Section A-Research paper
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Accident Alert Along With Fatigue Detector

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ABSTRACT

This paper describes for maintaining the car's safety and security through critical action. We are unable to look after our own while we operate in ignorance. This gadget has an eye blink sensor built in and also collision alert through GSM module and notifies to the respective person. This sensor's output is made with Arduino .A GSM modem is a mobile phone substitute without the screen, keypad, and speakers. The owner and the driver can both be alerted when a driver is acting in an unsafe manner. Consequently, the creation of an embedded sensor-based system is the main topic of this paper. Its goal is to help drivers prevent road collisions in order to preserve precious lives

Keywords – Collision alert, eyeblink sensor, Arduino, GSM.

I.INTRODUCTION

Vehicle accidents can cause serious injury or even fatalities, with a significant number of accidents occurring due to driver fatigue or distraction. To prevent such accidents, it is important to develop systems that can detect driver fatigue and alert the driver to take a break or adjust their driving behavior. A motor vehicle accident results in the deaths of 400 persons each day, or around 57 road accidents and 17 fatalities each hour(According to the International Research Journal of Modernization in Engineering Technology and Science).As a result In recent years, the advancement of technology has led to the development of intelligent transportation systems, which incorporate various sensors, communication technologies, and data analysis techniques to enhance the safety and efficiency of the transportation system.

One such system is the Accident Alert along with Fatigue Detector which tracks the behavior of the driver and looks for indicators of exhaustion using a variety of sensors, including an eyeblink sensor, GSM, GPS and an Arduino NANO. The system warns the driver with visual and audio alarms and suggests that the driver take a rest or modify their driving style when it detects a collision, regardless of the object's mobility or the driver's weariness. By drastically lowering the probability of accidents brought on by driver drowsiness, this device can make both drivers and passengers safer on the road. The design, execution, and potential effects of this system on traffic safety will all be covered in this article.

II. RELATED WORKS

[1] System that uses a MEMS sensor to detect an accident and send the information as an input to the controller for processing. When a rollover is detected, the system would use a GPS module to determine the location and a GSM module to send a message. This paper presents a method that might be effective and simple to use, however it does not provide a switch or any kind of system to prevent a false alarm

[2]Vinit Agrawal proposes an android application-based solution that uses a smartphone to automatically detect and report an accident was proposed.An eCall implementation and accident detection system were integrated within an Android application that was connected to a USB port. The device's most useful characteristics are its GPS receiver. Even though a smartphone has a linear accelerometer with three axes, it was chosen as an application unit (AU) due to its hardware resources and software capabilities

[3]The Rajvardhan Rishi system is made up of an Arduino, an accelerometer, GPS, and GSM. During the incident, it notifies the closest hospital, police headquarters, and family primarily by sensing changes in the accelerometer. Using an Arduino and GPS module, the device transmits a Google Map link. Although this system functions well, it cannot detect the infrequent little accidents that result in no injuries.

[4].The technology in question utilizes a night vision camera to prevent and manage mishaps. When the automobile starts, this system watches the driver's face, which mostly aids in continual observation. It has two uses: the first is to read blinking and the second is to detect eye blinking. Until the driver is cognizant again and gets alert, speed is automatically lowered. However, if the driver has a medical condition or blinks at an abnormal rate despite not being tired, the system will provide a false alarm and fails to identify the impact and contact the necessary authorities.

[5] Mr S.Kailasam proposed a system when the automobile starts, this system watches the driver's face, which mostly aids in continual observation. It has two uses: the first is to read blinking and the second is to detect eye blinking. Until

the driver is cognizant again and gets alert, speed is automatically lowered

[6] Rally Vision grounded smart in- auto camera system for motorist yawning discovery detects the sleeping pattern of the motorist using live videotape capturing. Even though this paper is that if a person is speaking or keeping its mouth open for a longer period of time indeed also it'll find it as feeling drowsy.

[7].Armaghan Hussain's device has two major components that use IR sensors installed on eyeglasses to detect eye blinking. This technology recognizes and categorizes the eye blinking into normal blinking based on the reflected and absorbed IR radiation (NB). The system is made up of an Arduino, an accelerometer, GPS, and GSM. During the incident, it notifies the closest hospital, police headquarters, and family primarily by sensing changes in the accelerometer. Using an Arduino and GPS module, the device transmits a Google Map linkAlthough this system functions well, it cannot detect the infrequent little accidents that result in no injuries. Consequently, in the event of minor mishaps, it will gradually lead to resource and time waste.

[8].Hoang Le paper presents reliable eye blink detection approach for Smart Glasses that use an eigen-eye approach in the first step of our technique to find closed eyes in specific video frames. Even though our prototype smart glasses have a poor power source and cannot support advanced imaging and computing capabilities, tests with them have revealed an accurate detection result.

III.EXISTING SOLUTION

In the existing system the system only has collision detection to notify road crash. The researchers in aims to design an smart vehicle system that can detect any abnormal condition or accident by sensing various parameters and the eye blink sensor placed within the vehicle even though there are few drawbacks which need to be taken into account such as, if the driver does not intervene in spite of the warning there is a possibility of collision, Depends on human responsiveness, Negligence can lead to accident and also, the system will issue a false warning and fail to recognize the impact and contact the appropriate authorities if the driver has a medical condition or blinks unusually quickly despite not being tired.

IV.PROPOSED SYSTEM

The system module includes: 1. Collision Alert: This system warns of collisions between vehicles that happen as a result of careless driving. 2. Accident Notifier: The eye blink sensor is positioned on top of the dashboard in front of the driver. During driving, the eye blinks normally because it monitors the time until the bell will indicate that he needs to wake up. The car has a smart rescue system that assists in sending the location of the accident site in the event of an accident.This system's primary goal is to lower the fatality rate by giving traffic accident victims prompt notification. Accidents are difficult to totally prevent, but there are certain procedures that can be taken to stop them before they happen. One such method is the ability to swiftly identify risky circumstances and warn the driver. This project implements such a method by presenting an alert message on the screen. If a driver's irresponsibility causes an accident, this system also outlines the necessary actions to be taken in the aftermath. A GPS-equipped smart rescue system will send the accident's location to the main server quickly. This hybrid structure used by the suggested system aids in drowsiness and accident detection.

V.DESCRIPTION:

Highway accidents are increasing in incidence these days as a result of both increased traffic and careless driving on the part of drivers. And in many cases, the family members are unable to receive information about the accident at the proper moment. This has the effect of delaying the assistance that the accident victim needs most. Our project, Vehicle Collision Alert Along With Driver's Fatigue Detector Using Eyeblink Sensor, is intended to address this issue and provide assistance to those involved in accidents while also potentially saving their lives by alerting the appropriate rescue personnel at the appropriate moment.

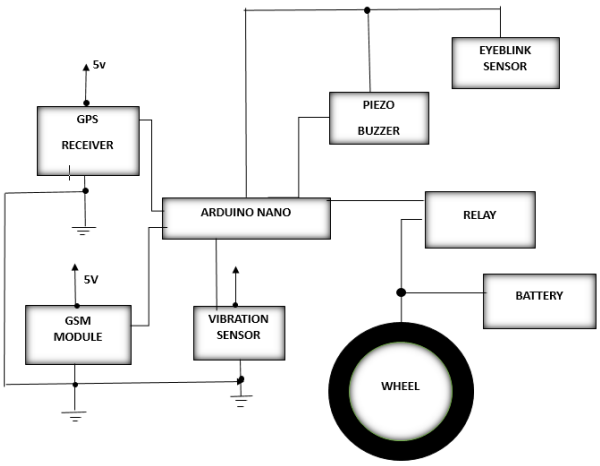
This gadget has an eye blink sensor built in and also collision alert regardless of the mobility of an object that gets in the path of the vehicle. Here we are using the vibration sensor that was installed in the vehicle by the collision detection unit. For instance, in the event of an accident, if the vehicle happens to be hit by another vehicle or an object, it may cause some vibration. In such situation, the vibration sensor will detect the signal and send the information to the Arduino Uno, which serves as the project's Central Processing Unit (CPU). After passing the message to the GSM modem as soon as the Arduino receives a signal from the vibration sensor, the GSM modem will begin operating.

When a crash scenario is recognized, the system diverts calls to the emergency number and sends alert notifications consisting a link that pins the location of the vehicle by using GPS module. A buzzer can also be used to trigger a beep to signal that an accident was detected. At the same time, the eye blink sensors recognize the blinking of the driver's eyes when the engine is started. The vehicle automatically stops when the value reaches the pre-set level after the eye blink sensor receives a signal from the transmission module; as a result, notification will be issued promptly to the emergency number. In this way, both the owner and the driver can be informed when the driver is engaged in an unsafe activity.

VI. SYSTEM DESIGN & IMPLEMENTATION

The components utilised in the proposed operation Fig(1) are Eye blink duration and frequency, Power supply, Buzzer,

LED ARDUINO (NANO), Relay Module, DC, and Eye blink (IR): connected to sleep detection and alert the driver. The major part is an ATmega328-based microcontroller (MC) called Arduino Uno, which handles all operations related to managing the embedded system circuit.



Fig(1) System Architecture

EYEBLINK SENSOR :

To detect eye blinks, a rather basic sensor called an eye blink sensor is employed in Fig(2). Simple infrared sensors are used to observe how long an individual's eyes blink in order to determine whether or not they are sleepy or fatigued. The accompanying data collected can then be processed by any logic necessary for the application.

Fig(2)Eyeblink Sensor

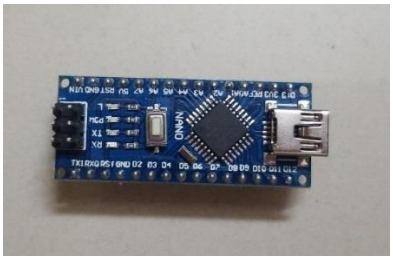
BUZZER:

The buzzer used here in Fig(3) is piezo buzzer and the task allotted for this is to provide audio alert for the driver in case if driver's fatigue is detected.

Fig(3)Buzzer

ARDUINO NANO:

Analyse the data from the sensors and compare it with built-in maps to actually sense, control and perform the driving task using Fig(4).



Fig(4)Arduino

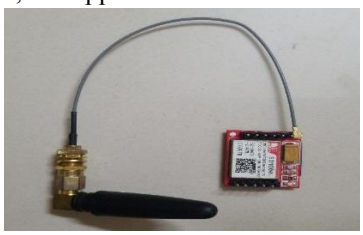
GPS :

GLOBAL POSITIONING SYSTEM Vehicles use Fig(5) for both navigation and tracking. The GPS technology detects the location of the car when an accident occurs and delivers the information to the specific person over GSM by calling or sending an SMS to alert them.

Fig(5)GPS Module

GSM :

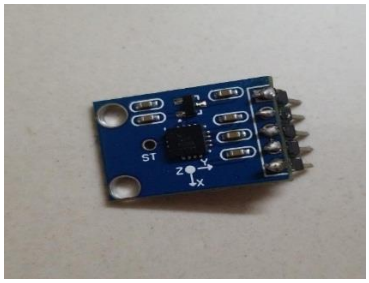
Global Mobile Communication System , By delivering a message, Fig(6) is employed as a medium for controlling and monitoring the transformer load from any location. By transmitting a communication through the GSM modem, GSM is utilised to cover and control the DC motor, Stepper motor, Temperature Detector, and Solid State Relay.Therefore, it is believed that mobile communication is generally successful and will be useful in artificial control, motor vehicles, and applications.



Fig(6)GSM module

VIBRATION SENSOR:

A high sensitivity non-directional vibration sensor, shown in Fig(7), may operate between 3.3V and 5V. The LM393 comparator is used by the sensor to identify the vibration. The circuit will briefly be cut off when there is movement or vibration. On the board, there are two LEDs: one for the power state and the other for the output of the sensor. Here, we powered the module with 5V..



Fig(7)Vibration sensor

LM256 CONVERTOR:

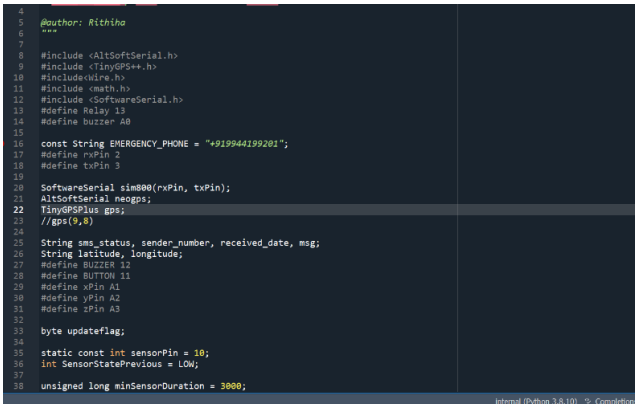
DC input ranges from 3 to 40 volts; the input voltage must be greater than the output voltage by 1.5 volts in order to boost. And the output, constantly variable DC 1.5V to 35V voltage, 3A of high-efficiency maximum output current.

Fig(8) LM256 Convertor

ARDUINO IDE:

Connects to the Arduino boards to interact and upload programmes to it.

In order to initialise the GSM module and test its response using AT commands, we have built a function called void initModule(String cmd, char *res, int t Fig(9).



```
@author: Rithika
"""

#include <AltSoftSerial.h>
#include <TinyGPS++.h>
#include<wire.h>
#include <math.h>
#include <SoftwareSerial.h>
#define Relay 13
#define buzzer A0

const String EMERGENCY_PHONE = "+919944199201";
#define rxPin 2
#define txPin 3

SoftwareSerial sim800(rxPin, txPin);
AltSoftSerial neogps;
TinyGPSPlus gps;
//gps(9,8)

String sms_status, sender_number, received_date, msg;
String latitude, longitude;
#define BUZZER 12
#define BUTTON 11
#define xPin A1
#define yPin A2
#define zPin A3

byte updateflag;

static const int sensorPin = 10;
int SensorStatePrevious = LOW;

unsigned long minSensorDuration = 3000;
```

Fig(9)Data Source

After that, we initialised the GPS, GSM, and serial connectivity hardware and software in the void setup() function.

```
 void setup()
{
  Serial1.begin(9600);
  Serial.begin(9600);
  lcd.begin(16,2);
  lcd.print("Accident Alert  ");
  lcd.setCursor(0,1);
  lcd.print("   System    ");
  delay(2000);
  lcd.clear();
  .... ......
  ...... .....
```

Methodology used:

This gadget has an eye blink sensor built in and also collision alert regardless of the mobility of an object that gets in the path of the vehicle. The collision detection alert system measures the distance between two vehicles and alert the drivers to prevent from collision The sensors recognises the vibration during the crash and redirects a call to the emergency number with alert notification consisting a link that pins the location of the car . At the same time, the eye blink sensors recognise the blinking of the driver's eyes when the engine is started. The vehicle automatically stops when the value reaches the pre-set level after the eye blink sensor receives a signal from the transmission module; as a result, notification will be issued promptly to the emergency number. In this way, both the owner and the driver can be informed when the driver is engaged in an unsafe activity.

The Prototype of this Vehicle Collision Alert Along With Driver's Fatigue Detector using Eyeblink Sensor uses the following steps:

Sensor Installation: The vehicle's driver cabin has been fitted with eyeblink sensors. These sensors have the ability to recognise the eyeblink patterns of the driver, which can be utilized in determining their level of fatigue.

Data collection: Throughout the entire journey, the eyeblink sensors constantly record the driver's eyeblink patterns. The system gathers and processes the data in real-time.

Collision Detection: The system includes vibration detector for collision detection, which continuously monitor the area around the vehicle for any potential collision risks regardless of how handheld the object in the path of the vehicle .

Eyeblink Pattern Analysis: The amount of driver drowsiness is assessed using the eyeblink data that has been collected. The system compares patterns like the frequency and intensity of eyeblinks to predefined thresholds to evaluate the driver's level of fatigue using algorithms (such as data acquisition, preprocessing, and Fatigue Detection decision tree).

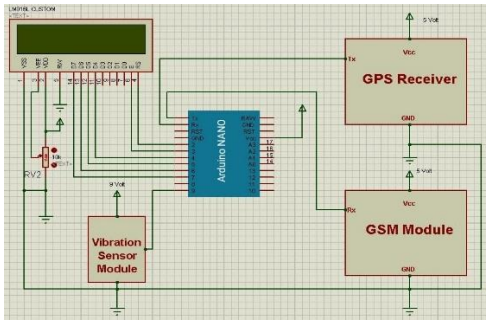
Alert Generation: The system generates a warning when it determines that the driver's level of fatigue has gone beyond a certain threshold or when it recognizes a potential collision hazard. The driver will be informed and remind to take proper action by peizo buzzer-based aural alarms.

Emergency Response: In the event of a possible collision, the system may also activate emergency response

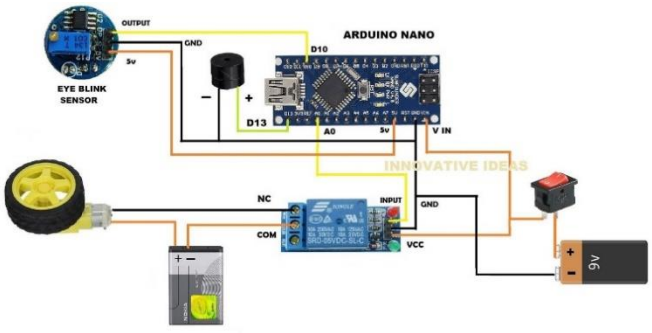
mechanisms, such as automatic braking that stops the car and sending a message to an emergency number that contains the location of the accident, in order to rescue the driver from danger.

System Integration: The system is co related with Vehicle Collision Alert Along With Driver's Fatigue Detector using Eyeblink Sensor: And linked to other devices, such as GPS and GSM modules, to improve its utility and efficacy in spotting potential crash dangers and signs of drowsiness**.**

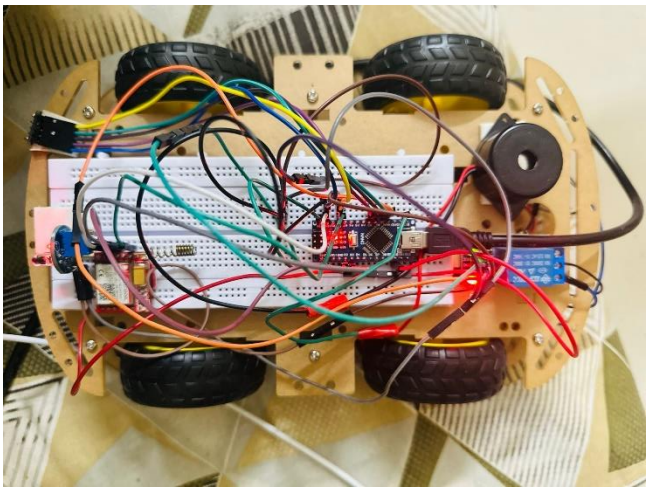
CIRCUIT DIAGRAM:



Fig(10) Vehicle alert circuit



Fig(11) Eyeblink circuit

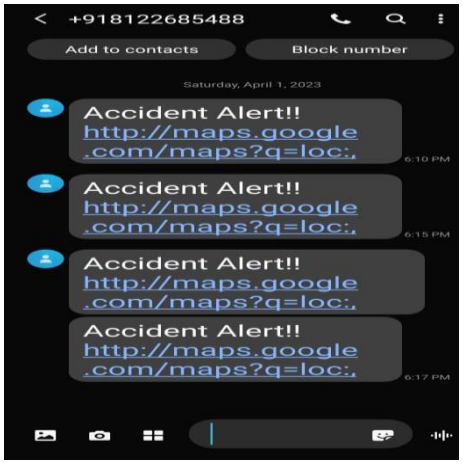


Fig(12)Final Prototype

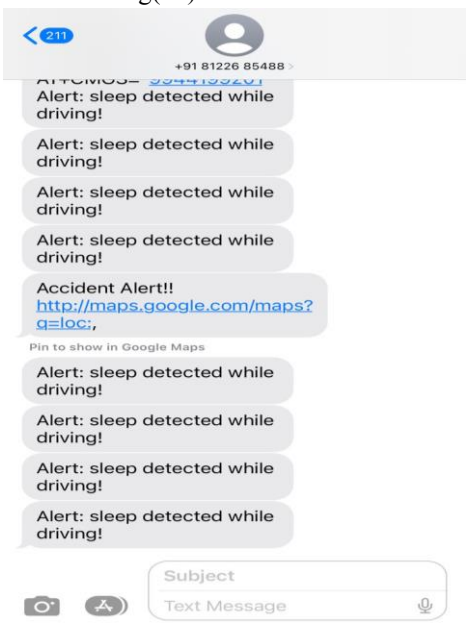
VII RESULT AND EVALUATION

The results and evaluations of the methods and techniques used for Vehicle Collision Alert Along With Driver's Fatigue Detector have been promising. Computer vision-based methods have been successful in alerting the driver, movement, and position.

The system sends a message Fig(13) via the GSM module after detecting an accident from the vehicle. Google Map will provide the precise accident location via SMS. Overall, the results and evaluations of the approaches and methods used for Vehicle Collision Alert Along with Driver's Fatigue Detector Using Eyeblink Sensor have been promising and successful in alerting the driver, movement, and location Fig(14).



Fig(13)Accident Alert



Fig(14)Fatigue Alert

VIII CONCLUSION

Our conception automates exigency aid services and uses them to descry accidents. As a result, the system is

transferring SMS from the scene of the accident to the closest exigency aid service provider. The growing demand for buses has also led to more business traffic and motor accidents. This is due to the dearth of top exigency installations in our nation. a vehicle accident alert system that automatically sounds. This design is a system that can identify accidents in a lot lower time and transmit the essential data. Continued exploration and development in this area could lead to significant advancements in the lives of motorists

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