International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Drunken Driving Detection Using IOT

Prof M.L. Dhore[1], Dhyey Thakkar[2], Amay Patel[3], Atharva Adsul[4], Vrushabh Ambadkar[5]

[1,2,3,4,5]Vishwakarma Institute of Technology, Pune-411037

Abstract
The Internet of Things (IoT) refers to a network of interconnected devices equipped with sensors and communication capabilities. This paper proposes an IoT-based model aimed at enhancing road safety by detecting drunk or drowsy drivers, especially during nighttime hours. The model incorporates analysis of alcohol concentration levels, eye-blinking rates, and pulse rate to identify potentially impaired drivers. Upon detection, countermeasures such as reducing vehicle speed, triggering alarms, notifying traffic authorities, or engaging autopilot functions could be initiated to mitigate risks and prevent accidents. The paper examines existing models and aims to synthesize effective ideas while addressing implementation challenges.

Keywords: Drunk, Driving, Sensor, Driver Monitering

INTRODUCTION

In contemporary times, with the surge in the number of vehicles on the roads, traffic accidents have increased significantly. A primary contributor to these accidents is drunk driving or driving under the influence (DUI). This issue is particularly pressing in developing countries like India, where 53.4% of unnatural deaths in 2014 were attributed to traffic accidents, with DUI being a leading cause [1].

Currently, law enforcement officials conduct breath tests on a sample of drivers to detect alcohol levels. However, this manual approach is inefficient and often fails to identify the majority of DUI cases. Alternative, more effective methods for detecting drunk driving could involve automatic detection using sensors. Preventative measures could include reducing the vehicle's speed or alerting authorities or individuals via the internet.

The automatic detection approach using sensors is closely related to the Internet of Things (IoT) paradigm. IoT refers to the network of physical devices embedded with sensors, electronics, computing modules, and network connectivity, allowing them to collect and share data. IoT has been utilized to propose solutions to a variety of problems [2]. In the context of DUI detection, sensors for detecting alcohol consumption can be directly or indirectly used. These sensors can connect to mobile phones, which can then utilize communication networks to alert relevant parties.

The concept of using IoT to detect DUI is not new. Various models have been discussed in the literature. However, no specific model has been widely adopted. The proposed methods face challenges such as implementation difficulties, scalability issues, and complexity. Therefore, new models must focus on low cost, ease of implementation, and accuracy.

Utilizing IoT in this field presents unique challenges. While sensors for detecting alcohol content are available, their integration into vehicles has not been effective. Ideally, a small, portable device would be

used for this purpose.
Section 2 of the paper reviews several proposed technologies, highlighting their respective advantages and disadvantages. Section 3 compares these methods and suggests alternative approaches. Section 4 provides a summary of the paper.

RELATED WORKS

Several approaches have been proposed to address this issue in various papers. Some specific papers have been analyzed in the following paragraphs.
Xiaorong et al. proposed a model for automatic drunk driving detection using the MQ-3 alcohol sensor and IoT technology [3]. The model incorporates the STC12C5A16AD chip alongside the MQ-3 alcohol sensor, which is capable of detecting alcohol content in the breath, similar to a breathalyzer. The car is equipped with the chip, the alcohol sensor, an alarm module, an LCD display, and modules for relay control and GPRS. When the alcohol sensor detects levels beyond a specific threshold, an alarm is triggered, and notifications are sent to the driver's relatives and local traffic control. If the alcohol concentration exceeds 200 mg/L, the engine is automatically shut down. The model proposed in this paper is straightforward and effective, leveraging the MQ-3 sensor. The basic structure is shown in Fig. 1.

Advantages:

- It is cheap and easy to implement.
- The MQ-3 sensor is cheap and widely available
- The car is not let to start if the sensor detects extremely high alcohol content

Disadvantages:

- It only considers the output of the MQ-3 sensor for its analysis.
- While the sensor is easy to integrate, it poses a challenge in terms of scalability as this would need to become an industry standard for real-life usage.
- The threshold value set is also static, which may not directly indicate the person's current ability to drive the car.

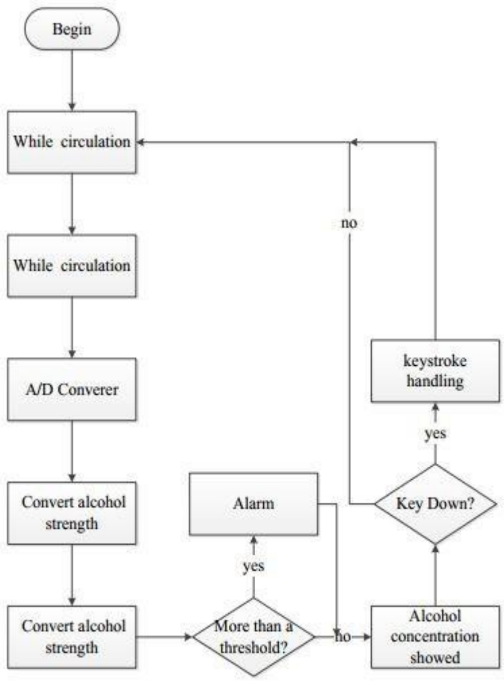

Fig. 1: Process chart for the MQ-3 sensor [3]

The second paper reviewed was proposed by Dai et al.. This approach leverages a smartphone as a tool for detecting and preventing drunk driving. An Android application utilizes the smartphone's accelerometer and orientation sensor to determine in real time whether a driver is impaired. The study, illustrated in Fig. 2, identifies sudden changes in speed, acceleration, random swerves, and sudden braking as indicators of DUI. To detect these behaviors, the system monitors parameters of lateral and longitudinal acceleration. This data is continuously collected in real time and analyzed against a predefined pattern using an algorithm. If the pattern matches the criteria for drunk driving, an alarm is triggered; otherwise, monitoring continues.

Advantages:

- This is one of the cheapest methods for prevention of drunk driving.
- Overhead involved is very minimal.
- The entire process can take place without any outside interference.

Disadvantages:

- A single uniform algorithm has been used for all test conditions. No attempt has been made to develop a learning algorithm to familiarize with a particular driving style.
- This method is wholly dependent on a smartphone. If

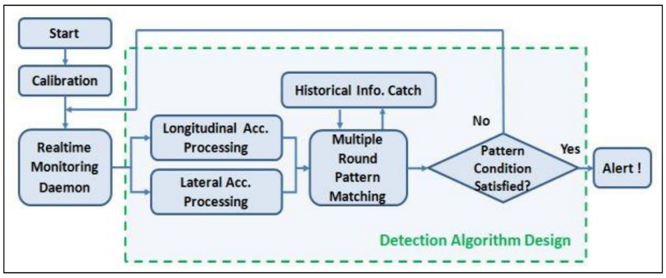

Fig. 2: Algorithm used for detection in model 2 [4]

The third method we reviewed [5] involves using physiological behaviors to prevent alcohol-related accidents. Drinking alcohol causes specific changes in physical behavior that can be tracked using specialized sensors. The authors propose several approaches:

- **Eye Blink Rate**: An Eye Blink Sensor can track the rate of eye blinking, which can prevent accidents caused by sleepiness. Alcohol consumption often affects blink rate, making this an effective indicator.
- **Heart Rate**: Since alcohol can increase heart rate or cause irregular heartbeats, the authors suggest using sensors that measure heart rate. This can provide a reliable metric for detecting impairment.

Advantages:

- These sensors are accurate and are easy to implement.
- They can not only save people while they are drunk but also can save them when they are asleep.

Disadvantages:

- Not very cost effective.
- Travelling long distance may cause some sensors to work inefficiently.
- Wearing the sensors can be annoying for the driver and may cause distraction while driving; therefore effective implementation is a challenge.

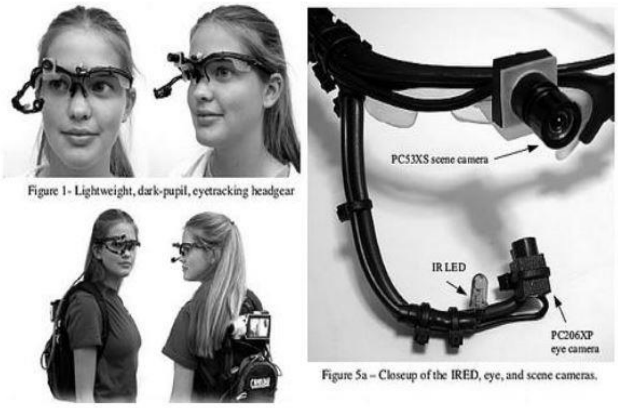

Fig. 3: Module for eye blink detection in model 3

The fourth work analyzed [6] addresses the problem of DUIby directly checking the alcohol gas coming out of the driver'smouth. The article primarily relied upon MQ-135 gas sensor (Fig. 4) for alcohol detection. Assuming gas sensor did not to track the location of the vehicle and alert the authorities. Also an ultrasonic sensor detects the proximity of foreignobject like other vehicles and if there is little chance of accident can decide not to activate the GSM and GPS.

Advantages:

- No external monitoring is required for this system towork
- Only hardware interfacing is primary to this modeland no data analysis technique is employed.

Disadvantages:

- The last advantage turns into a disadvantage when itcompromises with the accuracy of the model.
- Solely using the gas sensor is prone to false positivesand false negatives

Fig. 4:MQ135 alcohol gas sensor [6]

COMPARISON AND PROPOSED MODIFICATION

Various inexpensive sensors are available for detecting alcohol levels. However, relying solely on these sensors is not sufficient to effectively address the problem of drunk driving. Therefore, we propose a holistic method that combines multiple factors and personalizes the detection approach for specific individuals, rather than using a generalized method. This integrated approach aims to enhance accuracy and effectiveness in detecting and preventing drunk driving.

The parameters considered for the current work are:

- Alcohol content
- Eye blink rate and facial recognition
- Pulse Rate sensor

Alcohol content is the most fundamental detail required for the model and can be easily detected using various sensors. The raw data from the alcohol sensor is processed and compared against a threshold to determine the alcohol levels.

Eye blink rate is another crucial parameter in the model. Sensors specifically designed for this task are available. Additionally, facial recognition technology combined with machine learning techniques can be used to assess how drowsy a person appears to be, providing a drowsiness score. These parameters can also detect other effects, such as sleep deprivation, thereby enhancing the overall effectiveness of the detection system.

Pulse detection is another critical parameter for the model, as alcohol consumption can lead to an increased or irregular heartbeat. Pulse-detecting sensors can be used to monitor the driver's heart rate in real-time. By establishing a baseline for each driver, these sensors can identify significant deviations indicative of intoxication. Coupled with machine learning algorithms, the system can analyze heart rate patterns to distinguish between normal and alcohol-induced irregularities, thereby providing an additional layer of detection to enhance overall accuracy.

CONCLUSIONS

Drunken driving incidents are an everyday affair. This paper has listed several different methods to analyze drunken driving, and also listed their advantages and shortcomings. It is seen that combining various approaches with statistical learning tools can provide exciting results in this field.

REFERENCES

1. Safe Transportation System using IoT based Alcohol Detection by G Pradeepkumar
2. A Review Paper on Drunk Driving Detection System using IOT & ML Techniques by Ajay Kumar
3. IoT-based Drunk Driving Detection and Engine Locking System with Real-Time Location in App by Md. Akran Hossain
4. IoT-Enabled Alcohol Detection System for Road Transportation Safety in Smart City by Stanley Uzairue
5. Alcohol Sensing and Automatic Engine Lock System by Lokesh Khedekar
6. Novel Drunken Driving Detection and Prevention Models Using Internet of Things by Koneti Sandeep
7. Internet of Things(IoT) Based Multilevel Drunken Driving Detection and Prevention System Using Raspberry Pi 3 by Viswanatha V