Intelligent Hazard Alert System Based On GPS System

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Abstract - Stress, fatigue, and lack of focus are some of the most common causes affecting drivers, which can lead to gridlock and even accidents. Development of methods that help monitor and assess driver behavior is one of the issues that has drawn attention in the field of research on traffic accident prevention. This essay discusses the eye blink sensor and notification system-based car accident prevention technique. In this project, infrared sensor is used to compute eye blinking. The infrared photons into eyes are sent by the IR transmitter. The throwback infrared light from the eyeball is obtained by the IR receiver. When the eye closed, the IR receiver's output is high; otherwise, low. This is done to detect if the eye is opening or shutting. The logic circuit uses this output to signal an alert. We are able to operate the car automatically when the driver is sleepy. Thus, accidents brought on by sleepiness are avoided. A vibration sensor may be used to identify accidents under extraordinary circumstances other than sleepiness. GPS and the HC05 Transmitter module are then used to produce a notification system for the accidents. Because the vibration sensor is configured with a high threshold frequency, it will activate the notification system in the event of an accident.

Index Terms - Eye Blink Detection, IR Sensor, Drowsiness, Vibration Sensor, GSM.

I. Introduction

Driver error is the most responsible factor in each car collision that poses a risk to public safety. For a variety of reasons, many drivers are unable to manage their cars, which can result in serious collisions and even fatalities. One of the most significant contributing reasons to car accidents is napping behind the wheel. Other risks include driving while intoxicated, exceeding the speed limit, and engaging in multiple diversions such as texting or conversing with people or playing with children. People are aware of the risks associated with driving after drinking, but many do not realize how deadly driving when fatigued may be. According to a 2015 study by MoRTH, there are around 1,374 accidents and over 400 fatalities every day. Approximately 57 traffic accidents result in 17 fatalities every hour due to automobile accidents. That means that 54.1% of persons between the ages of 15 and 34 die in car accidents. Research has shown that driving ability declines with growing tiredness, and collisions that arise from this account for almost 20% of all vehicle accidents. However, once lost, life can't be recovered. To some extent, advanced technology provides hope in avoiding problems. This study suggested a sensor-based warning system that specifically uses an eye blink sensor to identify drivers' sleepiness in order to reduce accidents and protect human life. Since drinking alcohol renders a person unconscious, a sense of drowsiness is based on a similar idea. Sleepiness is a mental condition of unconsciousness. Thus, it is possible to almost address every aspect of driving safety and quickly prevent accidents.

II. Literature survey

A wearable device must be worn by the driver in order to acquire their normal heart rate; the value is then kept on the device, according to a technique presented by Riztiane et al. [1]. After it is saved, the motorist may activate their phone's front camera, which will identify the majority of their face—their eyes. Next, the driver's eyes will be monitored to determine whether they are open or closed, and their heart rate will also be recorded to compare their heart rate before and after driving. To ascertain the driver's level of tiredness, both sets of data will be merged. Three degrees of alarm alerts, namely normal, drowsy, or asleep, will be decided based on the stated sleepiness value. Additionally, the warning siren will sound to inform the driver if their eye blinking length goes beyond the pre-established threshold and if their heart rate indicates that they are sleepy. To ensure that the gadget produces an accurate measurement, the driver must limit their movements to a minimum. Gobhinath et al. [2] have presented a further physiological technique that makes use of a few sensors, including body temperature, heartbeat, and eye blink sensor. Throughout this work, the driver's body temperature, heart rate, and blink rate are all captured by different sensors. The measured data are relayed to a microcontroller, where they are compared to prior recoded reference values. An LCD alert will appear if the readings differ from the reference value. Microcontrollers are used to control automobile engines. The microprocessor will lock or stop the engine if the sensors register no output. Leng et al. [3] have presented an approach that is primarily based on motion and biological sensors, similar to [2]. The following design displays a bracelet with several sensors, including galvanic and photoplethysmogram sensors. The driver's smartphone will receive all of the data that has been gathered over Bluetooth. The motion sensor, which has an accelerometer and gyroscope embedded in, analyzes such data. The detection of driver sleepiness is aided by sensor data like , pulse variability, breathing rate, stressl, and adjustment counter. The wristband of the smart watch will vibrate if the sleepiness level reaches 5, which is equivalent to 80% drowsiness.

Naz et al.'s second study [4] examines a driver's eye closure, head movement, and yawning to identify tiredness. When a motorist leans their head while their eyes are closed, an alarm goes off and three warning levels are activated. This approach uses level-based alerts to annoy and notify the driver. To identify driver tiredness, researchers in a different publication employed a sequential approach that included the eyes and face detection methods [5]. The system states that it begins with an initialization phase that includes face and eye detection. The following phases, which include the detection of the eyes' condition and the driver's state, involve tracking the face and eyes in various frames. Furthermore, the sole technique employed to identify tiredness in a relevant publication published by Akrout et al. [6] is yawning detection. During the facial and oral localization steps, Akrout employed the Viola Jones approach. Subsequently, the extraction of the lips is soon afterward the extraction of the spatiotemporal descriptor, which is where the tracking of the lips and the interior mouth are calculated. However, poor mouth localization is the main reason why the yawn detection approach is so often unsuccessful. Other than that, the technology won't work if drivers cover their mouths when yawning since yawning won't be recognized.

III. PROBLEM DEFINITION

A concerning amount of people die in traffic accidents each year. When it comes to driving while intoxicated, reckless drive,motorists distraction, as well as visual weakening, fast, and cramming cars together, most traffic accidents are caused by one or more of the drivers' or passengers' faults. MoRTH, Govt. of India, released a study that said that, on average, one road accident results in the death of nearly every eleventh person out of 100,000, and that, on average, one road accident causes the injury of every 37th person. This is concerning because traffic accidents are entirely preventable. Given the circumstances, addressing the underlying causes of traffic accidents is essential to preventing them. Although automakers incorporate a mechanism to prevent harm to both the driver and the vehicle, no significant measures have been implemented to really prevent collisions. In this regard, the Road Accident Prevention Unit (RAPU) is a positive development. This concept utilises a variety of sensors to monitor the driver's condition and searches for factors that may lead to collisions, such as breathalyzer readings containing alcohol, driver weariness, or distracted driving. The system attempts to warn the driver when it detects an alarming scenario. The technology notifies surrounding cars of the issue and texts the motorists relative if the driver does not answer within the allotted time. It also activates a emergency signal out of vehicle. A commercially viable solution would also cut off the vehicle's power, increasing the likelihood that traffic accidents won't occur and lengthening the critical time for mitigation and preventative actions to be implemented. Only 9% of the incidents that were recorded, according to the Ministry of Transport and Highways' assessment, could be directly linked to material reasons like weather, vehicle issues, or flaws in the road. Furthermore, just 3.7% of the incidents involved a bicycle or pedestrian who was at fault. It was also found that sixty percent of driver-related traffic accidents were caused by speeding, sixteen percent by alcohol or drug usage, and twenty-six percent by driver weariness or clogged traffic. These eloquently highlight the urgency of the issue and the great role that motorists bear in creating traffic collisions. The goal of RAPU is to stop accidents that result from a driver's moment of insanity or total irresponsibility since these kinds of scenarios are completely preventable. The loss of a life in a traffic accident is unanticipated and needless, thus dealing with the issue is imperative.

IV. METHODOLOGY

The driver's level of drowsiness is identified via the eye blink sensor. The eye blink detects drowsiness in drivers by closing the eyelids for a brief period of time. We refer to that state as sleepy state. After the signal has been sent to the microcontroller, an ultrasonic sensor attached to the microcontroller receives it and evaluates its status. Depending on the state, it signals the motor drive. There are two requirements for ultrasonic sensors: the first is that the vehicle has two ultrasonic sensors linked to it. The ultrasonic sensor is currently measuring the distance from both ends. We have given the ultrasonic distance as 20 meters. A beep is created to inform the driver to wake up if a vehicle is present at any end, and a signal is delivered to the motor drive, causing the car to stop abruptly. The driver then restarted the module and carried on with the trip. In the event that there is no vehicle present at either end, the signal is sent to the motor drive. The car is now parked on the left side of the road by rotating the steering-related motor to the left and the main motor for a mere five seconds. A buzzer is then activated to rouse the driver up. The driver then restarted the module and carried on with the trip. The vibration sensor located at the front of the car is linked and set to a high threshold frequency, which allows it to detect accidents in extraordinary circumstances and transmit a signal to the microcontroller. The GPS and GSM modules get a signal from the microcontroller. The GPS position and message are generated by the GSM and GPS module and sent to the appropriate person, police station, or ambulance service. Thus, the rescue procedure moves more quickly than usual. In figure 1, the suggested methodology's thorough analysis is displayed.

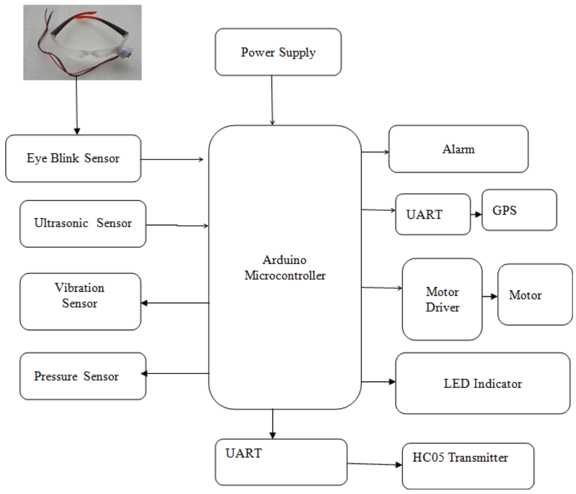

Fig.1.A schematic diagram of proposed methodology

ATMEGA328P MICROCONTROLLER:

The ATmega328 is a kind of Advanced Virtual RISC microprocessor. Supported data processing is eight bits. There contains 32KB of inbuilt flash memory. This has a 1KB EEPROM accessible. This feature shows that the microcontroller can store data and provide results even if its power source is shut off. It does this by requiring energy to be restored. Furthermore, the SRAM of the ATmega-328 is 2KB. Later on, we will go more into the other characteristics. Because of its many distinctive features, the ATmega 328 is the famous device in market at present. These features comprise a real timer clock with an independent oscillator, six PWM pins, an adjustable Serial USART, a programming lock for software security, efficient operation, low power consumption, and throughput of up to 20 MIPS.

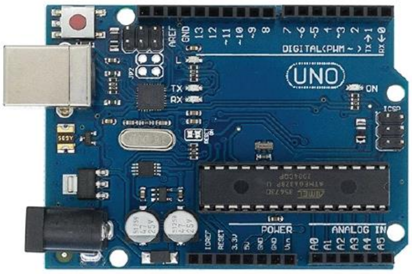

Fig.2.shows Atmega328P Microcontroller

EYE BLINK SENSOR:

When the eyelid is closed, the sensor activates. The infrared rays are what identify it. A UCL researcher estimates that a blink lasts between 100 and 150 milliseconds on average, whereas the Harvard Database of Useful Biological Numbers puts it between 100 and 400 ms. We referred to closures lasting more than 1000 ms as micro naps. The IR sensor, a relay, and the attention blink sensor frame make up this sensor module. The attention blink sensor frame, which the driving force is supposed to wear, is attached to the vibrator gadget. Every time there is an accident or the driver nods off, this vibrator goes off. The module is made up of an infrared transmitter that shoots in the direction of the eyes and an infrared receiver that picks up reflected light when the eyelids are closed. The relay is also linked to the microcontroller board because it supplies the additional current needed by this module.

Fig.3.represents eye blink sensor

VIBRATION SENSOR:

Another name for this sensor is a piezoelectric sensor. These flexible sensors are instruments for sensing different kinds of activities. It converts changes in force, temperature, acceleration, pressure, and strain into an electrical charge using the piezoelectric effects. Any vibration on a piece of equipment will indicate a fluctuation in velocity, that might trigger the accelerometer to generate an electrical signal. The range of the sensor that may be employed will depend on the maximum amplitude or range of the vibration being detected. This sensor's function is to detect any shock applied to the car, simulating an accident happening in real time. The output generates a signal that pauses the wheel's rotation and sends it to the DC micromotor.

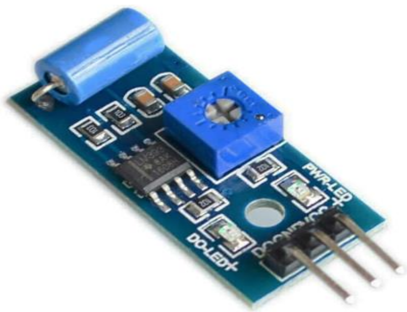

Fig.4.visualizing Vibration sensor

ULTRASONIC SENSOR:

An ultrasonic sensor makes use of ultrasonic sound waves to estimate object's space and then changes the throwback sound to electrical pulses Ultrasonic waves surpass the speed at which sound—that is, sound that is audible to humans—travels. The most often utilized range for ultrasonic sensing is 40 to 70 kHz. Range and resolution are fixed by frequency; lower frequencies result in optimum sensing extent. The measurement resolution is 1cm, the range is up to 11 meters, and the frequency that is most frequently employed is 58 KHz. The way ultrasonic sensors operate is by producing sound waves at a frequency that don't infringe people. After that, they wait for the sound to be reflected back, estimating the necessary time and distance. This is practically the same as radar calculates the time taken for a radio wave to get back from target.

Fig.5.Ultrasonic sensor

GPS:

The GPS module serves as a receiver for GPS signals; it can only transfer the GPS signal acquired via the serial connection to the GPS software on a computer or smartphone for processing. Another name for the GPS position module is the "user part." Similar to a radio, it records relevant position, speed, and time data in addition to receiving and demodulating satellite broadcast C/A coding signals. The GPS module does not send out any signals; it is a passive location device. The GPS module uses the distance rendezvous approach to calculate the pseudo distance with each satellite in order to extract the receiver's longitude, latitude, altitude, and time correction amount of these four parameters. Although it has a fast point speed, there are many errors. The initial positioning module requires the participation of at least 4 satellites in order to perform computations. We call this kind of positioning 3D. Three satellites are able to locate objects in two dimensions, but the accuracy is low. The GPS module continuously communicates positional data and supplementary data in NMEA format over the serial connection interface, enabling the receiver to select the relevant application.

Fig.6. GPS Module

PRESSURE SENSOR:

An electrical device used to monitor atmospheric pressure is called an air pressure sensor, often referred to as a barometric sensor. It is employed in a variety of situations, including as industrial, automotive, meteorological, and medical ones, to detect, track, and regulate air pressure levels.

Fig.7.Prsessure sensor

III. CONCLUSIONS

There are several strategies for avoiding this error from happening again. However, autonomous vehicle control and eye blink sensors are the greatest ways to stop accidents caused by fatigue. Currently, the next ten to twenty years will be dominated by electric cars in an effort to reduce gasoline use. Many nations restrict fuel-consuming cars and provide discounts for purchasing electric vehicles. Therefore, it is relatively simple to install the accident prevention system in electric vehicles that uses an eye blink sensor in conjunction with automated vehicle control. because motors, rather than engines, power the E-vehicle. In contrast, automated vehicle control is a crucial component of modern vehicles, and its installation is a difficult procedure.

IV. REFERENCES

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