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ENHANCING ROAD SAFETY: IOT-BASED DRIVER DROWSINESS DETECTION AND HEALTH MONITORING SYSTEM

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ABSTRACT: This study examines health markers associated with driver fatigue and sleepiness. Most car accidents occur when people are tired. Driver fatigue is a major issue that contributes to numerous car accidents each year. It is impossible to say how many accidents are caused by sleepiness, but a study found that 20% of accidents are caused only by fatigue (rospa).This invention uses a USB camera and a buzzer to detect eye blinks and wake up drivers who are about to fall asleep. GPS technology allows drivers to keep track of and record their exact location. The administrator of the suggested web application design will be in charge of configuring the system's parameters and making communication easier for coworkers. The driver's health is monitored using heart rate and temperature monitors that they wear. An alcohol sensor may detect when a rider is inebriated, causing the car to slow down.

Key Words: Eyes Detection, Health Monitoring, Alcohol Detection.

I. INTRODUCTION

The phrase "Internet of Things" (IOT) refers to the administration of systems for physical items that include technology that allows them to communicate, learn about their surroundings, and collaborate. Technology based on the Internet of Things (IoT) will transform people's daily lives and make it easier to run enterprises in the future. The Internet of Things (IoT) has gained widespread acceptance in a variety of fields, including medical, management, high-quality healthcare, agriculture, smart cities, and well-designed houses.

India has a serious problem with drunk drivers. Driving while intoxicated is extremely dangerous and can have serious consequences. This is quite worrying. The perilous combination of driving a car while fatigued or sleepy is known as "drowsy driving." This is commonly caused by a driver not getting enough sleep, but it can also occur if they work shifts, drink alcohol, or take medication. Figure 1 depicts a graph illustrating how many car accidents were caused by tired drivers during a given year. The data illustrate how many fatal accidents occur each year.

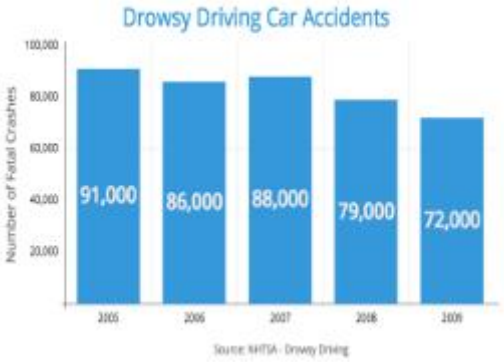

Fig.1Accidents due to drowsy driving

However, the number of persons engaging in the harmful behavior of drinking and driving has increased. Every year, over 200 individuals are killed as a result of drunk driving. Other visitors, in addition to the driver and other passengers, suffer negative consequences. According to a 2016 survey, 390 persons in automobiles and 100 pedestrians were killed or badly injured in incidents caused by intoxicated drivers. During that year, forty children were murdered or seriously injured by drunk drivers.

The specific method by which our bodies enter sleep is yet unknown. It goes without saying that falling asleep behind the wheel is dangerous, and it also makes driving less safe. As depicted in Figure 1, the National Highway Traffic Safety

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Administration reports that driving drowsiness caused 72,000 accidents, 44,000 injuries, and 800 deaths in 2013.

Fig.2 (a) Open eyes

Fig.2 (b) Close eyes

It is becoming increasingly difficult to find a solution to this predicament. This method was used to investigate eye health parameters and status. A USB camera and Raspberry Pi were used to assess the driver's vision. Figure 2(a) shows the driver's eyes open. Figure 2(b) shows the driver's eyes closed. It triggered a buzzer to alert the driver if they displayed any signs of drowsiness, which is defined as closing their eyes for more than five seconds. Sensors for measuring temperature and heart rate were utilized to determine body temperature and heart rate. An alcohol sensor measures the amount of alcohol gas in the air. When alcohol is present, the motor slows down. GPS tracks the driver's location, allowing doctors and coworkers to contact him if they require assistance. The information is delivered to the server (cloud), which subsequently sends a message to the coworker informing them of the driver's status.

II. LITERATURE SURVEY

There is a growing desire among individuals to study methods for enhancing the remote access models employed in health monitoring measures and driver sleep detection. Researchers have previously examined the factors that contribute to fatigue.

The research report titled "Survey on Driver's Drowsiness Detection System "has this title. Omkar Dharmadhikari devised a technique to assess driver fatigue by monitoring the driver's yawning and head tilt.

The title of the paper is "Enhancing the Detection of Drowsy Drivers through Analysis of Facial Movements." The text is enclosed by tags. Esra Vura and Mujdat Cetin developed the Facial Action Coding technique and enhanced the database through the utilization of machine learning.

The user inputs the value of "[6]" for the prompt "A research paper concerning an Internet of Things-based system designed to monitor the health and concentration of drivers." T. Shwetha, J. Panduranga Rao, and B. Sreenivasu were pioneers in the development of the Internet of Things (IoT). The driver's health was assessed using a temperature sensor and a heart rate monitor, while their vision was examined using a camera.

The research paper titled "Automatic Driver Drowsiness Alarm and Health Monitoring System" is available for purchase Ganga T. K. and B.T. Petkar developed the device with a microprocessor.

III.DESIGN REQUIREMENT

A. Hardware

- Raspberry-pi 3
- USB Camera
- Temperature Sensor(DHT-11)
- Heart Beat Sensor
- Alcohol Sensor(MQ-3)
- Speed Limiter
- GPS
- Buzzer

B. Software

- Python IDE
- Communication Protocol
- HTTP

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- Open CV

IV. BLOCK DIAGRAM

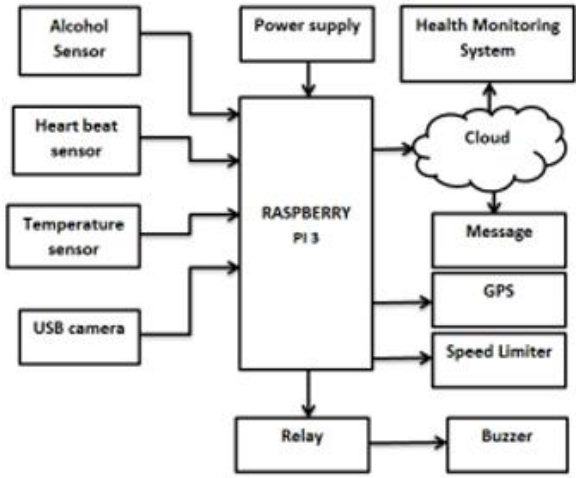

Fig.3 Block diagram

Description of Block Diagram:

Figure 3 shows the block design for the IOT-based driver sleepiness detection and health tracking system. The Raspberry Pi 3 includes sensors, GPS, a USB camera, a speed controller, and a buzzer. The Raspberry Pi-3 receives data from temperature and heart rate monitors. The monitors measure the signals of health. An alcohol sensor is used to determine whether a driver is under the influence of alcohol. A speed limit has been implemented to keep things under control. When alcohol is found in the car, the vehicle slows down. A USB camera is integrated to continuously monitor the driver's eye location. If the motorist locks their eyes for more than five seconds, the buzzer will sound. When the driver hears the bell, he pays attention. Taking this action can prevent the accident from occurring.

All information is forwarded to the server's health monitoring system. A message is sent to the driver's coworker to let them know how he is doing. Hospitals can use GPS to track a driver's whereabouts even in an emergency, allowing them to provide assistance.

Information of Raspberry pi 3

The Raspberry Pi 3 has a central processing unit (CPU), universal serial bus (USB) connections, general-purpose input/output (GPIO) plugs, and the ability to connect to a display serial interface (DSI) or a camera serial interface (CSI). Figure 4 shows how the Raspberry Pi is set up.

The Raspberry Pi 3 B, released in 2016, contains a quad-core CPU, making it eighty percent quicker than the Raspberry Pi 2. It also outperforms the previous model, by a factor of several.

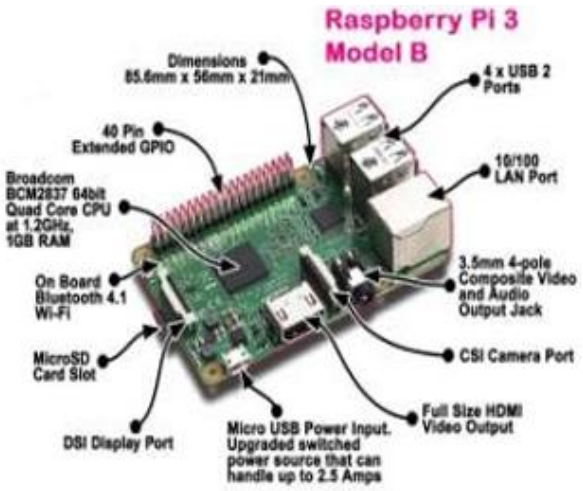

Fig.4 Raspberry Pi 3

Heartbeat Sensor

Optical power changes can be utilized to determine how quickly the heart beats. The sensor is activated when it comes into contact with the driver's finger. This takes up the driver's pulses and delivers them to the Raspberry Pi. Figure 5 shows the current heartbeat monitor. There are three pins on the device: ground, +5V, and output. Photoplethysmography is the science that explains how a heartbeat tracker works. The intensity of the light varies as the amount of blood in the body fluctuates.

Fig.5 Heartbeat Sensor

Temperature Sensor DHT11

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Figure 6 demonstrates how the DHT11 sensor's pins are configured. The gadget has three pins: ground, data, and VCC. This sensor is referred to as a digital sensor because the data pin it employs is digital in nature. The DHT11 monitor can determine both the temperature and humidity. This product is really durable and will last a long time. The gadget includes both a resistive element and an NTC type thermostat. The voltage supply required is 5V. This monitor measures temperatures from 0 to 50 degrees Celsius and is accurate to within 2 degrees Celsius of that range. The humidity ranges from 20% and 90% relative humidity.

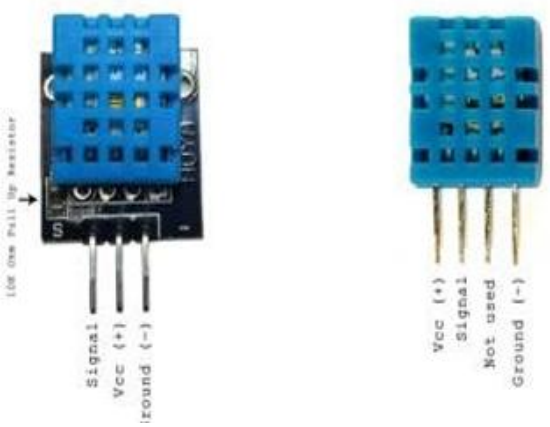

Fig.6 Temperature Sensor

Alcohol sensor(MQ3)

This sensor measures how much alcohol is in a person's exhaled breath. It responds rapidly and is quite sensitive. This semiconductor sensor can detect alcohol concentrations ranging from 0.05 to 10 mg/L. It is feasible to understand or simplify the data from this sensor. The Raspberry Pi, Arduino boards, and microcontrollers are all designed to be compact. The MQ3 alcohol meter is depicted in Figure 7. It includes a standard yield stick, a digital yield stick, ground, and four VCC pins.

Characteristics:

- 5V DC or AC circuit
- Requires heater voltage
- Operation Temperature: -10 to 70 degrees C
- Heater consumption: less than 750mW

Fig.7 Alcohol Sensor MQ3

USB Camera

It is simple to connect a USB camera to any version of Windows. USB technology allows for speeds of up to 480 megabits per second (Mb/s). It also offers a download speed of up to 5 Gbps. Edmund Optics has a large selection of USB cameras to pick from. EO USB cameras feature both CMOS and CCD sensors. Figure 8 illustrates that a USB camera is installed.

Fig.8 USB camera

GPS System

GPS is a satellite-based navigation system that tells users exactly where they are and what time it is, regardless of the weather conditions. GPS is also used to plot routes for trucks, automobiles, boats, and planes. The framework serves basic duties to people from all walks of life, including citizens and military personnel all across the world. The worldwide tracking system allows you to navigate and track time from anywhere in the world. Figure 9 depicts the specific processes required to establish a GPS link.

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Fig.9 GPS tracking system

Speed limiter

A speed limiter is designed to slow down a car when necessary. In the case that the driver is intoxicated, this project uses a speed limiter to decelerate the vehicle. To prevent the accident from occurring.

Buzzer

Direct current (DC) control allows bells to function as ordered electronic devices that produce sound. They are used in a wide variety of electronic products, including computers, printers, scanners, alarms, toys, automobiles, phones, clocks, and other voice-activated equipment. Signals can be put up in a variety of methods that are always changing. It may be a piezoelectric, electromechanical, or mechanical bell or beeper. A sound-flapping device is one that produces noise.

Cloud Computing

People who sign up for the cloud can access PC framework resources such as storage space and processing power whenever they need them, rather than having to manage them themselves. This term is commonly used to refer to data centers that many people can access via the Internet. Widespread fog, which occurs frequently these days, can occasionally have capabilities distributed across multiple locations from central servers. In rare circumstances, if the client and group are close enough, they may be assigned an Edge server.

A cloud element in this technology allows the driver to send messages to a coworker and access the database via a health tracking center.

V. RESULTS

Fig.10 Hardware Setup

Figure 10 depicts how the gear is configured. Python software allows you to select an area of interest (ROI) around the eyes. Figure 11 depicts an example of a square or rectangular box used to identify eyes. The gadget can determine if the eyes are open or closed. You can detect if someone is drowsy by glancing at their eyes and determining whether they are closed or open. If the driver begins to feel sleepy, a warning will sound.

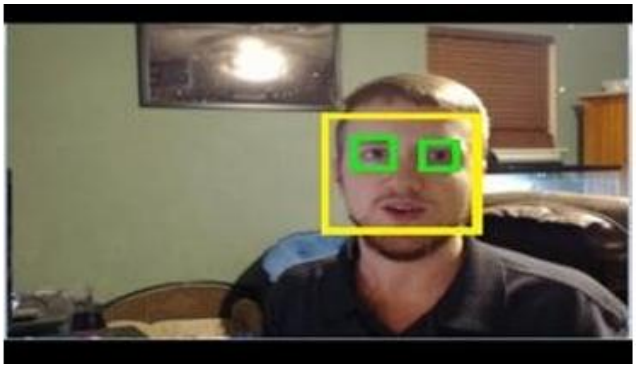

Fig.11Sleep state of person

Also determine the health parameters i.e. heart beat and body temperature is shown in the form of graph or table. As shown in fig. 12

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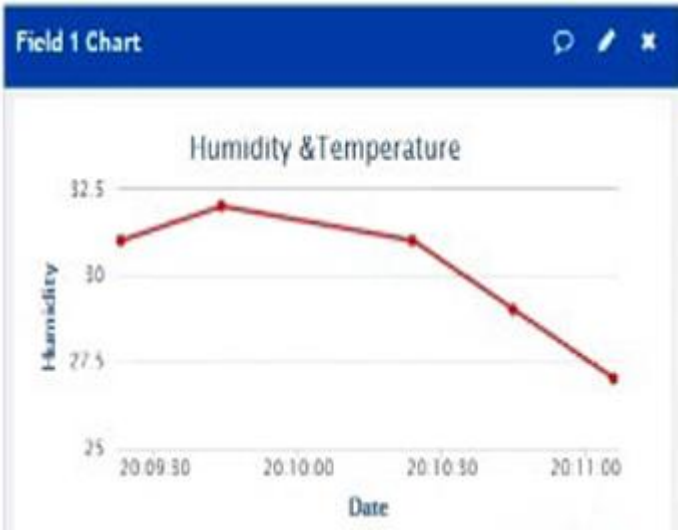

Fig.12 Graph of humidity and temperature

VI. CONCLUSION

The Internet of Things (IoT) is utilized in this project to investigate and develop a system for monitoring a driver's health and identifying fatigue. The purpose of our initiative is to deliver cost-effective solutions to real-world situations. When the driver's eyes close for more than one second due to fatigue, the buzzer sounds. This invention employed a temperature and heartbeat sensor to monitor the driver's health. An alcohol sensor is used to determine how much alcohol a driver has consumed. If alcohol is found, the car will take longer to accelerate. With GPS, medics or a coworker can contact him in the event of an accident. As a result, the frequency of crashes decreases. With this in mind, incorporating our technology into company will assist save the driver's life, which is critical.

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