terms are violated, the microcontroller will immediately display this information about the LCD and transfer the data to a specific website programmed for this purpose. If a violation is determined, the system indicates that the helmet is not worn or that alcohol has been found related to the motorcycle's position. Once these conditions are met, the system prevents the engine from protecting the driver from potential hazards.

Use Embedded C. This is because it is suitable for real-time applications that allow direct interaction with hardware components and allow efficient handling of interrupts. Our project includes the ESP32 microcontroller, and the embedded C code we write can be easily ported to a variety of microcontrollers with minimal time and effort. What's more, this programming language is easy to read, debug and wait. Develop your code using the Arduino IDE, an open source platform that simplifies both hardware and software integration.

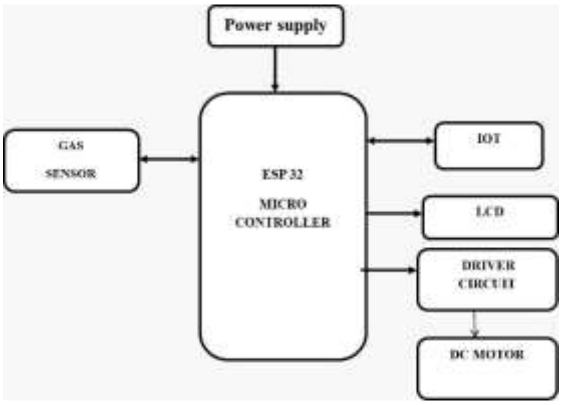


Fig 2.1 Block diagram of smart helmet

## III. LITERATURE SURVEY

In reference[1] Study: Development of an IoT-based smart helmet for accident detection and rider safety.

Key Focus: Enhancing motorcycle safety by ensuring helmet usage, detecting alcohol consumption, and enabling accident detection with real-time alerts.

Innovations: Helmet-Mandated Start: The bike starts only when the helmet is properly buckled.

Alcohol Detection: MQ-3 sensor prevents ignition if alcohol is detected.

Accident Detection & Alerts: GPS & GSM module sends location updates to emergency contacts in case of an accident.

Wireless Communication: nRF24L01 modules enable seamless data transmission.

Author: Sarosh Ahmad

In reference[2] Study: Development of an IoT-based smart helmet for accident detection and prevention.

Key Focus: Enhancing motorcycle safety by ensuring helmet usage, detecting alcohol consumption, and enabling automatic accident identification with real-time alerts.

Innovations: Helmet-Mandated Start: The bike starts only when the helmet is worn and no alcohol is detected.

Alcohol & Impact Detection: IR and alcohol sensors ensure a sober rider, while a 3-axis accelerometer detects crashes.

Accident Alerts: A mobile application automatically sends accident location details to emergency contacts and authorities.

Integrated System: Helmet circuit, automobile circuit, and mobile application work together for enhanced safety.

Authors: Md. Atiqur Rahman, S.M. Ahsanuzzaman

In reference[3] Study: Development of an IoT-based smart helmet and motorbike unit for enhanced rider safety and parental monitoring.

Key Focus: Ensuring motorcycle safety through helmet usage, alcohol detection, accident alerts, and real-time monitoring of rider behavior.

Innovations: Helmet-Mandated Start: Pulse rate sensor ensures the helmet is worn before ignition.

Alcohol & Accident Detection: Sensors detect alcohol levels and impact; ignition shuts off in case of violations.

Emergency Alerts: GPS & GSM module sends accident location to emergency contacts, with a buzzer and OLED displaying contact details.

Rider Monitoring: LIDAR sensor detects vehicles from behind; force-sensitive resistors ensure proper sitting posture.

Parental Supervision: ESP8266 Wi-Fi module sends speed and tilt data to Thing Speak, allowing parents to monitor riding behavior.

Author: Pranav Pathak

In reference[4] Study: Development of an Arduino-based smart helmet system for two-wheeler rider safety.

Key Focus: Enhancing rider safety through accident prevention, real-time tracking, and emergency alerts.

Innovations:

Helmet-Mandated Start: The bike starts only if the helmet is worn.

Alcohol & Accident Detection: Breath analyzer prevents drunk riding; vibration sensor detects accidents.

Emergency Alerts: GPS & GSM module sends location details to authorized contacts in case of an accident.

Weather Adaptation: Integrated wiper system clears raindrops from the helmet screen.

Affordable Safety Solution: Cost-effective system for practical implementation.

Authors: Mahesh S Gour, Druva Kumar S

In reference[5] Study: Implementation of advanced wireless techniques in a smart helmet to prevent road accidents.

Key Focus: Ensuring rider safety by enforcing helmet usage, detecting alcohol consumption, and providing real-time accident alerts.

Innovations:

Helmet-Mandated Start: The bike starts only if the helmet is worn and no alcohol is detected.

Alcohol Detection: Prevents ignition if alcohol is detected in the rider’s breath.

Accident Alerts: GSM module sends the rider’s geographical location to emergency contacts via SMS in case of an accident.

Smartphone Integration: Helmet and alcohol detection data can be monitored through a smartphone.

Wireless Communication: Advanced wireless techniques enhance real-time safety monitoring.

Authors: Muneshwara, Anand, Dr. Chethan A. **S**

## IV. RESULT AND DISCRIPTION

After connecting the phone's hotspot to the microcontroller, the entire monitoring circuitry operates. The system uses two sensors to check if the driver is wearing a helmet, and is not below the effect of alcohol. This statistics are processed by the microcontroller and ultimately sends a sign to the drive group to induce the engine. This mechanism ambitions it to improve driver protection and reduce the chances of injury. If you no longer have to meet the requirements, then an LCD display provides applicable facts. If alcohol consumption exceeds this type, the engine will not be activated and this statistic can be transferred to a website that indicates that alcohol has been eaten. Variable I corresponds to infrared (IR) sensors. One cost means that a helmet will be worn, even if the zero cost indicates that it is not always the case. A cost of 1 can make the conditions easiest. If the price is zero, the gadget will immediately pass the information on the website. This points out that the helmet is not worn. So the microcontroller will best enable the engine, but I am satisfied with all the situations related to G. In either case, save the engine before you start. In situations where both situations are not met, the microcontroller spreads the facts. This also includes the location of the vehicle directly including the owner of your own family in the event of an emergency, reducing unnecessary operation.

Fig 3.1 circuit of the system

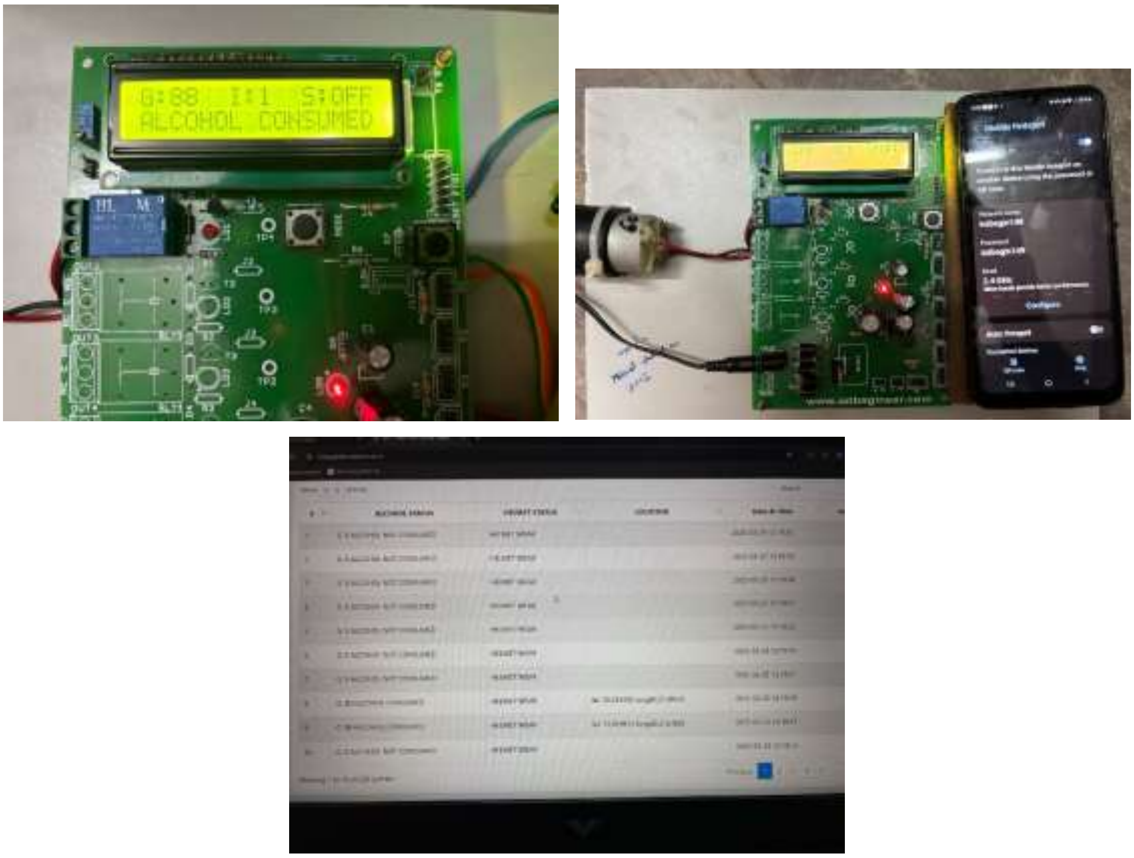


Fig3.2 Output of the system

## V I. FUTURE SCOPE

In the future, smart helmets can be further enhanced by integrating AI and machine learning to analyze riding patterns and predict potential accidents. Advanced biometric sensors can monitor heart rate, fatigue, and stress levels to alert riders in real time. Adding 5G connectivity would enable instant accident reporting and communication with emergency services. A built-in augmented reality (AR) visor could provide navigation assistance and hazard alerts. Solar-powered or energy-efficient battery systems could improve long-term usability. Additionally, integrating vehicle-to-everything (V2X) communication would allow the helmet to interact with nearby vehicles and traffic systems for proactive safety measures.

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