

A Research Paper on Car Engine Control System Based on Driver's Health for Economic Car

Prof. Abhijit S Mali¹, Miss. Sukhada Sunil Ghugare², Prof. Juber M. Mulla³

^{1,2} Dept. of E&TC Engg. Tatyasaheb Kore Institute of Engineering & Technology, Warananagar

³ Dept. of Mechatronics Engg. RIT, Islampur

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ABSTRACT

India is growing country. In India road transport facility increases. As the road transport improves it automatically increase the road speed limit. In effect the drivers drive vehicles with high speed that will increase the possibility of the accidents. The car accidents have many causes one of them is due to driver's bad health. Due to sudden heart attack or high blood pressure driver's vision getting blurred it may lead to accident condition. There is a system required that will early detect these type of causes and that will automatically reduce the speed of vehicle. The proposed system will do this using AT328P controller and pulse sensor with drive control to reduce the vehicle speed. This will try to increase the survival rate and reduce the chances of accident.

Keywords— Arduino, GSR Sensor, Flex Sensor, Servo Motor, DC Motor, Motor driver

INTRODUCTION

The function of road transportation is significant in the growing nation. Accident rates will rise in tandem with the growth of road transportation. It is often noted that the majority of accidents occur as a result of a motorist experiencing a heart attack and abruptly losing control of their car. The suggested approach will attempt to address this problem by identifying the heart attack situation early on. The employment of two different types of sensors—the GSR sensor and the flex sensor—to give driver safety measures is the primary emphasis of this article. Human heartbeats vary depending on the circumstances. A pulse sensor that employs Internet of Things control to identify panic situations will continually monitor the driver's heartbeat in order to prevent accidents. IOT alerts the police, ambulance, and owner to the situation. The GPS Neo 6M and GSM SIM 800L are utilized for such notice. The automobile will automatically apply the brakes and slowly come to a stop if it is found that the person's heartbeat has increased. An alert message will be sent to family members or the emergency system with GPS coordinates so that they can get to the scene immediately.

The driver's drunkenness is detected by an alcohol detection sensor, which prevents the engine from starting. The pulse sensor measures the driver's present condition; if the pulses are out of range, the engine will lock and not start. The automobile will sound an alert if the driver feels that he is in a dangerous situation and that his hand grips are moving away from the steering wheel. If he does not respond, the speed of the vehicle will be lowered. The entire system is based on the Internet of Things and uses GSM to send notifications.

LITERATURE SURVEY

Many health problems are arising as a result of the drivers' primary lack of attention to their health, and some people have offered health solutions to prevent this. IoT, cloud, and RFID technology were employed by P.M. Durai Raj Vincent and Jayapradha Soundarajan [1] as security measures to preserve patient life. To gather various data from various consumers, they employed a number of sensors. Path length, path identification duration, and local efficient threshold, energy, time, and latency are the parameters that Priyanka and Jashanpreet Kaur [2] employed for path identification using ACO. These factors are used to determine the most energy-efficient method that takes the least amount of time, which is utilized in healthcare services. Data

integration utilizing a Raspberry Pi and Docker container, which saves the data on the server and transmits the information to the user, was presented by Kavita Jaiswal, Srikandan Sobhanayak, Bhabendu Kumar Mohanta, and Debasish Jena [3]. Here, the Raspberry Pi uses the associated sensors to gather and store medical data. Through mobile apps, the user may access the received data. Patients' health is improved by the information these applications supply. Lavanya, S., Divya Bharathi, J., and G. Lavanya [4] presented an Internet of Things (IoT)-based intelligent home-centric healthcare platform that offers various medical health applications with minor adjustments and seamlessly connects smart sensors affixed to the human body for physiological monitoring for daily medication management. An intelligent real-time patient monitoring system that can be utilized in homes and hospitals to accurately identify any abnormalities and measure parameters like temperature and ECG was proposed by Mumtaj.S.Y. and Umamakeswari.A [5]. In the event of any anomaly, the system notifies the physicians and caregivers. Additionally, it allows physicians to decrease expenses associated with patient monitoring and maximize the use of available medical resources.

J. M. S. Mulla and S. S. Bidwai [18] on their paper introduces the technique for the deployment and the alerting system for the economic vehicle to identify the accident spots.

From all above literature it is found that the drivers health monitoring system is not that quick and it will require the advanced sensor network that will used to sens the problems quickly and aler the user. In some paper it is found that for aler system only buzzer is attached but with the buzzer there is need of vibration motor is require to alert the driver on the steering wheel. So from this survey it is decided to use the GSR sensor for the panic detection and the pressure sensor mounted on the steering wheel as well as alertiing system.

METHODOLOGY

Entire system is operated using microcontroller AT328P. There are five sensors are attached with its input side. These sensors collect different data like pulse rate, blood pressure, grip pressure of driver. After getting that data driver's health will be predicted. If there is any issue then message will be send to the ambulance system or the relatives with the GPS coordinates. Then proximity sensor collect the data and as per the ultrasonic sensor data the motor driver will slow down the speed of wheels and shift the car to the left side. Using servo motor controller the hand breaks will be applied. The status of the entire system will be available on the LCD display. The entire system block diagram is available in Fig. 1.

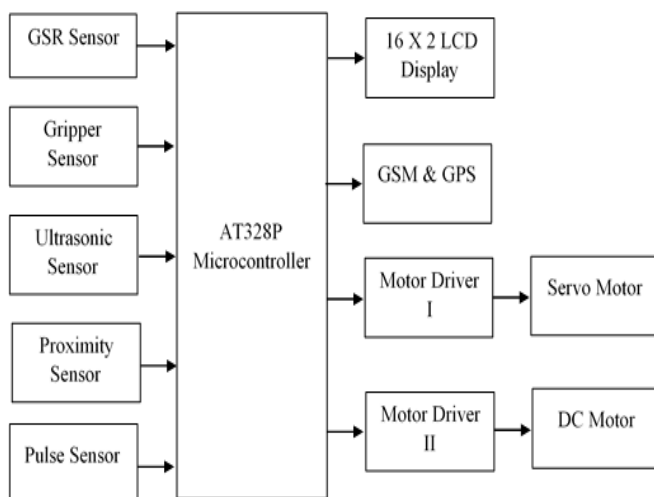


Fig. 1. Block Diagram of Proposed System

The flowchart of the system represent the sensor operations. Once the sensor is initialized then the system will be activated. Then sensor continuously start to detect the available data. If the user having any issue regarding health and heart it will be detected by the GSR sensor and it will send signal to the controller and controller generates the alert signal as well as the alert message send to the persons so that the person gets the real time coordinates of the driver and easily helping agencies reaches to the accident spot. The flowchart for proposed system is as follows,

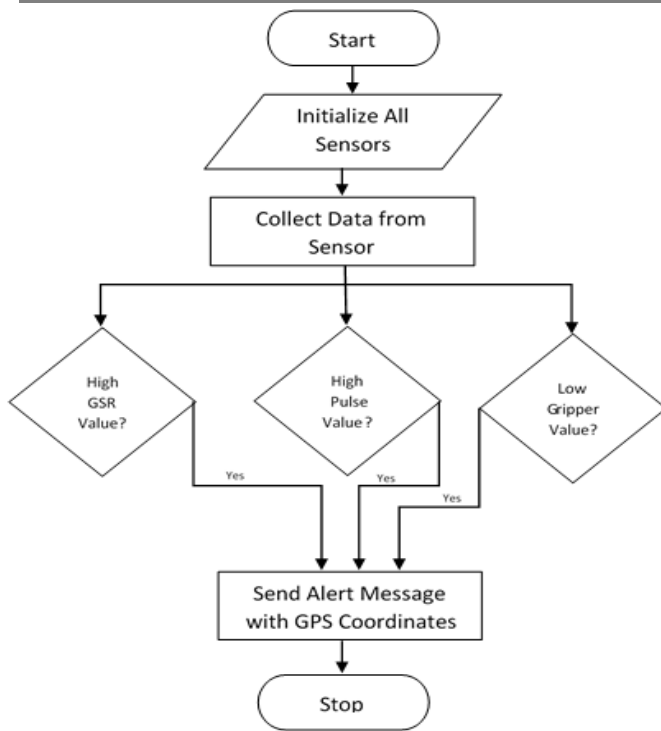


Fig. 2. Flowchart of the system

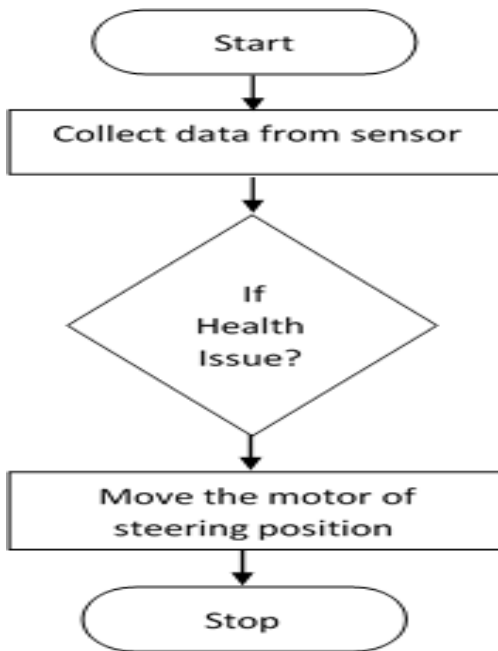


Fig. 3. Flowchart of 2nd part(lane detection) of the system

The above flowchart represent 2nd part of the system. Once the sensor is initialized it will start to detect the health of the drivers. If the limit crosses the threshold limit then it will automatically start to buzz the speaker and still the problem continues the system automatically transfers the operation to the automatic mode and starts to detect the lane. If no one present near or back side of the car. The car steering start to tilt slowly. And finally reach to the left most side of the road. After that system send the warning message. In this way the second part of the system will work.

RESULT

For the proposed project, software simulation is created to verify the correctness of the system and its intended operation. The circuit diagram that results from that is as follows:

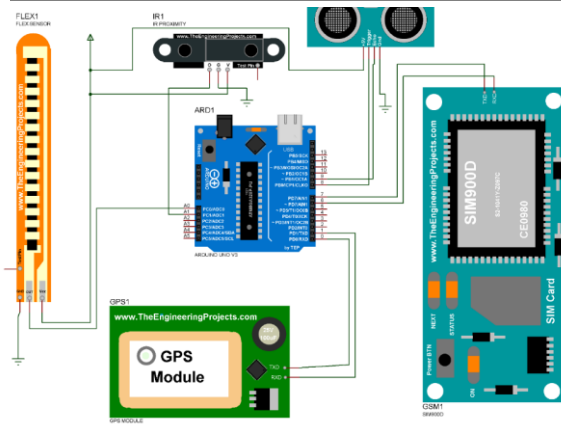


Fig. 4. Actual Working Diagram of Proposed System

Here, the GPS and GSM modules' TX and Rx pins are linked to the Arduino UNO. Serial data will be used for communication between these models and the UNO. When pressure is applied to the steering wheel, the flex gripper sensor senses it and converts it into an electrical signal. The wheel motor and hand brake sensor's output. Fig. 4 displays the Arduino Uno motor connection.

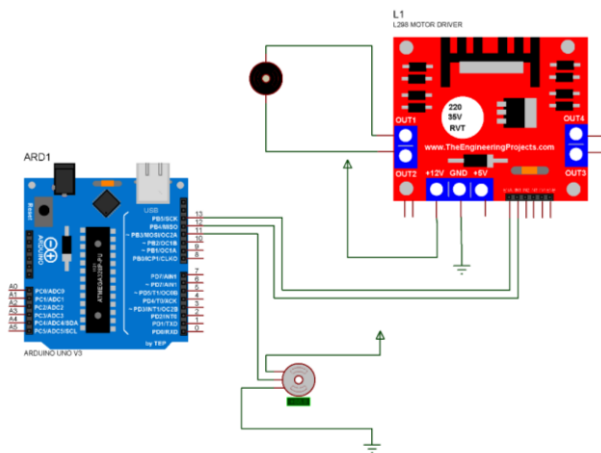


Fig. 5. 2nd Part of Proposed System

The following table represents the data detected by the sensor while testing.

Table I. Sample values of the sensors and it's data

Sr. No.	Pressure Sensor	GSR Sensor	Status
1.	120	80	Normal
2.	132	85	Normal
3.	142	145	Moderate Problem
4.	0	155	Danger
5.	20	160	Danger
6.	0	82	Moderate Problem
7.	125	85	Normal

The above table displays the values of GSR and the Pressure sensor. Here the values of pressure sensor varies between zero and the 200. Whenever values are less than 50 it is predicted as the danger condition. As the danger condition it will send the message with the location to the relatives or the ambulance system networks. If only one sensor value is triggered the lower limit it will only display the moderate problem. There might be a chance of the danger but still no any confirmation from the system that condition is not taken in the danger region. It is the same as the normal condition but alert is stated. The threshold value for the heart rate sensor from the above result is set to be the 80 and the 120 for the pressure sensor that will be considered as the normal value but if increases it will be considered as the fault in human body.

If G is the GSR sensor value and the P is the pressure sensor value then the current state will be calculated as,

$$G_{Th} = 8 \text{ ----- (1)}$$

$$G1 = R * G_{Th} / 100 \text{ ----- (2)}$$

$$G = G1 - G_{Th} \text{ ----- (3)}$$

From equation number 3 we can calculate the GSR sensor value and compare it with the observed value. The difference between them will be used to calculate the actual value of the Danger condition.

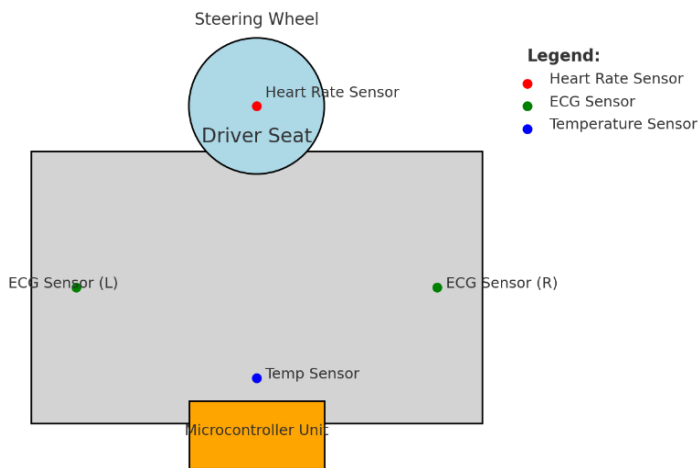


Fig. 6. AutoCAD design for the entire system

The above figure 6 represents the AutoCAD design of the entire structure. The sky blue color area represents the steering wheel. Where we implemented the Heart rate sensor. The ECG/GSR sensors are connected to the human hand using the wired connection. The temperature sensor is also attached to that wire connected system. Then the entire circuitry is interfaced with the microcontroller unit. In this way the entire circuit is mounted on the vehicle dashboard.

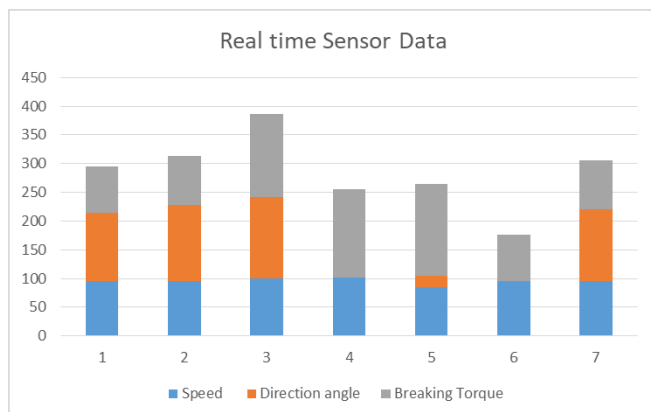


Fig. 7. Realtime data analysis

In above figure the realtime sensor data is available from this data we can say that normal condition having every sensor data in the above 100 but if there is danger condition then the data remains below the 100. In condition 4 and 5 it is observed that the danger condition.



Fig. 8. Car data analysis

From the above figure car data is analyzed using speed direction angle and the breaking torque. As the danger condition is there then the value to torque is increases to apply the break as well as the car is telted in the left side direction so the it will remain same from the accidental condition.

FUTURE SCOPE

Economical car engine control system based on driver health Because India cars are compatible with the growing trends in AI, IoT, and smart transportation, they provide a wide range of possible future uses. In the future, health monitoring systems and autonomous driving capabilities may be integrated, enabling the vehicle to safely park or slow down in the event that the driver's condition suddenly worsens. Using machine learning models on a large set of fatigue and health indicators may enhance the system's ability to predict and prevent health-related problems. By combining health data with national safety databases, authorities may create policies and procedures for monitoring the health of drivers in commercial transportation.

CONCLUSION

In conclusion, an accident prevention system based on driver health monitoring that uses Arduino, GPS, GSM, flex sensors, and GSR (Galvanic Skin Response) sensors holds significant promise for enhancing road safety, especially in commercial vehicles. Real-time monitoring is made possible by the efficient processing of sensor data by the Arduino central controller. GPS makes precise vehicle tracking possible, which is crucial in the event that an alarm is activated since it informs emergency services and fleet management of the car's location. By allowing communication between the vehicle and control centers and providing alerts about the driver's whereabouts or condition, GSM enables quick response. Flex sensors monitor a driver's posture and can help identify sudden movements or fatigue signs that may indicate a medical emergency. By detecting skin conductivity to ascertain stress or alertness levels, the GSR sensor gives more details about the driver's current state.

By combining these elements, the system can continually monitor the driver's vital signs and attention level while also notifying emergency contacts or fleet management in the event of abnormal data. This proactive approach to health monitoring can increase overall road safety by averting accidents caused by driver fatigue, stress, or unforeseen health issues.

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