SYMBIOSIS INSTITUTE
OF TECHNOLOGY

ALCOHOL-DETECTION VEHICLE SECURITY WITH REMOTE ALERTING

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INTRODUCTION

Drunk driving stands as a perennial threat to road safety, causing countless accidents and fatalities globally. The gravity of this problem necessitates innovative and effective solutions. In response, we introduce a novel system aimed at curbing this menace: the "Alcohol-Detection Vehicle Security with Remote Alerting."

Background: Drunk driving remains a significant contributor to road accidents and related fatalities. Existing measures, such as breathalyzers and ignition interlock systems, though valuable, have limitations. They often rely on the cooperation of the driver and may not address the problem comprehensively. Our system seeks to overcome these limitations by providing an automated and non-intrusive solution to detect alcohol impairment within a vehicle.

Statement of the Problem: The core issue we address is the urgent need to prevent individuals under the influence of alcohol from operating vehicles. Drunk driving poses a substantial risk not only to the impaired driver but also to other road users. Traditional methods for addressing this problem have often fallen short, making it imperative to devise a more robust, automated, and responsive system.

Proposed Approach or Solution: Our innovative approach integrates IoT technology with an MQ-3 alcohol sensor and a NodeMCU microcontroller. This combination allows real-time monitoring of alcohol vapor levels within the vehicle. When the sensor detects alcohol levels above a predefined threshold, the system takes swift action. It immobilizes the vehicle's wheels, effectively preventing a drunk driver from taking control, and simultaneously triggers a message to the vehicle owner and relevant authorities via a messaging API. This proactive and automated response ensures the safety of the impaired driver and other road users.

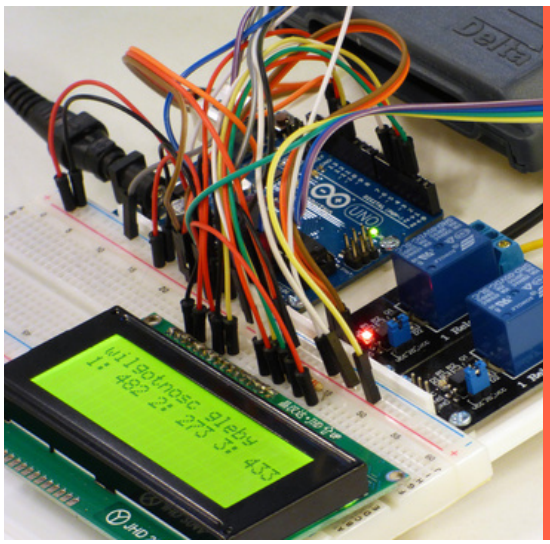
ABSTRACT

Drunk driving remains a persistent and critical issue contributing to road accidents and fatalities worldwide. In response to this problem, we have developed a novel Smart Vehicle Security System that employs a NodeMCU microcontroller and an MQ-3 alcohol sensor. The system's primary objective is to prevent impaired individuals from operating vehicles, thereby enhancing road safety.

Our approach involves real-time monitoring of alcohol vapor levels within the vehicle cabin. The MQ-3 alcohol sensor utilizes its sensitive gas detection capabilities to accurately identify elevated alcohol concentrations. When a predefined threshold is exceeded, the system initiates a series of protective actions. The vehicle's wheels are immobilized, effectively preventing the drunk driver from operating the vehicle, and an alert message is sent to the vehicle owner and relevant authorities via a messaging API.

The major findings of this study reveal the feasibility and effectiveness of using affordable and readily available components to create a robust and non-intrusive solution for tackling drunk driving. By employing IoT technology, we ensure that the system operates seamlessly without causing any inconvenience to sober drivers. Moreover, the remote notification feature enables prompt response from concerned parties, further enhancing road safety.

Our Smart Vehicle Security System presents an innovative and practical solution to the pervasive issue of drunk driving. By integrating alcohol detection with intelligent vehicle immobilization and remote alerting, we contribute to the broader mission of reducing accidents and saving lives on the road. This technology not only addresses a pressing safety concern but also promotes responsible and accountable vehicle operation.



Alcohol-Detection Vehicle Security with Remote Alerting.

METHODOLOGY

01 —Component Selection

- NodeMCU (ESP8266) microcontroller: This serves as the brain of the system, responsible for data processing and communication.
- MQ-3 Alcohol Sensor: This sensor detects alcohol vapor within the vehicle cabin.
- Vehicle immobilization mechanism: You'll need a mechanism to prevent the vehicle from being driven, such as a relay that can disable the ignition system.
- Messaging API (e.g., Twilio): To send alerts to the vehicle owner and authorities.

02 —Wiring and Connections

Establish connections between the components following the manufacturer's specifications and guidelines. Connect the MQ-3 alcohol sensor to the NodeMCU and ensure the immobilization mechanism is appropriately linked to the vehicle's ignition system.

03 —Programming

Develop the software logic for the NodeMCU. This program should continuously monitor the alcohol sensor's readings. If alcohol levels exceed a preset threshold, it should trigger the immobilization mechanism and send alerts via the Messaging API.

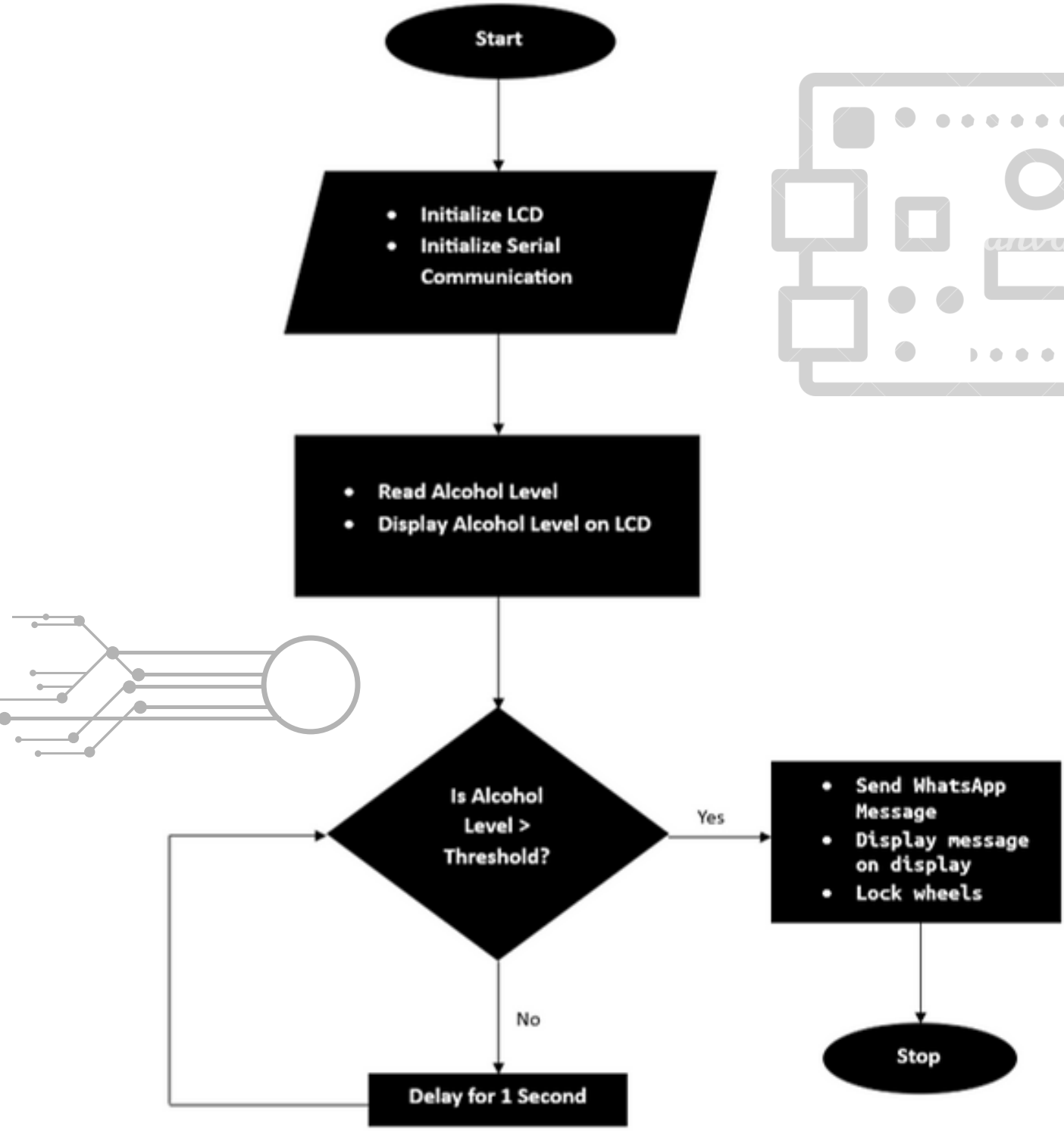
03 —Testing

Rigorously test the system under controlled conditions to ensure that it functions as intended. Check the accuracy of alcohol detection, the effectiveness of the immobilization mechanism, and the reliability of the alerting system.

03 —Integration and Installation

Once testing is successful, integrate the system into the vehicle. Ensure all components are securely and safely installed.

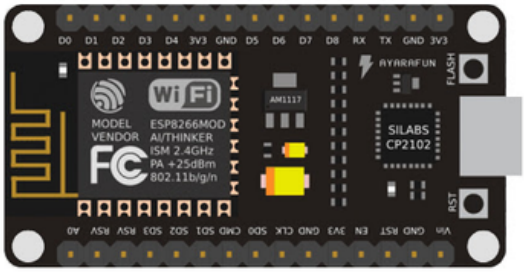
DATA FLOW


Start
Initialize LCD
Initialize Serial Communication
Read Alcohol Level
Display Alcohol Level on LCD
Is Alcohol Level > Threshold?
Yes
Send WhatsApp Message
Display message on display
Lock wheels
Stop
No
Delay for 1 Second

OPERATION

1. Power-Up: The system initiates when the vehicle is powered on. Components including the NodeMCU, display, alcohol sensor, and buzzer receive power from the vehicle's electrical system.
2. Alcohol Sensing: The MQ-3 alcohol sensor continuously samples the vehicle's cabin air for alcohol vapor. It generates analog data reflecting alcohol concentration.
3. Data Acquisition: The NodeMCU reads the sensor's analog data through its analog-to-digital converter (ADC). The data is processed, yielding a meaningful alcohol concentration value.
4. Display Feedback: Real-time alcohol concentration is displayed on an OLED or LCD screen, allowing the driver to monitor the cabin's air quality.
5. Threshold Comparison: The system compares the current alcohol concentration to a preset threshold. If the concentration is below this threshold, the system remains inactive.
6. Threshold Exceeded: If alcohol levels surpass the threshold, the system enters an alert state. Several actions occur in unison:
7. Auditory Alert: The buzzer activates, delivering a prominent sound within the vehicle cabin.
8. Visual Alert: The display presents a warning message, indicating elevated alcohol levels.
9. Message or Call Alert: Using Wi-Fi, the NodeMCU connects with a call or messaging API (e.g., Twilio) to inform predefined contacts, including the vehicle owner and authorities, about the situation.
10. Ignition Control: Concurrently with the alert actions, the NodeMCU sends a control signal to a relay or ignition cut-off mechanism, disabling the vehicle's ignition system and preventing the engine from starting.
11. Driver Response: The driver, upon hearing the alerts, recognizes the situation and refrains from attempting to start the vehicle.
12. Resolution: Once alcohol levels drop below the predefined threshold, the system returns to a standby state. The display clears the warning message, and the buzzer deactivates. The ignition system is re-enabled, allowing the vehicle to start again.

COMPONENTS



Node mcu as main processor

1602 Liquid Crystal Display

MQ3 Alcohol Sensor

Steering Wheel and Ignitation Locking Mechanism

CONCLUSION

As outlined in the 'Introduction' section, our primary objective is to create an innovative system that integrates alcohol detection, vehicle immobilization, and remote alerting. This comprehensive approach is expected to provide a solution to the problem of drunk driving. The 'Methodology' section will detail the steps and procedures we will follow to implement this system, ensuring that it aligns with the goals and objectives set forth in the introduction. It will encompass component selection, wiring and connections, programming, testing, and integration, with the aim of achieving the envisioned outcome of enhancing road safety and promoting responsible vehicle operation

To eradicate “Drunk and Drive system” and to reduce the burden of police men we are proposing alcohol detection system in vehicles. “Alcohol Detection sensor” can be used in the various vehicles for detecting whether the driver has consumed alcohol or not, and an alert message is sent to nearby police station if the person is drunk through GSM modem. In the existing system, alcohol detectors are not proposed in any of the vehicles, hence there is a chance for anyone to drink and drive.
The main purpose of the Alcohol Detection with Vehicle Controlling project is “Drunk driving detection.” Nowadays, many accidents are happening because of the alcohol consumption of the driver or the person who is driving the vehicle. Thus, Drunk driving is a major reason for accidents in almost all countries all over the world. The alcohol Detector in Car project is designed for the safety of the people seating inside the car. The alcohol Detection with Vehicle Controlling project helps to control the vehicle in case the driver has consumed alcohol. An alcohol breath analyser project should be fitted/ installed inside the vehicle.