International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 04 | April - 2024 SJIF Rating: 8.448 ISSN: 258-3930

DROWSINESS AND ALCOHOL DETECTION USING ARDUINO

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Abstract - Accidents on road ways are increasing in our day to day lives. These accidents pose significant threats to human safety and well-being. There are several ways for reduction of accidents. Some of them are Drowsiness detection and Alcoholic detection. By using sensors, communication devices and algorithms, the system aims to identify potential hazards. This abstract presents a comprehensive approach to accident reduction using Internet of Things (IoT) technology. Drowsiness Detection System aims to mitigate the risks of drowsy driving and enhance road safety. By utilizing an Arduino microcontroller and various sensors, this system continuously monitors the driver's vital signs and facial expressions. It analyzes parameters such as eye blink patterns, head movements, and heart rate to accurately identify signs of drowsiness. Upon detecting drowsiness, the system promptly alerts the driver through alarms or visual cues, prompting them to take necessary actions to prevent accidents. This project serves as a vital tool in reducing road accidents caused by driver drowsiness, ensuring safer journeys for all. This project presents the design and implementation of an Alcohol Detection with Engine Locking for cars using Arduino UNO as the MCU (Master Control Unit). The system will continuously monitor level of alcohol concentration in alcohol detection sensor and thus turn off the engine of vehicle if the alcohol concentration is above threshold level. The model will also send the message of whereabouts of the vehicle through SIM900A. The project provides an efficient solution to control accidents due to drunk driving

***Key Words*:** Arduino UNO, Sensor Fusion, Real time monitoring, MQ-3 sensor, GPS module, GSM module, Telematics.

1.INTRODUCTION

In today's fast-paced world, characterized by hectic lifestyles and extensive reliance on transportation, accidents often occur due to the unknown attributes of drivers. A significant portion of these accidents stems from drivers operating vehicles while drowsy or under the influence of alcohol. According to the Ministry of Road Transport and Highway authority, approximately 1.35 million people lose their lives annually due to road crashes. Research indicates that a staggering 94% of car accidents are caused by drivers, with 25 to 30% of these accidents attributed to drowsiness and drunk driving. There is thus an urgent need for real-time driver alertness monitoring systems integrated into emerging intelligent transportation systems to mitigate the risk of accidents. To address this imperative, we propose the implementation of drowsiness and alcoholic detection systems. Utilizing Arduino Uno as a Master Control Unit (MCU), our system employs an MQ3 sensor to detect alcohol concentration levels. If the detected concentration exceeds a predefined threshold, the system alerts the MCU. Moreover, in cases where the driver is found to be intoxicated, the system automatically shuts off the engine and sends alerts to designated contacts and civil authorities via the GSM module. Additionally, a camera is deployed to monitor the facial expressions of the driver, triggering a buzzer alert if the driver's eyes are closed. By integrating these functionalities, our system offers a comprehensive approach to enhance road safety and prevent accidents caused by impaired driving.

2. LITERATURE REVIEW:

The research field of driver drowsiness detection has seen various approaches, each focusing on different physiological signals to assess the state of the driver. Federico et al. proposed a method centered around respiratory signal analysis, utilizing a plethysmography belt to monitor the driver's breathing. Their algorithm, TEDD (Thoracic Effort Derived Drowsiness index), employs respiratory rate variability to detect signs of drowsiness, thereby classifying the driver's state.In contrast, José Solaz et al. presented an intrusive method leveraging automotive cameras to track the driver's respiratory movements. This continuous monitoring of chest and abdomen movement serves as a proxy for breathing rate. They evaluated their system using a two-fold Kinect 'gold standard' to gauge its effectiveness.

Umit Budak et al. opted for EEG spectrogram signals as their primary source of data. They extract frequency features from these signals and utilize the Q-factor wavelet transform to break down the EEG signals into sub-bands. These sub-bands are then fed into a

short-long term network for classification, offering a different perspective on drowsiness detection.

Anuva Chowdhury et al. surveyed various methods for detecting drowsiness, emphasizing the use of physiological signals captured via sensors either on the driver or in close proximity. These signals, reflecting vital signs, provide insights into the onset of drowsiness, contributing to a comprehensive understanding of the driver's state.

3.METHODOLOGY:

An Arduino board interfaces with a GPS module (like Neo-6M) and a GSM module (like SIM800L). The GPS provides location data, while the GSM enables cellular communicationWhile GPS and GSM don't directly detect drowsiness, additional sensors can be integrated. Alternatively, a camera with image processing can track eye closure and head position. monitor blink rate, with slow blinks indicating drowsiness An MQ-3 sensor detects alcohol presence in the driver's breath. The Arduino reads the sensor output, indicating alcohol concentration. The Arduino continuously reads sensor data. If drowsiness or alcohol is detected, the system triggers an alarm (buzzer or light). Additionally, the GPS coordinates are used to send an SMS alert with the vehicle location (using GSM) to emergency contacts or authorities.

4. PROPOSED SYSTEM:

The proposed system incorporates several key features to enhance driver safety. Firstly, it utilizes a camera positioned on the vehicle's dashboard to provide real-time monitoring of the driver's facial expressions. This enables precise tracking of the driver's eye movements, allowing for immediate detection of drowsiness. Additionally, the system integrates an alcohol concentration sensor to identify instances of intoxication. If the sensor detects elevated alcohol levels, it automatically prevents the engine from starting, thereby mitigating the risk of accidents caused by impaired driving. By combining both alcoholic and drowsiness detection functionalities into a single board, the system streamlines its operation and reduces complexity. This holistic approach enables early identification of potentially hazardous driver behaviors, facilitating proactive intervention to prevent accidents and promote road safety.

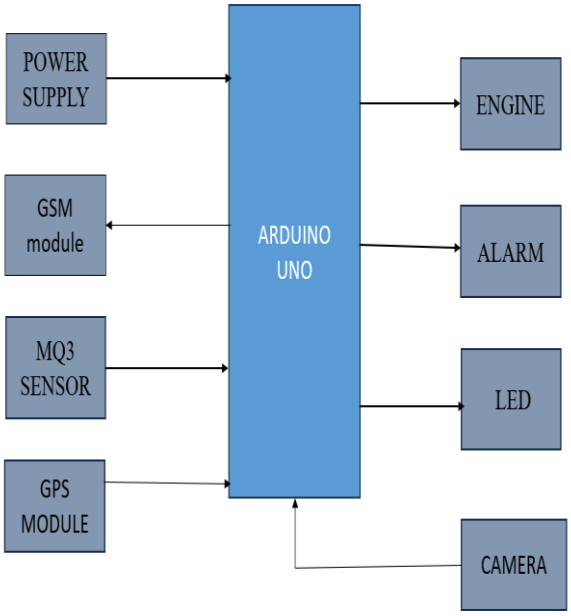

Fig 4.1 Block Diagram

4.1 HARDWARE DEVELOPMENT:

The core hardware components include:

Arduino UNO:
The Arduino UNO serves as the central control unit, facilitating seamless communication and coordination among the different modules. It utilizes its versatile I/O pins and programming capabilities to interface with sensors, process data, and execute control algorithms efficiently. With the Arduino IDE and extensive library support, development becomes streamlined, enabling rapid implementation of complex functionalities.

MQ3 SENSOR:
The MQ3 sensor, based on metal oxide semiconductor technology, detects alcohol concentration by measuring changes in resistance when exposed to alcohol vapors. Its high sensitivity and resistance to interference make it suitable for accurate alcohol detection in diverse environments.

GSM :
The GSM module enables wireless communication over the GSM network, allowing the system to send alerts and notifications via SMS. This feature enhances the system's usability and enables remote monitoring and intervention when necessary.

GPS:
The GPS module provides location tracking functionality, allowing the system to determine the precise geographical coordinates of the device. This information is invaluable for real-time monitoring, route planning, and tracking applications.

LED AND BUZZER:
LEDs and buzzers serve as visual and auditory indicators, respectively, providing immediate feedback to users regarding detected events such as drowsiness or high alcohol levels. Thes components enhance user awareness and safety,ensuring prompt responses to critical situations.

DC Motor :
A Direct Current(DC) motor is a motor that turns energy from a direct current and turns this into mechanical energy. It works on the principle of Lorentz Law, which states that the current carrying conductor placed in a magnetic and electric field experience a force.

WORKING:
The drowsiness detection and alcoholic detection system utilizing GSM and GPS modules with Arduino, combined with deep learning for drowsiness detection, operates by continuously monitoring various physiological and environmental parameters.Here the camera used to observe the continues vatial signs of the driver. These sensor data are processed by the Arduino board, which interfaces with the GSM module to send real-time alerts via SMS to predefined numbers if signs of drowsiness are detected. The GPS module simultaneously tracks the vehicle's location, enhancing the alert with geographical coordinates for immediate assistance.

For alcohol detection, a metal oxide semiconductor sensor like MQ3 measures changes in resistance when exposed to alcohol vapors. This data is also processed by the Arduino board, and if alcohol presence surpasses a predetermined threshold, the system triggers an alert through the GSM module, ensuring timely intervention.

4.2 Hardware Connections:

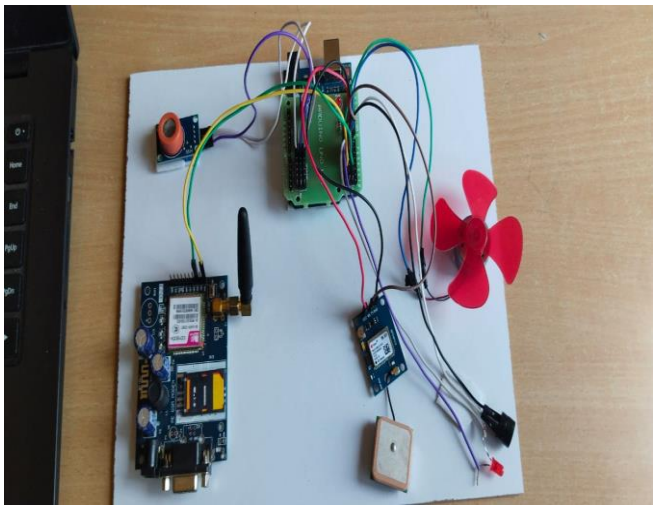

Fig 4.2: Hardware Implementation

4.3 ALGORITHM

Initialization: Set up the camera and MQ3 sensor.

Face Detection: Use the camera to detect and recognize the face of the person (Aya).

Facial Expression Recognition: Analyze Aya's facial expressions using the camera to detect signs of drowsiness.

Alcohol Detection: Utilize the MQ3 sensor to measure the alcohol concentration in the surrounding air.

Decision Making: If drowsiness is detected and alcohol concentration is high, stop the engine, activate a red LED, and sound a buzzer.

Action: Depending on the decision, take action such as stopping the engine, activating LEDs or buzzers, or sending a message.

Location Tracking: If needed, retrieve the current location of the vehicle using GPS.

Messaging: Compose a message with the detected situation (e.g., "Drowsiness and alcohol detected, engine stopped.") along with the current location.

Sending Message: Send the composed message to a specified phone number.

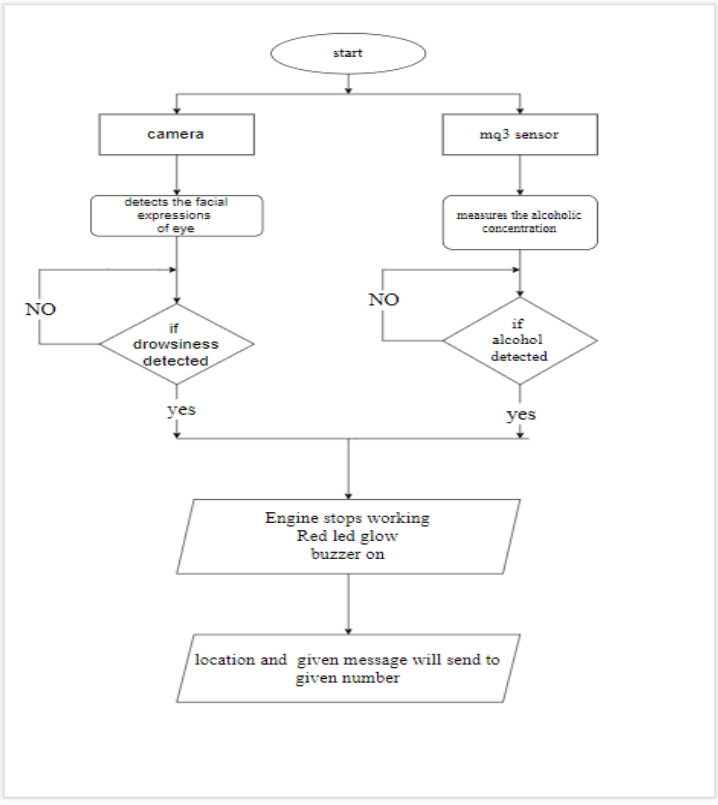

Fig 4.3: Flow chart

5. RESULT :

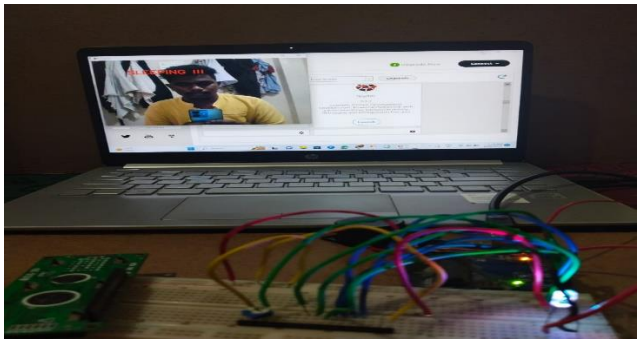

Fig 5.1 drowsiness detected

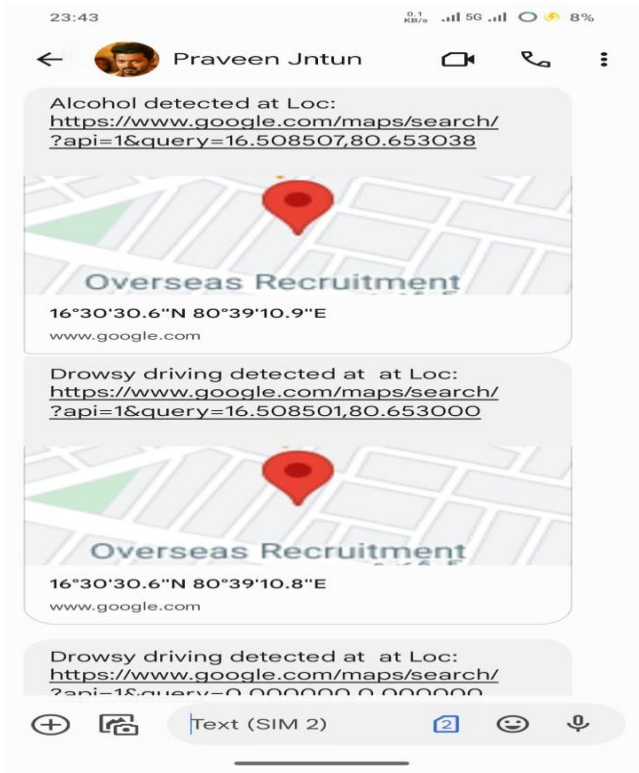

Fig 5.2: Alert SMS notification

Here, Fig 5.1 shows that the output of drowsiness detection, when a camera track eye closure indicating drowsiness and Fig 5.2 indicating the message ie. Location sent to emergency contact during the alcoholic detection.

6. CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

Our project integrates drowsiness and alcohol detection with GSM and GPS using Arduino, offering a robust solution for road safety. By combining microcontrollers, sensors, and communication modules, we've created a system capable of real-time impairment detection and alerts. Demonstrating feasibility, it mitigates risks linked to impaired driving. Arduino's flexibility and connectivity enable customization to meet varied needs. Future refinements include improving sensor accuracy and addressing privacy concerns. Our project highlights technology's potential to tackle societal issues like impaired driving. Further research and collaboration can enhance these systems, potentially saving lives.

6.2 FUTURE SCOPE:

Enhanced Accuracy: Continuous refinement of algorithms and sensors can lead to increased accuracy in detecting drowsiness and alcohol levels. This might involve integrating multiple sensor inputs, such as facial recognition, eye movement tracking, heart rate monitoring, and even brainwave analysis for drowsiness detection.

Real-Time Monitoring: Future systems could provide real-time monitoring of driver condition, alerting drivers when they are becoming drowsy or when alcohol levels exceed safe limits. This could be integrated directly into vehicles or as wearable devices.

Regulatory Adoption: Governments may introduce regulations mandating the use of drowsiness and alcohol detection systems in vehicles, similar to existing regulations for seat belts and airbags. This could drive widespread adoption and further innovation in the field.

REFERENCES

- National Highway Traffic Safety Administration (NHTSA) https://www.nhtsa.gov.
- P. Manikandan, V. Muneeswarn, G. Ramesh, Ravuru Siva Rakesh, Peddysetty Chakraesh , Nagireddy Sumanth Reddy, Noorbonala Sahul , “Drunk and Drive Controller for Vehicle”, International conference on advance computing and innovative technologies in engineering (ICACITE), 2021.
- I. T. S. D. a. A. Group and I. T. Forum, "IRTAD road safety annual report 2020," Organization for Economic Co-operation and Develop, 2020. https://www.itf-oecd.org.
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