International Journal of Scientific Research and Engineering Development-– Volume 7 Issue 2, Mar-Apr 2024
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

CAR ACCIDENT DETECTION AND PREVENTION SYSTEM

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ABSTRACT
Automobile collisions are regarded as one of the most catastrophic events. While there are numerous other factors that can contribute to auto accidents, most of them are caused by careless or fast driving. Due to a lack of knowledge, it appears that getting to the accident scene in time is problematic. The introduction of microcontroller technologies offers a remedy in that it might lower the quantity of mishaps. This system is explained as one that detects and regulates a vehicle's speed and notifies the appropriate parties when an accident happens. Through the use of a distance sensor, the system continuously measures the separation between moving cars and impending impediments. When a crucial distance is reached, it will warn the driver to regulate their pace and slow down on their own.

Keywords — Accident detection, alert system, GPS, GSM, Sensors.

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INTRODUCTION
An estimated 1.35 million people lose their lives in traffic accidents each year. More than 20 to 50 million people have non-fatal injuries as a result of the incidents. Furthermore, a lot of these wounds leave victims disabled.Worldwide, traffic accidents cost USD 518 billion, or 12% of each nation's GDP [1]. Today's world fast a moving & insecure world there is a necessity and accident the look after one's safety. Nowadays lots of accidents happen on highways due to an increase in traffic and also due to rash driving drivers. Car accidents are a leading cause of injury and death worldwide, often resulting from human error, distraction, or impaired driving. In response to this alarming issue, the development of car accident detection and prevention systems has gained significant attention. These systems employ advanced technologies to monitor various aspects of vehicle operation and driver behavior, aiming to detect potential hazards and prevent accidents before incidents. By leveraging technologies such as ultrasonic sensors, infrared sensors, cameras, and GPS tracking, these systems can identify obstacles, monitor traffic conditions, and assess the driver's state to anticipate and respond to potential threats in real time.Additionally, a great number of injured people lose their lives as a result of ignorance. The automated intelligent system would be the best solution considering the circumstances. The primary goal of a car accident detection and prevention system is to enhance road safety by implementing proactive measures to mitigate the risk of collisions. These systems typically integrate a combination of sensors, processors, and communication modules to continuously monitor the vehicle's surroundings, detect potential dangers, and alert the driver or take autonomous action to prevent accidents. By leveraging technologies such as ultrasonic sensors, infrared sensors, cameras, and GPS tracking, these systems can identify obstacles, monitor traffic conditions, and assess the driver's state to anticipate and respond to potential threats in real time. Additionally, advancements in artificial intelligence and machine learning enable these systems to adapt and improve their effectiveness over time, offering a promising approach to reducing the frequency and severity of car accidents. The most obvious reason for a person's death during accidents is the unavailability of the first aid provision, which is due to the delay in the information of the accident being reached by the ambulance or to the hospital. Response times in car accident situations are critical for providing emergency medical care to victims in a

timely manner and are predicted to affect the number of fatalities.

LITERATURESURVEY

"A Review of Car Accident Detection Systems"
This comprehensive review article provides an overview of various car accident detection systems developed using different technologies such as sensors, machine learning algorithms, and communication systems. It discusses the advantages and limitations of each approach and highlights the importance of real-time detection and prevention mechanisms in reducing the severity of accidents

"Development of a Smart Car Safety System Using Ultrasonic Sensors"
This research paper presents the development of a smart car safety system utilizing ultrasonic sensors for obstacle detection and collision avoidance. The system integrates real-time sensor data processing to detect potential hazards and automatically apply braking or steering interventions to prevent accidents, demonstrating promising results in simulated and real-world scenarios.

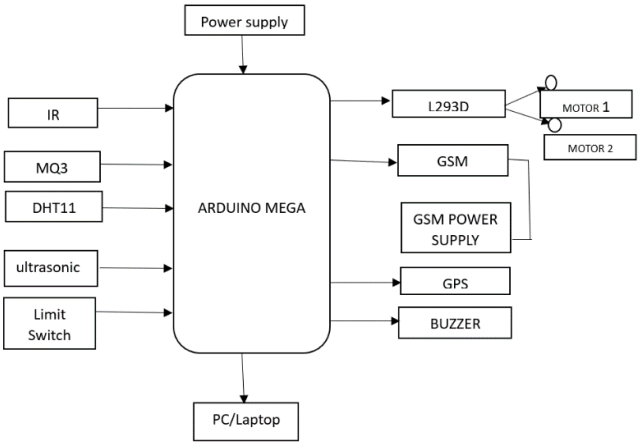
PROBLEMSTATEMENT

The percentage of the population using autos is rising. This Every day there are more accidents as a result of the traffic jams. Because of the delay in ambulances arriving at the scene of the accident or traveling from the scene to the hospital, lives are lost as a result. The accident sufferer must be taken as soon as possible to the hospital. The investigating unit must be notified when an accident occurs. In order to reduce the amount of time needed for the investigation, it is also advantageous to notify the inquiry department.

PROPOSED METHOD

The usage of cars has increased dramatically in the modern world, which causes traffic and an increase in traffic-related incidents. Because of the unavailability of immediate preventive and safety facilities. Hence our proposed system is to provide safety and we are going to control the speed of vehicles according to the respective zone. In this project, we are using an Android smartphone to detect accidents and report them to the nearest available emergency responding stations with the exact location of the victims where the accident took place through the mobile application. Our car accident detection and prevention system leverages advanced sensor technology and real-time data processing to enhance road safety. Upon detection, it alerts the driver and, if necessary, takes proactive measures such as applying brakes or adjusting the vehicle's speed to prevent collisions.

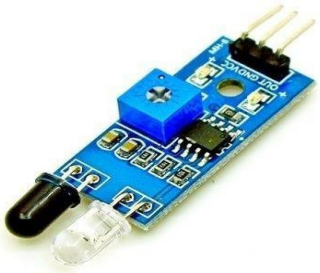
SYSTEM ARCHITECTURE



COMPONENTS REQUIRED

IR Sensor

An encoder wheel is used to count pulses that indicate how much length of seat belt is being pulled, and an IR sensor is utilized to detect whether the seat belt buckle is on properly. These two sensors provide an output to the LPC2138/48. The seat belt's correct attachment is determined by Ardiuno. The microprocessor determines if the seat belt is correctly fastened if both sensor outputs are functioning properly; if not, the seat belt alert sound will keep ringing. One of the most important safety measures in a car to prevent serious injury to the driver is a seat belt. An IR sensor is used to determine whether the seat belt buckle is correctly fastened, and an encoder wheel counts pulses that show how far the seat belt is being pulled. The LPC2138/48 receives an output from these two sensors. Ardiunoindicates where the seat belt should be fastened correctly. If both sensor outputs are operational, the microprocessor assesses if the seat belt is correctly tightened; if not, the alert sound will continue to ring. A seat belt is one of the most crucial safety features in an automobile to guard against major injuries to the driver.



Alcohol sensor MQ3

It is a component of breathalyzers and breath testers that are used to identify ethanol in human breath. The sensor is filled with the little tube. The heater coils in this tube heating system, which is composed of tin dioxide and aluminum oxide, are what actually generate the heat. The MQ3 analog gas sensor can be utilized in breath analyzers and is appropriate for detecting alcohol. It is extremely sensitive to alcohol and only slightly sensitive to benzene. The MQ3 gas sensor's potentiometer-sensitive SnO2 material, which has a lower conductivity in clean air, allows the sensitivity to be changed.The sensor conductivity increases along with the gas concentration when the target alcohol gas is present. The change in conductivity is converted to the matching output signal of gas concentration by the usage of a basic electrocircuit. The MQ-3 gas sensor is very sensitive to alcohol and resists disturbance from vapor, smoke, and fuel well. Its fine sensitivity range is approximately two meters. The sensor is affordable and appropriate for a variety of uses; it can identify alcohol at various concentrations.

Temperature sensor DHT11

The widely used DHT11 temperature and humidity sensor has an 8-bit microprocessor that outputs the temperature and humidity values as serial data, along with a separate NTC for measuring temperature. The most popular temperature and humidity sensor is the DHT11. The sensor has an 8-bit microcontroller to output the temperature and humidity measurements as serial data, as well as a dedicated NTC for measuring temperature. Additionally, the sensor comes pre-calibrated, making it simple to interface with other microcontrollers. With an accuracy of ±1°C and ±1%, the sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90%.

GSM

Through message systems, GSM assists in managing the temperature sensor, solid-state relay, stepper motor, and DC motor. This plan contributes to lessening the reliance on labor-intensive, ineffective manual systems. But the suggested system can run entirely automatically and without human intervention. Thus, this automated system is more cost-effective, efficient, and user-friendly than it has ever been. Therefore, it may be the favored method of communication when trying to exercise control.For providing communication between the GPS, GSM, and the allocated mobile number GSM SIM800 module is preferred. The name SIM900 says that it is a tri-band work ranging a frequency of 900MHz to 1900 MHz such as EGSM900 MHz, PCS 1900 MHz, and DSC 100 MHz Receiving pin of the GSM module and the transmitting pin of the GPS module are used for communication between the modules and the mobile phone

GPS

GPS is useful for tracking as well as navigating. Without the driver's assistance, tracking systems are utilized to maintain tabs on the vehicle. On the other hand, a navigation system directs the vehicle to the location without any problems. The architecture used for tracking and navigation is the same. The tracking stem recognizes the car that is likely to have an accident as soon as it happens, and it sends a call or SMS alert to the rescue crew. A device that can receive data from GPS satellites and determine its own geographic position is called a GPS navigation device, GPS receiver, or just GPS. The device can make directions and show the position on a map with the help of appropriate software.Currently consisting of thirty satellites, the Global Positioning System (GPS) is a global navigation satellite system (GNSS) that was sent into orbit by the United States Department of Defense. Its position on Earth is determined by dividing it into a set of coordinates that a GPS module can readily determine. This GPS is SIM28ML. This GPS module will locate the car, and the coordinates will be used to get the data that the GPS receiver fetched. The GSM module uses the received data to send information to the saved contact after it has been sent to Arduino. Operating within the range of 1575.42 MHz, the frequency yields an output of the GPS module uses the NMEA format, which contains real-time location data.

Arduino Mega

A microcontroller board based on the ATmega2560 is called the Arduino Mega 2560. It contains 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, 54 digital input/output pins (of which 15 can be utilized as PWM outputs), a reset button, an ICSP header, a power jack, and a USB connector. It comes with everything needed to support the microcontroller; all you need to do is power it with a battery or an AC-to-DC adapter or connect it to a computer via a USB cable to get going. The majority of shields made for the Uno and the older Duemilanove or Diecimila boards work with the Mega 2560 board.

Buzzer:

A buzzer or beeper is an electrical signaling device that is commonly found in cars, home appliances like microwaves, and game shows. Usually made up of multiple switches or sensors connected to a control unit, it detects whether a button was pressed and which one, as well as whether a predetermined amount of time has passed. It then typically turns on the light on the corresponding button or control panel and emits a warning sound, which can be either continuous or intermittent, in the form of a buzzing or beeping sound. This device's original electromechanical mechanism was the same as an electric bell sans the metal gong that produces the ringing sound. These devices frequently served as sounding boards by being fastened to the wall or ceiling. Using a circuit to turn the AC into a loud enough noise to power a loudspeaker and connecting it to an inexpensive 8-ohm speaker was another way to implement some AC-AC connected gadgets.

DC Motor

Simple DC motors with a gearbox attached are typically DC motors with a 30 RPM and 12 V output. This finds application in a wide range of robotic applications, including all-terrain robots. Connecting these motors to wheels or any other mechanical assembly is made easy by the 3 mm threaded drill hole in the middle of the shaft. Robotics uses the 12V DC geared motors at 30 RPM on a regular basis. incredibly user-friendly and offered in standard size. Moreover, using an ARM 7 or similar chip to drive motors doesn't require expensive hardware.This motor, which has a voltage

between 5 and 35V DC, can be used with the most widely used L298N H-bridge module with onboard voltage regulator motor driver, or you can select the most exact motor diver module from the large selection offered in our Motor divers category based on your unique needs.

Ultrasonic Sensor:

The HC-SR04 ultrasonic sensor measures the object's distance via sonar, just like bats do. It provides reliable readings and exceptional non-contact range detection in an intuitive packaging. The ultrasonic transmitter and receiver modules are included in the package.

ADVANTAGES

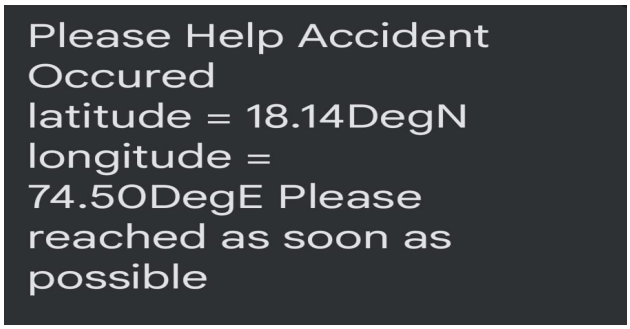
1. Compared to other methods, this methodology for assessing or detecting the presence of alcohol in the breath is comparatively quick.
   2. Because the sensors utilized in this research are smaller and less bulky, they are portable.
   3. Because the technology-based project is self-sufficient, it may be utilized as a safety system for any kind of vehicle and the person operating it, helping to avert accidents.

APPLICATION

1. Automotive and transport vehicles.
2. Security, remote monitoring, and transportation and logistics.

3. This system also can be interfaced with a vehicle alerting system.
4. For Personal Vehicle.
5. Insurance Companies.
6. Research and Development of Vehicle.

EXPERIMENTAL RESULT



CONCLUSION

We now come to the conclusion that the ARM7 Sensor is the foundation of our project, "Car Accident Detection and Prevention System." Our primary goal is to identify and stop auto accidents so that individuals can feel safe in their daily lives. As a result of this model, drivers should exercise caution and safety when driving, and traffic police can utilize it to identify instances of reckless driving. We can save hundreds of lives if we put this model's notion into practice.

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