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Smart Helmet Using Arduino

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Abstract: Drunk driving is a significant contributor to road accidents globally, posing a serious safety concern. This project introduces a smart helmet system designed using Arduino technology to address this issue and improve rider safety. The system incorporates an alcohol detection module into the helmet, which continuously checks the rider's breath for signs of alcohol. If the alcohol level exceeds a set threshold, the system triggers a mechanism to cut off the fuel supply to the vehicle, preventing the engine from starting or operating. The helmet features a microcontroller (Arduino), an alcohol sensor (such as the MQ-3), and an optional wireless communication module. To ensure precise monitoring, the alcohol sensor is positioned close to the rider's mouth. The design emphasizes ease of use, reliability, and practicality for seamless real-world application.This smart helmet offers a practical and automated solution to mitigate accidents caused by drunk driving. By integrating advanced technology, it enhances road safety, supports adherence to traffic laws, and encourages responsible driving habits among motorcyclists.

Keywords: Smart Helmet , Alcohol Detection, Arduino Technology, Road Safety

INTRODUCTION

Road safety is a critical concern, especially for motorcyclists, who are particularly vulnerable to accidents caused by alcohol-impaired driving. Alcohol consumption significantly impairs judgment, reaction time, and coordination, increasing the risk of severe accidents. To address this issue, a "smart helmet" equipped with alcohol detection technology is proposed.

This helmet integrates an alcohol sensor with Arduino-based processing to monitor the rider’s breath for blood alcohol concentration (BAC). If the BAC exceeds a predefined threshold, the helmet sends a signal to the motorcycle's control system, activating a relay that halts fuel flow to the engine. This innovative system ensures the motorcycle cannot start, preventing impaired riders from operating the vehicle. The use of Arduino technology enables a cost-effective and efficient solution for real-time alcohol detection. Additionally, the helmet is designed to be lightweight and comfortable, ensuring rider convenience. By combining safety features with advanced technology, the smart helmet offers a practical approach to mitigating drunk driving risks and enhancing road safety.

LITERATURE SURVEY

SL. NO	AUTHOR NAME	TITLE	ADVANTAGES	CONCLUSION
1.	Dinesh Kumar S, S. Natarajan, S. Mohan	Smart Helmet System for Accident Detection Using Arduino	• Real-time accident detection through accelerometers and gyroscope sensors. • Automatic SMS alert system to emergency contacts, improving	The research demonstrates how integrating an Arduino-based system with sensors can detect motorcycle accidents and send immediate

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			response time. • Cost-effective and easy to implement using Arduino.	notifications to emergency contacts.
2.	K. Suresh Kumar, R. Sathish Kumar, P. R. Chinnapillai	Design of Smart Helmet for Rider Safety Using Arduino	• Integration of GPS for location tracking during emergencies. • Alerts for helmet wearing, ensuring riders are always safe. • Use of real-time data to prevent accidents based on vehicle speed and rider status.	The authors conclude that using an Arduino-based smart helmet improves safety by ensuring that the helmet is worn properly, detecting dangerous driving conditions, and sending alerts if an accident occurs.
3.	Anjali Gupta, Ashwini Kumar, Surbhi Rani	Smart Helmet for Monitoring and Alerting System Using Arduino	• Health monitoring features (heart rate and temperature). • Detection of driver fatigue using a pulse sensor.	The system effectively combines accident detection, health monitoring, and emergency alerts in a single smart helmet.
4.	Vinayak D. G, Ankit G. D, Akash S. M	Development of Smart Helmet for Rider's Safety	• Incorporates an alcohol sensor to prevent drunk riding. • Integration with Bluetooth for hands-free communication. • Real-time emergency alerts to family and friends.	The system helps prevent riding under the influence by integrating an alcohol detection module. Moreover, the Bluetooth system allows hands- free communication, which contributes to a safer riding experience.
5.	S. K. Agarwal, R. Shukla, A. Tripathi	Smart Helmet for Safety and Emergency Communication System Using IoT	• Uses IoT for real-time monitoring of the rider's vitals. • Remote control features for emergency communication. • Data storage and analysis for future improvements in safety.	This study highlights the importance of integrating IoT with a smart helmet to monitor vital signs like heart rate and body temperature. It also emphasizes the need for remote communication features to ensure immediate help in case of emergencies.

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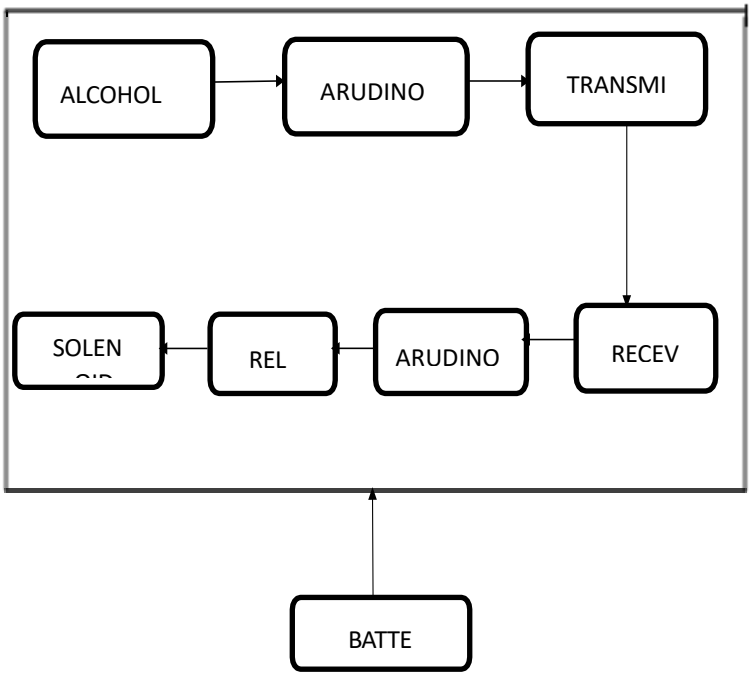
METHODOLOGY

The proposed smart helmet system utilizes a combination of hardware components and Arduino programming to detect alcohol and prevent motorcycle operation. The methodology involves embedding an MQ-3 alcohol sensor within the helmet to monitor the rider's breath for alcohol content. If the alcohol concentration exceeds a predefined threshold, the Arduino microcontroller activates an RF transmitter that sends a wireless signal to an RF receiver mounted on the motorcycle's control system. The receiver communicates with another Arduino that manages the fuel flow, triggering a relay to engage a solenoid valve, effectively cutting off the fuel supply to the engine. A rechargeable lead-acid battery powers the system, ensuring continuous operation of the helmet's electronics and the motorcycle's control unit. Additionally, feedback is provided to the rider via LED indicators or a buzzer, notifying them of the alcohol detection and fuel cutoff. This integrated system ensures that alcohol-impaired riders are unable to start their motorcycles, enhancing road safety and reducing accident risks.

BLOCK DIAGRAM



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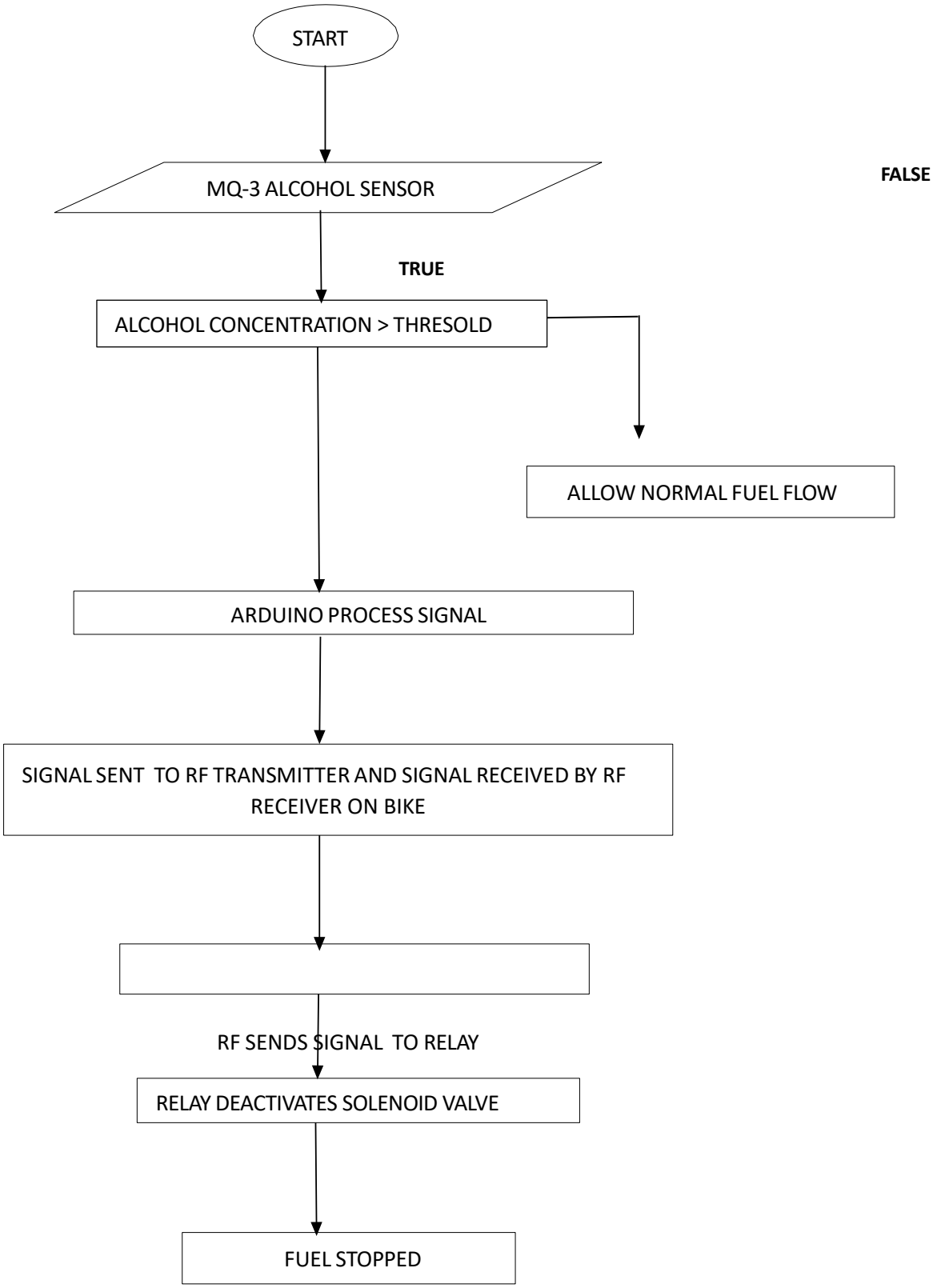
FLOW CHART



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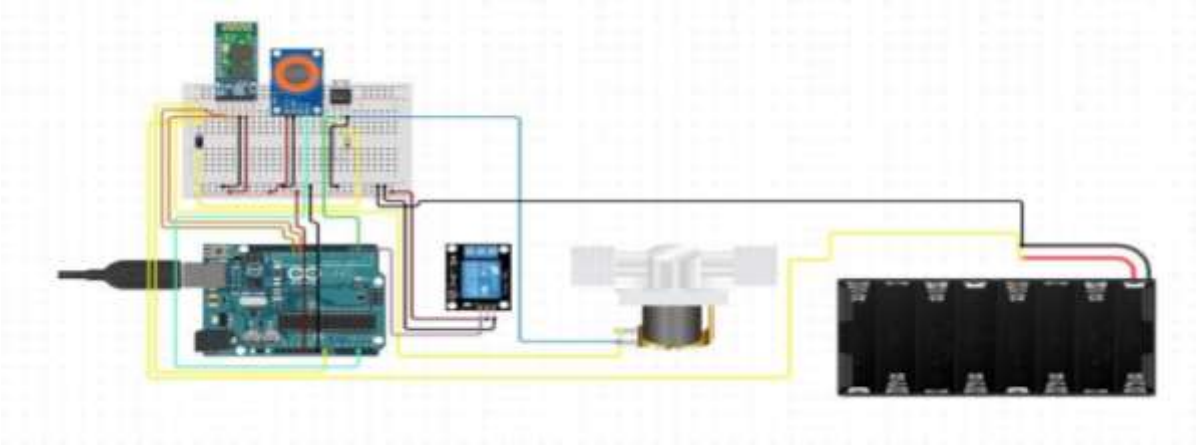
CIRCUIT DIAGRAM



HARDWARE USED:

1. ARDUINO UNO BOARD: Arduino UNO is open source micro-controller board that helps create interactive projects giving smart solutions by automation. It is based on the processor ATmega328p. It also comes with a variety of input and output pins that can be used to connect different electronic components.

2. MQ3 ALCOHOL GAS SENSOR: Detects the concentrations of alcohol gas in the air and ouputs its reading as an analog voltage. The sensor can measure concentrations of 0.04mg/L to 4mg/L. The concentration sensing range is suitable for breathalyzers.

SOLENOID VALVE: A solenoid valve is an electromechanical device used to control the flow of liquids or gases in various systems. It operates by using an electric current to create a magnetic field that moves a plunger or valve to open or close the flow path.

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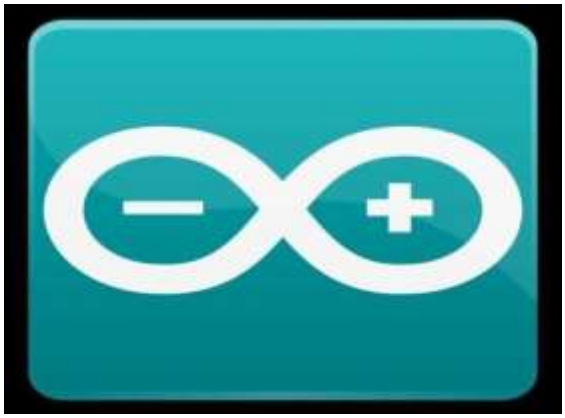
3. RF TRANSMITTER AND RECIEVER: operates at the same frequency as the transmitter, receives the transmitted data As the RF waves move away from the transmitting antenna they move towards another antenna attached to the receiver, which is the final component in the wireless medium

4. RELAY : A relay is an electrically operated switch that receives and sends electrical signals to control other devices:

5. LITHIUM ION BATTERY: A battery is used for power supply

SOFTWARE USED

1. ARDUINO UNO IDE: The Arduino IDE (Integrated Development Environment) is used to write the computer code and upload this code to the physical board. The Arduino IDE is very simple and this simplicity is probably one of the main reason Arduino became so popular. An integrated development environment (IDE) is a software application that helps programmers develop software code efficiently. It increases developer productivity by combining capabilities such as software editing, building, testing, and packaging in an easy-to-use application.



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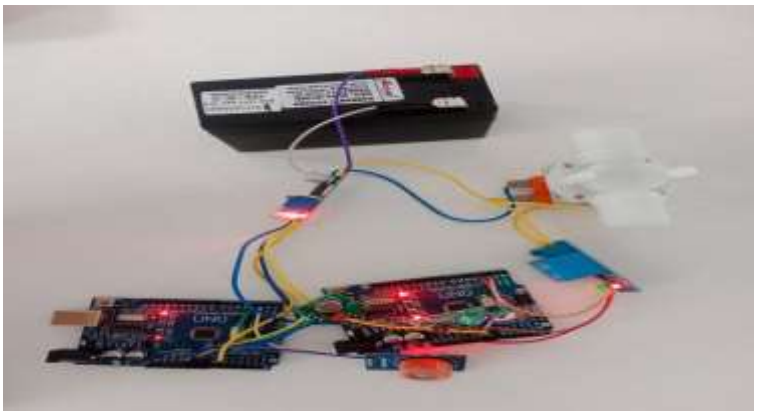
APPLICATIONS

- **Safety and Security :** The smart helmet can detect alcohol levels and alert the rider if the alcohol concentration exceeds a predefined limit.
- **Real time monitoring:** Using a breathalyzer sensor connected to the Arduino, the smart helmet continuously monitors alcohol levels as the rider wears it.
- **Data logging and Analysis:** The Arduino-based smart helmet can store alcohol level readings over time, providing insights for personal safety tracking**.**
- **Integration with other safety features**: The smart helmet can be integrated with other safety features such as GPS tracking, voice-controlled navigation, or emergency alert systems.

RESULT



CONCLUSION

- The implementation of a smart helmet with Arduino for alcohol detection and fuel flow control provides a significant step towards enhancing rider safety. By integrating alcohol sensors with the Arduino system, the helmet can continuously monitor the rider's alcohol levels and ensure that they are within a safe range before allowing the engine to operate.

- This technology not only promotes responsible riding behavior but also reduces the risk of accidents caused by impaired riding due to alcohol consumption. Additionally, the system enhances overall vehicle safety by automatically cutting off fuel flow when alcohol levels exceed the permissible threshold, ensuring the rider's safety and the safety of others on the road.

- With further advancements, this smart helmet can be expanded to include additional features like GPS tracking, emergency notifications, and real-time analytics, making it a comprehensive solution for rider safety.

REFERENCES

[1]. Kumar, D., Natarajan, S., & Mohan, S. (2017). Smart Helmet System for Accident Detection Using Arduino.
[2]. International Journal of Advanced Research in Computer Science and Software Engineering, 7(2), 35-39. [2]. Gupta, A., Kumar, A., & Rani, S. (2018). Smart Helmet for Monitoring and Alerting System Using Arduino. Journal of Electrical Engineering & Technology, 13(4), 1681-1686.
[3]. G, V. D., D, A. G., & M, A. S. (2019). Development of Smart Helmet for Rider's Safety. International Journal of Engineering Research & Technology, 8(6), 555-559.
[4]. Agarwal, S. K., Shukla, R., & Tripathi, A. (2020). Smart Helmet for Safety and Emergency Communication System Using IoT. International Journal of Electrical, Electronics and Computer Systems, 9(1), 41-46.
[5]. Kumar, K. S., Kumar, R. S., & Chinnapillai, P. R. (2016). Design of Smart Helmet for Rider Safety Using Arduino. International Journal of Innovative Research in Computer and Communication Engineering, 4(6), 5537-5542.