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REAL TIME IMPLEMENTATION OF ALCOHOL AND DROWSINESS DETECTION

Naganetra.M[1], Rohini.D[2], Vaibhavi Sreenivasa[3], Vaishnavi Katti [4], Vishalini Divakar [5]

[#1,2,3,4] Student, ECE Department, K.S.I.T, Bengaluru, India

[5] Assistant Professor, ECE Department, K.S.I.T, Bengaluru, India

Abstract: In recent days road accidents are increasing due to human errors such as drowsy driving, distractions and drunken driving have become the leading factors for the accidents. In this paper, an effort is made to build a real time system to detect drowsiness as well as the alcohol detection with subsequently alerting the car driver. The main aim of this proposed system is to reduce the number of accidents due to driver's drowsiness and alcohol intake to increase the transportation safety. This proposed system contains a 5-megapixel digital USB camera, Raspberry-pi loaded with Raspbian-OS, Alcohol sensor (MQ-3) is used to detect the breath alcohol content in percentage. If the intoxication level is above the threshold, buzzer gets triggered ON with a message being sent to the authorized person and simultaneously the engine is stopped using a relay. This system will perform some tasks like the alarm notification and switching off the car power source. The detection of drowsiness is carried out using an OpenCV-source, Haar cascade classifiers and canny edge detection.

Keywords: Raspberry pi, MQ3 sensor, USB camera, Haar cascade classifier, Canny edge detection, buzzer, relay, External ADC.

I. INTRODUCTION

As we know that, the second largest road network in the world is India which is being fuelled by the rapid growth in the constructions of road networks. In 2017, it says that Indian roads ply over 250 million registered motor vehicles and unfortunately increases the road casualties as well on the Indian roads. According to the recent report of WHO, human errors such as drink-driving, distractions and driver's drowsiness are the leading reasons for the road accidents. Drowsy driving and drunken driving is considered as a severe problem that results in thousands of road accidents per year. It is strenuous tell the exact number accidents caused due to driver's drowsiness and alcohol consumption, but the traffic survey reveals that the contribution of driver's drowsiness may be up to 20% and the contribution of drunken driving is about 31% of all road accidents. Driver drowsiness and drunken driving reduces the driver's decision-making capability and the perception level. These are the two main reasons that affect the ability to control the vehicle. There are some techniques which are used to detect drowsiness in drivers like by sensing of driver operations, physiological characteristics of driver or the vehicle movements etc.

The primary purpose of this drowsiness and alcohol detection system is to develop a system that can reduce the number of accidents caused due to drowsiness and drunken driving of driver. In the initial part of the project is the detection of alcohol intoxication using an alcohol sensor (MQ-3) that works as a Breathalyzer and calculates the blood alcohol content (BAC) from breath alcohol content (BrAC). The raspberry-pi board is interfaced with MQ- 3 through an external ADC, buzzer and relay. Raspberry-pi continuously checks for the alcohol content present in the air and also computes blood alcohol content in Percentage from the corresponding readings. If the calculated %BAC crosses the threshold limit, the driver is alerted with an alarm through a buzzer and the relay turns off the engine.

The second part is to detect the driver's drowsiness. For the detection of drowsiness, we use a camera to identify face. Eye detection and yawning is the important part of this project will be done using OpenCV. The captured frame is to be processed by Raspberry pi using python. Eye close detection is based on Haar cascade classifier, canny edge detection technique and shape predictor which performs several comparisons from a database of positive value and negative value of images.

II. PROPOSED METHODOLOGY

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. In this paper, a real time driver's monitoring system is proposed to detect the alcohol intake and the drowsiness. The fig 1 depicts the block diagram of the components used to bide the driver's alcohol and drowsiness detection. The Raspberry Pi is the major component that controls the model's overall functions. The alcohol sensor detects alcohol based on human breath, which means that if the driver has drank alcohol, the sensor's green LED

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will blink and an analogue signal will be delivered to the external ADC. The alcohol sensor will record both analogue and digital measurements, but because a threshold must be specified, we will use analogue readings. We utilise an external ADC to convert analogue to digital signals because the Raspberry Pi only accepts digital inputs.
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The raspberry pi board is directly connected to the pi-camera. The pi camera captures photographs of the driver in real time, which are then analysed to see if the driver is drowsy using yawning and eye blinking threshold parameters. The Raspberry Pi is the central component of the concept, and it is responsible for all of the system's functions. Raspberry determines whether the alcohol content is above or below the threshold based on digital data from an external ADC. The Raspberry Pi uses OpenCV, HAAR-cascade classifier, and canny edge operator to process the images captured by the pi-camera for drowsiness detection. The driver's condition is determined by its output. When the driver is identified as being drowsy, the buzzer turns ON, and a message is delivered to the designated person. The relay's primary function is to turn off the engine's power supply if the driver is found to be inebriated or sleepy.
To begin, as soon as the driver enters the car and turns on the engine, the alcohol sensor detects the driver's alcohol level; if the alcohol concentration is above the threshold, the car's power supply is instantly turned off via a relay, preventing the driver from turning on the car. If the MQ-3 sensor detects no alcohol concentration at first, the engine fires up and the car begins to drive.

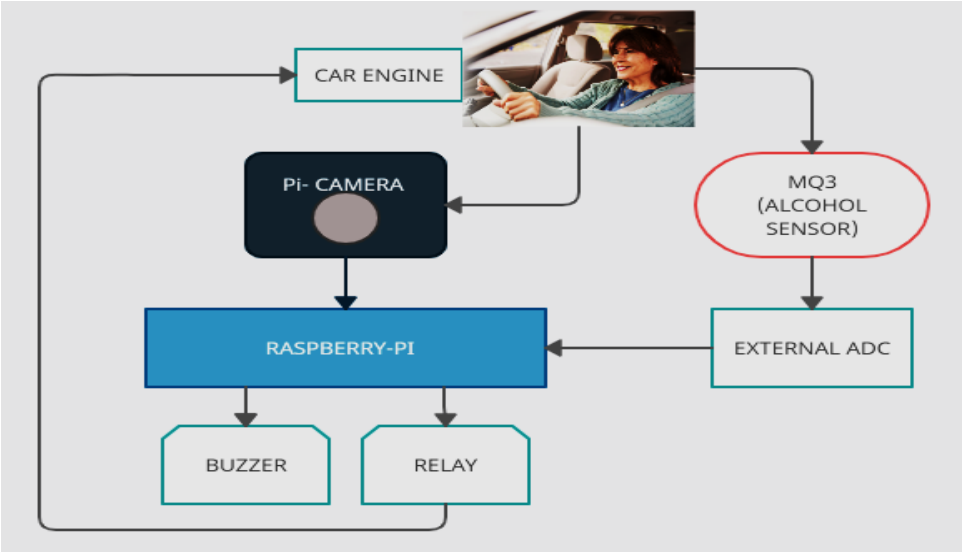

Fig 1: Block diagram

When the vehicle is turned on and any alcohol content is discovered in the middle of the journey, or if the driver is found sleepy (as assessed by the driver's eye blinking threshold and yawning frequency), the driver is warned through a buzzer. The vehicle's speed steadily decreases until it comes to a complete halt. The message alert is delivered to the authorised user via the Twilio application when this procedure takes place. This is done to notify the authorised user of the driver's current state.

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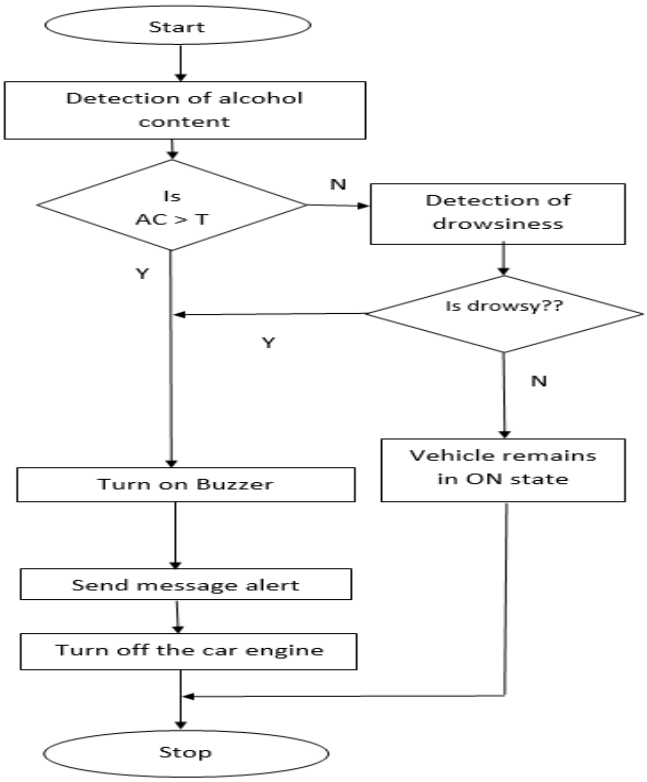
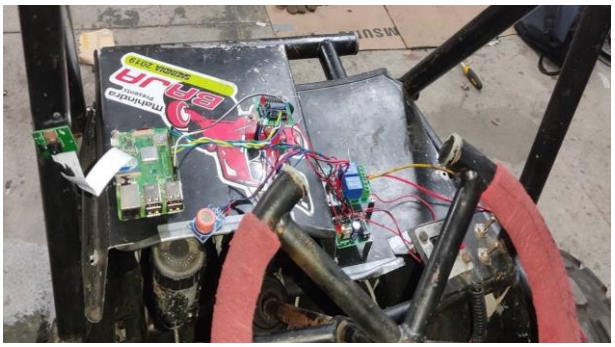


Fig 2: Flow diagram

III. RESULT

The suggested approach for detecting alcohol and sleepiness helps to decrease traffic accidents that result in serious injuries and deaths. The MQ-3 gas sensor measures the amount of alcohol drank by the driver and takes appropriate action. The classifiers and characteristics employed in the identification of sleepiness produce reliable findings, allowing for speedier detection of drowsiness.



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The circuit is put on the car's dashboard, and the Pi camera is positioned so that the driver is fully visible in the frame. The MQ-3 alcohol sensor is mounted near the steering wheel to properly measure the amount of alcohol consumed by the driver. The relay is attached to the car engine and determines the state of the vehicle based on the alcohol concentration and drowsiness thresholds. The relay functions as a switch, closing the circuit to turn off the car engine, which is an open circuit engine that only runs when the circuit is open.

The relay functions as a switch, closing the circuit to turn off the car engine, which is an open circuit engine that only runs when the circuit is open. The MQ-3 sensor's analogue signals are converted to digital signals by the external ADC, which is then sent to the Raspberry Pi, which only receives digital signals. The Raspbian OS is accessed using

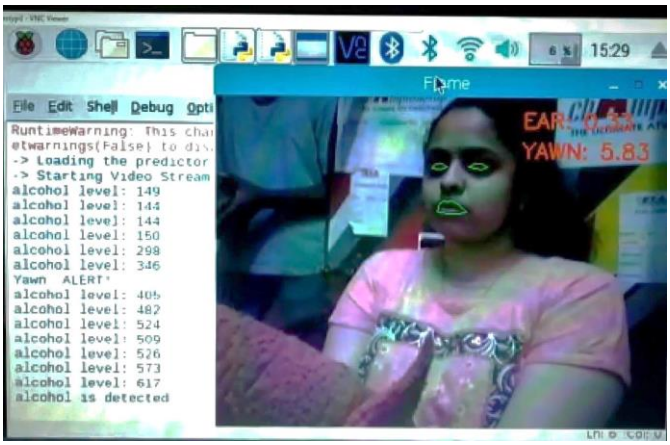

Fig 4: Alcohol detection

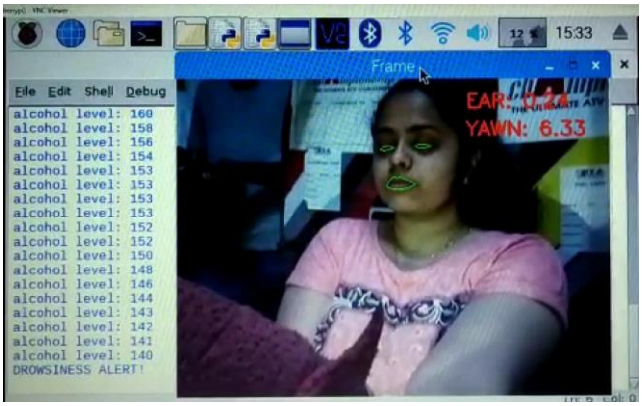

Fig 5: Drowsiness detection

VNC viewer. VNC (Virtual Network Computing) viewer is a cross-platform screen sharing system that remotely controls another computer. The MQ-3 continuously monitors the alcohol content of the driver and keeps displaying the alcohol level on the screen as shown in fig 4. As soon as the alcohol content level exceeds the threshold (which is 600ppm), the alert message stating “alcohol is detected” is displayed on the screen along with the buzzer alert. If no alcohol content above the threshold is detected, the next condition, sleepiness detection, is activated. This is done using a Haar-cascade classifier and a Canny edge detector, which uses the raspberry pi camera to monitor the driver's eye blinking threshold and yawning frequency, and then takes appropriate steps. The SMS alert received on the authorised user's phone can be seen in Fig 6. The Twilio application is used for this purpose. If both alcohol and drowsiness are detected, the message alert is sent.

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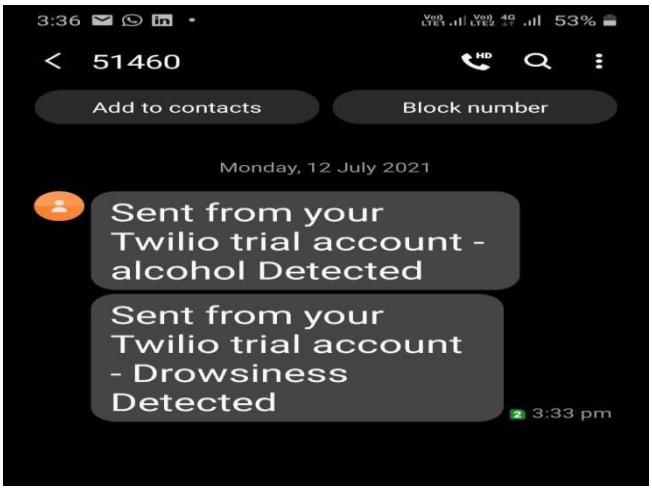

Fig 6: Message alert received on the phone of the authorized user.

IV. CONCLUSION AND FUTURE WORK

Drowsy driving and drunk driving are both regarded serious issues, and they are the two main factors that impair a driver's ability to operate a vehicle, resulting in thousands of road accidents each year. As a result, researchers are researching ways or procedures to limit the number of accidents caused by human faults such as drowsy driving and drunk driving. This research examined numerous strategies for detecting alcohol and detecting drowsiness, with the goal of developing a system to ensure driving safety. The system is made up of a Raspberry Pi 3B+, a Pi camera, a MQ3 sensor, a relay, a buzzer, and an external ADC, as well as a few algorithms. The proposed system has the advantages of simultaneously warning about drowsy and yawning, using a Raspberry Pi instead of an Arduino to send a text message to the authorized person, and reducing the speed to stop the vehicle if alcohol ingestion or drowsiness is detected. This model can be developed for accident detection based on the alignment of the vehicle and to detect accidents far before it occurs. This model may be built to detect the usage of mobile phone by the driver which is also one of the leading causes for road accidents. If this is done on autonomous vehicles,.3 steps can be taken to drive the vehicle to one side of the road and eventually come to a halt.

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