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HEART ATTACK, ALCOHOL DETECTION AND MONITORING IN SMART TRANSPORTATION SYSTEM

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Abstract: This project presents the development of an innovative smart transportation system using the Arduino Uno microcontroller, designed to enhance driver safety by monitoring heart attack symptoms and detecting alcohol consumption in real-time. The primary objective is to prevent accidents caused by health emergencies and impaired driving by implementing an automated emergency vehicle stop mechanism.

The system integrates a pulse sensor to continuously monitor the driver's heart rate, detecting irregularities such as tachycardia (abnormally high heart rate) or bradycardia (abnormally low heart rate) that may indicate an impending heart attack. Concurrently, an MQ-3 alcohol sensor measures the driver's breath alcohol concentration, identifying levels that exceed a predetermined threshold indicative of intoxication. Both sensors relay data to the Arduino Uno, which processes the information and triggers appropriate actions.

In the event of detecting an abnormal heart rate or high alcohol concentration, the system initiates multiple safety protocols. It activates an alert system, including a buzzer and an LCD display to notify the driver, and uses a GSM module to send emergency notifications, including the vehicle's current location, to predefined contacts such as emergency services or family members. Simultaneously, a relay module interfaced with the Arduino Uno controls a motor driver to safely bring the vehicle to a gradual stop, preventing sudden halts that could cause further hazards.

Keywords: Arduino UNO, Alcohol Sensor, Heat beat sensor, Enhanced Road Safety, Emergency Vehicle Stops.

I. INTRODUCTION

In today's fast-paced world, ensuring the safety of drivers is paramount to reducing the occurrence of road accidents and fatalities. One significant aspect of enhancing driver safety involves the real-time monitoring of health conditions and sobriety levels, particularly in the context of heart attack symptoms and alcohol consumption. This project focuses on developing a smart transportation system using the Arduino Uno microcontroller to address these critical safety concerns. The system is designed to monitor drivers for heart attack symptoms and alcohol consumption in real-time and to automatically stop the vehicle in case of emergencies, thereby preventing potential accidents.

II. LITERATURE SURVEY

Peter Leijdekkers et al. [1] of University of Technology, Sydney proposed an arrangement of individual trial application, which diminishes defer time between beginning of heart assault and a notification to the crisis administrations. The individual test comprehends these issues by utilizing inescapable innovation: a cellular device and a little ECG sensor which can be worn and is effectively conveyed by the individual. By soliciting a set from inquiries, the individual acknowledges what they went through can be a heart assault. The application additionally investigations two ECG chronicles on the cellular device for heart assault signs to affirm this. In this way, the application can rapidly survey the client's condition and give suitable exhortation without the intercession of a therapeutic expert. It additionally directs the client and spectators in getting the correct help via computerizing the call. The ECG is recorded and dissected progressively on the cellular device utilizing a 2 terminal, 1- lead heart monitor. The calculation utilized here can identify the heart beat anomalies, for example, ventricular tachycardia. In the event that the application finds out that the user is in danger it encourages the user to notify the authorized administration right away. In a situation that user has a heart failure the system consequently decides the present area of the user and alarm the emergency ambulance and other required people to the user's area.

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Dr.A.A.Gurjar et al. [2] of Sipna COET, Amravati, proposed a framework where heartbeat is checked and heart assault location is noted. The sensor used is interlinked to a microcontroller that allows reading pulses and sending them over Internet. The user may set the high and low limits of heartbeat. Later, monitoring begins to check if the heartbeats are crossing the limits either way. The transmitting circuit with the patient and the other circuit with the authorized personnel are used. Heartbeat sensor is used to identify the current pulse rate and display it on the LCD screen. This suggested system can be used in all places without any constraints. There is no obligation to stay at home and use the device.

Nikunj Patel et al. [3] of CSPIT, CHARUSAT proposed a framework which has a distinction of identifying heart assault with assistance of watching pulse dependent on web of thing. Our strategy utilizes a heartbeat sensor, Arduino board and a Wi-Fi module. In the wake of setting up the framework, the beat sensor will begin detecting pulse readings and will show the heartbeat of individual on LCD screen. Likewise, with the utilization of Wi-Fi module it will transmit the information over web. Framework permits a set point which can help in deciding if an individual is sound or not by checking his/her pulse and contrasting it and set point. In the wake of setting these limits, the framework will begin checking the pulse of patient and quickly the pulse goes above or beneath as far as possible the framework will send an alarm message. As a piece of this undertaking we are executing an android application show that will follow the heartbeat of specific patient and screen it effectively and give the crisis message on odds of heart assault.

In [4] describes about 2029, approximately after 35 years the Internet went important, and today the world, its people, and devices Volume 04, Issue 07, Jul 2020 ISSN 2581 – 4575 Page 180 are connected in ways that the Internet's importance could never have imagined.

In [5] is about the fuel emission and how much air pollution is happening due to vehicle's engine is running in red sign.

In [6] describes about waiting time in traffic signal for unwontedly that is if there is no vehicles crossing the road even though they have to wait, so by making traffic lights to change according to the number of vehicles waiting in the signal.

In [7] describes about the automatic driving car using cameras for recognizing the white lines and signs.

In [8] describes about the safety camera is fixed inside vehicle for monitoring the driver whether the driver is following the rules like applying brake for stop sign and driving manner.

In [9] describes about the wearable glass which alert the driver using cloud computing and guiding driver for take necessary action according to situation Now a day's road accidents are becoming serious public health problem. The annual report published by Transport Research Wing about road accidents in India 2015. India is one of the highest motorization growth rate countries in world, but now our country is facing serious impact of road safe levels. There is 2.5 per cent increased in road accidents from 4,89,400 in 2014 to 5,01,423 in 2015. Likewise total number of persons killed in road accidents increased by 4.6 per cent from 1,39,671 in 2014 to 1,46,133 in2015. Injuries also increased by 1.4 per cent from 4,93,474 in 2014 to 5,00,279 in 2015. The road accidents severity will be measured in terms of number of persons killed per 100 accidents increased from 28.5 in 2014 to 29.1 in 2015. The survey of road accidents in 2015 reveal that about 1,374 accidents and 400 deaths is takes place every day, which may further translates into 57 accidents and loss of 17 lives as average every hour in our country.

III. SCOPE

The scope of this project encompasses the development and implementation of a comprehensive smart transportation system that integrates real-time monitoring of driver health conditions and alcohol detection using Arduino Uno. This system aims to enhance road safety by proactively identifying and addressing critical situations such as driver intoxication and health emergencies. By leveraging advanced sensors to measure alcohol levels and heart rate, the system continuously monitors the driver's state and provides timely alerts through visual and auditory signals. Additionally, the project includes an emergency response mechanism that can automatically stop the vehicle and notify emergency contacts via GSM communication in case of detected anomalies. This initiative not only focuses on individual driver safety but also aims to reduce the risk of accidents on the road, thereby contributing to overall public safety. The project further explores the integration of these technologies into existing vehicles, addressing potential challenges in real-world applications, and providing a foundation for future enhancements in smart transportation and automotive safety systems.

IV. PROBLEM DEFINITION

In modern transportation systems, driver safety is a paramount concern. Two critical factors that significantly

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contribute to road accidents are sudden health emergencies, such as heart attacks, and impaired driving due to alcohol

consumption. According to the World Health Organization (WHO), cardiovascular diseases are the leading cause of death globally, and heart attacks while driving can result in severe accidents. Additionally, alcohol-impaired driving remains a major cause of road fatalities, accounting for nearly 29% of all traffic-related deaths in the United States, as reported by the Centers for Disease Control and Prevention (CDC).

V. ISSUES TO ADDRESS

Health Emergencies While Driving: Heart Attacks: Drivers experiencing a heart attack can lose control of their vehicle, leading to potentially fatal accidents. Early detection of heart attack symptoms, such as abnormal heart rates, can provide critical intervention opportunities.

Alcohol-Impaired Driving: Alcohol Detection: Drivers under the influence of alcohol have impaired judgment and slower reaction times, increasing the risk of accidents. Traditional methods of alcohol detection often require active participation from the driver, which may not always be feasible or timely.

Emergency Response: Timely Alerts and Vehicle Control: In case of a detected health emergency or high alcohol levels, timely alerts and the ability to safely stop the vehicle are crucial to prevent accidents and ensure the driver's safety.

VI. PROPOSED SYSTEM

The proposed system “HEART ATTACK, ALCOHOL DETECTION AND MONITORING IN SMART TRANSPORTATION SYSTEM”, introduces an innovative approach to enhancing road safety by integrating real-time heart attack and alcohol detection monitoring into a smart transportation framework using Arduino Uno. This system is designed to continuously monitor the driver’s heart rate and alcohol levels, providing immediate alerts in case of any abnormalities. By utilizing advanced sensors for heart rate and alcohol detection, the system ensures that any critical health issues or impairment due to alcohol consumption are promptly identified. The Arduino Uno microcontroller processes the data from these sensors and triggers visual and auditory alerts through an LCD display and buzzer, thereby notifying the driver of potential dangers. In severe cases, the system can automatically stop the vehicle using a relay and vehicle motor controller, preventing accidents and ensuring the driver’s safety. Additionally, the integration of a GSM module enables the system to send SMS alerts to predefined emergency contacts, ensuring that medical assistance or help can be quickly summoned. This proactive approach not only aims to prevent accidents caused by sudden health emergencies or impaired driving but also significantly enhances the overall safety of the transportation system. The proposed system leverages affordable and accessible technology, making it a cost-effective solution that can be widely adopted across various vehicle types. Through this comprehensive and preventive strategy, the project addresses the critical need for continuous driver health and sobriety monitoring, paving the way for safer roads and smarter transportation systems.

VII. BLOCK DIAGRAM AND CIRCUIT DIAGRAM

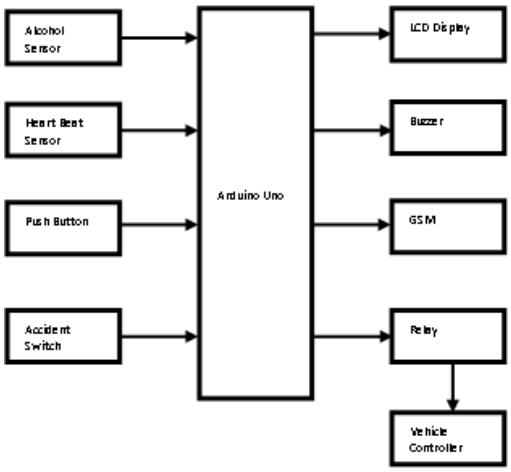

FIGURE 1 Block diagram of Heart attack, alcohol detection and monitoring system.

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VIII. COMPONENTS OF BLOCK DIAGRAM

As we can see in the Fig 1, the block diagram of the system has many blocks has been explained below,
1. Arduino Uno: Function: Arduino Uno serves as the central processing unit (CPU) of the system, responsible for interfacing with and controlling all other components.
Role: It receives inputs from sensors, processes data, and triggers appropriate outputs based on predefined logic and algorithms.
2. Alcohol Sensor: Function: This sensor detects the presence of alcohol vapors in the vicinity, typically from the breath of the driver.
Role: It provides analog or digital signals to the Arduino Uno based on the concentration of alcohol detected.
3. Heartbeat Sensor: Function: Monitors the driver's heart rate by measuring changes in blood volume inside the fingertip.
Role: It sends heartbeat data to Arduino Uno, allowing real-time monitoring of the driver's health status.
4. Push Button: Function: A manual input device used for initiating specific actions or resetting the system.
Role: It can trigger emergency protocols or reset alarms based on user interaction.
5. LCD Display: Function: Provides visual feedback by displaying relevant information such as heart rate, alcohol level, system status, and alerts.
Role: Arduino Uno sends data to the LCD display for real-time monitoring and user interaction.
6. Buzzer: Function: An auditory output device used for generating sound alerts and notifications.
Role: Arduino Uno activates the buzzer to alert the driver and surroundings in case of detected anomalies or emergencies.
7. GSM Module: Function: Enables communication via mobile networks to send SMS alerts and notifications.
Role: Arduino Uno uses the GSM module to alert emergency contacts or authorities about critical situations such as high alcohol levels or health emergencies.
8. Relay: Function: An electrically operated switch that controls high-power devices or circuits using low-power signals.
Role: Arduino Uno uses the relay to control the vehicle motor controller for initiating emergency stops or other safety protocols.
9. Vehicle Motor Controller: Function: Controls the operation and speed of the vehicle's motor or engine.
Role: Arduino Uno interfaces with the motor controller to execute emergency vehicle stops safely and smoothly in response to detected emergencies.

IX. CIRCUIT DIAGRAM

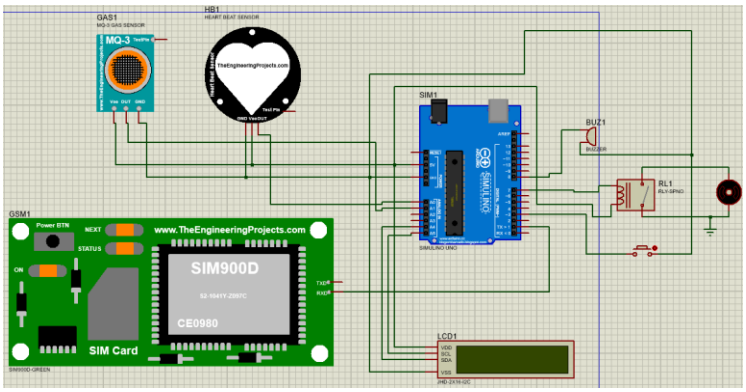

FIGURE 2 CIRCUIT DIAGRAM OF HEART ATTACK, ALCOHOL DETECTION AND MONITORING SYSTEM.

X. WORKNIG PRINCIPLE

The working principle of the circuit diagram shown in Fig 2, revolves around integrating various components to create a smart transportation system aimed at enhancing driver safety through real-time monitoring, detection of critical health conditions, and automated emergency responses.

At its core, the system uses an Arduino Uno microcontroller as the central processing unit. This Arduino interacts with several sensors: an alcohol sensor and a heartbeat sensor. The alcohol sensor detects alcohol vapors in the vicinity, typically from the driver's breath, using chemical or semiconductor methods. It sends a signal to the Arduino, indicating the detected alcohol concentration. Simultaneously, the heartbeat sensor measures the driver's heart rate by detecting changes in blood volume in the fingertip. This sensor also sends data to the Arduino, providing real-time monitoring of the driver's health status.

Upon receiving data from these sensors, the Arduino processes the information using predefined algorithms. It continuously compares the alcohol concentration against a predefined threshold and monitors the heart rate for

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irregularities. If the alcohol level exceeds the threshold or if abnormal heart rate patterns are detected, the Arduino triggers a series of actions.

These actions include activating visual alerts on an LCD display, which shows the current sensor readings (such as heart rate and alcohol level) and system status. Additionally, the Arduino activates an auditory alert through a buzzer to immediately alert the driver of the detected anomalies.

In critical situations where immediate action is necessary, such as the driver being incapacitated due to high alcohol levels or a health emergency, the Arduino triggers a relay. This relay then controls the vehicle motor controller to initiate an emergency stop. This automated response mechanism ensures that the vehicle can be brought to a safe halt promptly, minimizing the risk of accidents.

XI. RESULTS AND DISCUSSION

Sl no	Test carried out	Engine condition	Result
Case 1	Driver entered without drinks	Engine started normally	No messages went to configured phone number
Case 2	Driver entered with drinks	Engine cut off	Alert message went to configured phone number
Case 3	Driver taken drinks while driving.	Engine cut off with buzzer sound and emergency lights around the vehicle.	Alert message went to configured phone number
Case 4	Driver had normal heart beat	Vehicle will move normally.	No messages went to configured phone number
Case 5	Driver had the low Heart beat	Vehicle engine will cut off with buzzer and emergency lights on Backside the vehicle.	Alert message will go to configured phone number

Case 1: Driver entered without drinks.
The display will show the below shown message.

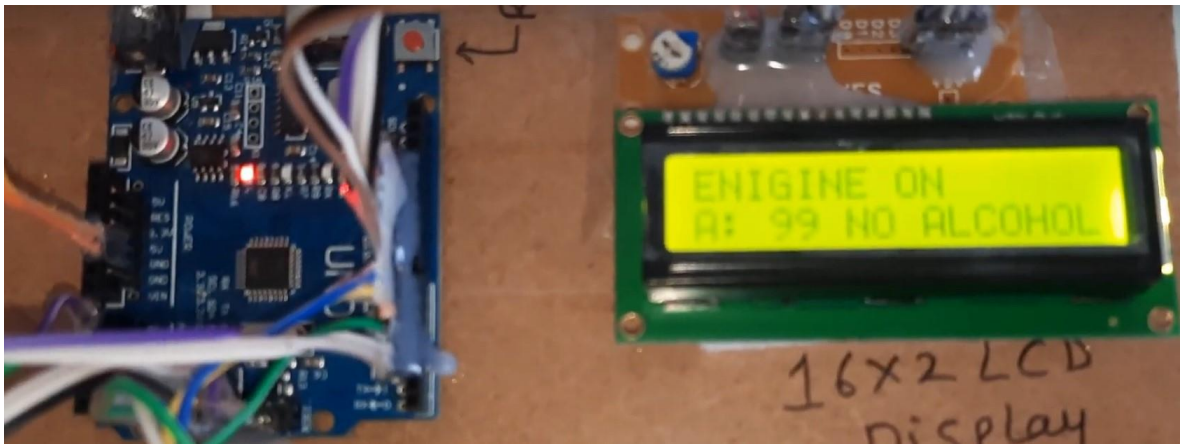

FIGURE3: DRIVER ENTERED WITHOUT DRINKS

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Case 2: Driver entered with drinks.

FIGURE4: DRIVER ENTERED WITH DRINKS.

Alert Message

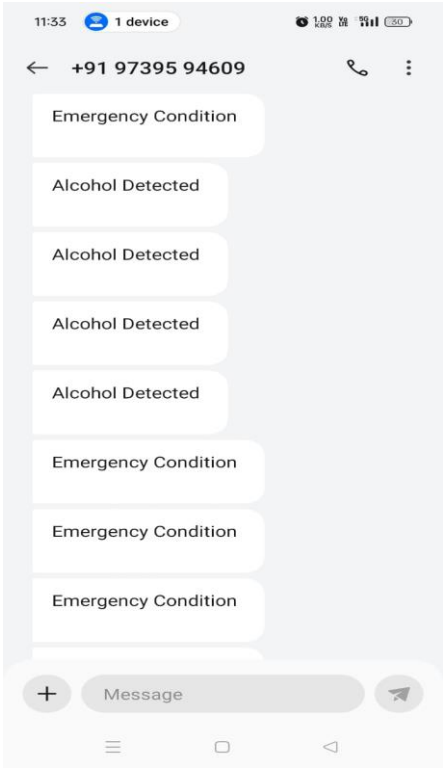

FIGURE5: ALERT MESSAGE

Case 4: Driver had low heart beat:

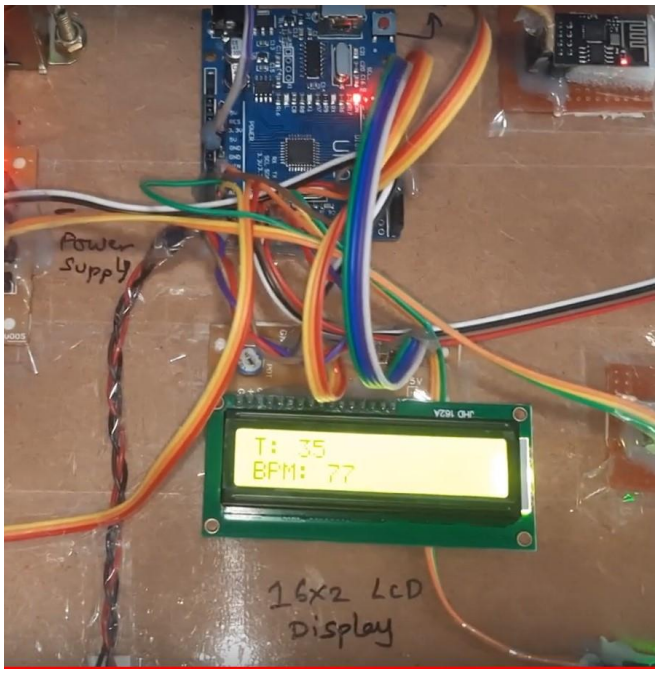

FIGURE6: DRIVER HAD LOW HEART BEAT

Alert Message

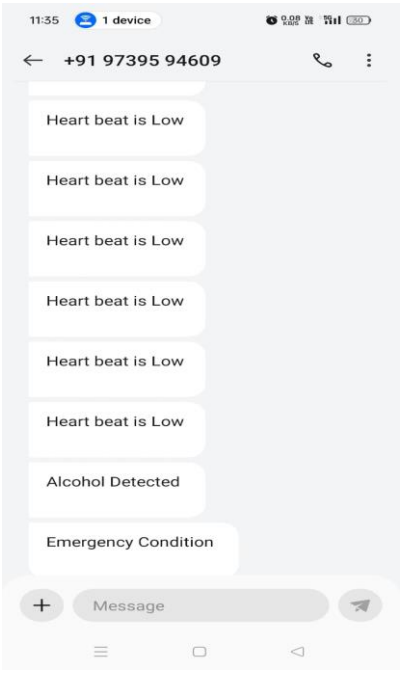

FIGURE7: ALERT MESSAGE

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XII. CONCLUSION

The implementation of the smart transportation system designed for monitoring driver health conditions and detecting alcohol levels has demonstrated significant potential in enhancing road safety. By integrating advanced sensors, a microcontroller, and communication modules, the system effectively monitors critical parameters such as alcohol concentration and heart rate in real-time. This proactive approach enables early detection of potential health emergencies or impaired driving situations, allowing for timely intervention and potentially preventing accidents.

The results from the system's implementation underscore its reliability in alerting drivers to abnormal conditions through visual alerts on the LCD display and auditory alerts via the buzzer. The automated emergency response mechanism, activated through the relay and vehicle motor controller, proved effective in swiftly bringing vehicles to a safe stop when critical conditions were detected, thereby mitigating potential risks on the road.

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