CAR PRE COLLISION ALERT SYSTEM USING DISTANCE SENSORS

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ABSTRACT

In terms of automobile safety technology, the "Car Pre-Collision Alert System Using Distance Sensors" project is a breakthrough. This system offers complete pre-collision alerts and accident detection by combining ultrasonic sensors, a vibration sensor, GPS, and a GSM module. This greatly improves driver awareness and vehicle safety. Roadside crashes are a major source of worry, and this effort attempts to reduce the likelihood of them. It uses ultrasonic sensors to monitor the distances between the user's car and surrounding obstacles on a constant basis. In order to reduce the risk of an accident, the system computes these distances and notifies the driver in real time. Apart from the pre-collision warnings, the system has a vibration sensor that may identify collisions or incidents. When there is a collision, the system uses GPS to pinpoint the scene's position. Additionally, it has the ability to notify users' designated contacts or emergency services by SMS using the GSM module. One project that demonstrates how sensor technology, GPS, and wireless communication may be used to improve driver safety is the "Car Pre-Collision Alert System." It greatly lowers the dangers related to driving by offering early warnings and accident detection capabilities. This research highlights the importance of technology in preserving lives on the road and is in line with the increasing need for advanced driver assistance systems (ADAS).

Keyword: NODEMCU, robot, IOT,GPS,GSM

1. INTRODUTION

The number of automobiles in use today is growing at a very rapid pace. This is leading to a significant rise in the frequency of traffic accidents resulting in fatalities. Approximately 1.2 million individuals pass away annually, as reported by the World Health Organization. Even though India only contributes 1% of the world's road vehicles, it accounts for 16% of all road accident fatalities. An article in a reputable daily claims that the number of fatalities from traffic accidents in India hit a record high of over 1.51 lakh in 2018, an increase of around 3,500 over 2017. The states with the highest number of traffic deaths were Tamil Nadu, Maharashtra, and Uttar Pradesh. Many people nowadays pass away while driving as a result of unreported traffic incidents. This is particularly typical at night, when phone calls are the only means of communication. Due to a growth in automobiles on the road without a matching expansion in the road infrastructure required to sustain them, accidents are on the rise. Even while we can't stop injuries from happening, we can still help sufferers. In such circumstances, vehicle collision detection is helpful. Several academics have proposed several methods for detecting accidents, including mobile applications, GSM and GPS software, vehicular ad hocnet works, and cellphones.The steady progress of technology is enabling the human race to achieve new heights every day. Over the past 20 years, human requirements have significantly increased at every level of society, making safety the top priority [1]. Traffic accidents are among the most dangerous things that may happen. Automobile accidents are the leading cause of death from injuries and the tenth largest cause of mortality globally. An estimated 1.25 million people die and up to 50 million are injured in traffic accidents annually; these incidents account for 30 to 70 percent of orthopaedic hospital beds in underdeveloped countries.

1.1 OBJECTIVE

The quality and quantity of data available to an automated collision detection system determines how effective it is. The reliability of the system may be jeopardized if the data is incomplete, inconsistent, or inaccurate as it may lead to incorrect positive or negative results. False positives arise when the system mistakenly interprets legitimate action as collusion. When the system is unable to recognize instances of true collusion, false negatives occur. Systems for detecting collusion must be able to process large amounts of data quickly and analyze the connections between various items. Because collusion is so complex, it can be challenging to design and implement effective techniques for detecting it. The current study suggests an automatic anti-collision system that makes use of sensor devices to identify objects and trigger an alarm system if the car gets too close to the item. By combining collision detection and alarm systems into a single system, the study presents a revolutionary approach to reducing vehicle accidents. An alarm system, a microprocessor, and an ultrasonic sensor make up the suggested system. A signal from the sensor is sent to the microcontroller, which then forwards it to the warning unit. Through the use of a buzzer, the warning device is intended to provide an auditory alert that may otherwise result in an accident. The

distance data is further shown on an LCD panel.

2. LITERATURE SURVEY

The latest in automotive safety technologies, collision warning and collision avoidance systems, assist drivers in averting rear-end collisions. Their goal is to prevent drivers from being distracted by signals that are seen as being too early or unneeded, while yet giving them enough time to avoid an accident. It is anticipated that connected vehicle (CV) technologies would significantly influence automotive collision avoidance systems when combined with other driving assistance (DA) technology. A Review 3 of traffic operations, security, and our cities' future. Few studies, nonetheless, have determined the true safety advantages of fitting this equipment into every car. The next big advancement in vehicle safety may be the installation of collision warning systems. By actively alerting drivers to approaching crashes, these gadgets hope to provide them ample time to take the necessary precautions to mitigate or avoid the catastrophe. These kinds of active safety measures will work, based on analysis and fatality rate data.

With its newfound sophistication, the collision avoidance system is actively and significantly enhancing passenger safety in cars. Nevertheless, studies have only examined when cars are moving, neglecting the moment when occupants are most at risk—when they get out of the car, their awareness of their surroundings decreases, and the car's structure no longer protects them. The application of smart technology to enhance transportation systems by giving vehicles and the road traffic infrastructure intelligence to provide a safe and comfortable environment is known as an intelligent transportation system (ITS). ITS includes message delivery, traffic management, and sensor technologies. The technology of Collison ultrasonic sound sensors was eschewed. It notifies the driver of impending autos and identifies them.

The technology will calculate the separation between two cars moving in the same direction and lane. When an object's trajectory approaches the vehicle and becomes risky, the system initiates safety measures on the vehicle. A car safety system is made up of internal sensors and a microcontroller. It mainly focuses on creating a digital driver-vehicle connection using the CAN system. The CAN architecture often results in less wiring.

3. Block diagram

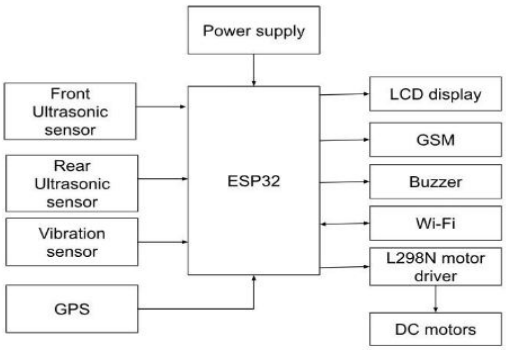

Fig.3.block diagram

3.1 NODEMCU (ESP32)

The ESP32 is a family of low-cost, low-power System on a Chip (SoC) microcontrollers by Espressif that has a dual-core CPU, Bluetooth and Wi-Fi connectivity. If you are familiar with the ESP8266, the ESP32 is a feature-rich replacement that comes with a ton of more functionality.

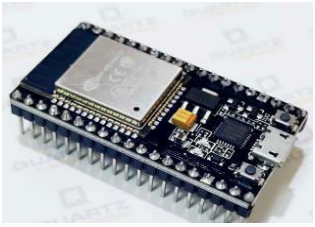

Fig.3.1 nodemcu esp32

3.2 LCD 16×2 display

These days, we never use anything that doesn't have an LCD on it—like laptops, digital watches, CD players, or DVD players. In the screen industry, they are frequently utilized in place of CRTs. When compared to LCDs and CRTs, cathode ray tubes use a significant amount of electricity and are larger and heavier. These gadgets use a remarkably little amount of electricity and are slimmer. The LCD 16x2 operates on the idea of blocking light instead of dissipating it. An overview of LCD 16X2 pin configuration and operation is included in this article.

Fig.3.2 LCD display.

3.3. Buzzer

Buzzer A beeper, buzzer, or other auditory signaling device can be mechanical, piezoelectric, or electromechanical in nature. This is mostly used to transform the audio signal to sound. It is often powered by DC voltage and found in computers, printers, alarm clocks, timers, and other devices. It may produce a variety of sounds, including siren, melody, alarm, and bell, according on the varied designs.

Fig.3.3 buzzer.

3.4 Ultrasonic Sensor

The Ultrasonic Sensor may be used as a distance measurement sensor since it employs ultrasonic waves to measure an object's distance, such as that of bats. The two ultrasonic transducers are as follows: one broadcasts a high frequency ultrasonic signal, acting as a transmitter, and the other receives an echo signal that is reflected by any object in its path, acting as a receiver. We can calculate the object's distance by dividing the time interval between the two signals by the sound speed. The sensor states that it can measure distances between 2 and 400 cm in theory. However, realistically speaking, a range of up to 75–80 cm may be easily attained. They operate on little power, are inexpensive, and are simple to interface. They may be used as a parking assist sensor, to identify and avoid impediments in a robot's path, and to determine the depth of water because waves can travel in water.

Fig.3.4. Ultrasonic Sensor.

3.5 NEO-6M GPS module

With a powerful satellite search capabilities and an integrated 25 x 25 x 4 mm ceramic antenna, the NEO-6M GPS module is a high-performing all-in-one GPS receiver. The power and signal indicators allow you to keep an eye on the module's condition. In the event of an unintentional main power outage, the module has the ability to save data. Its automated waypoint and simple assembly are guaranteed by its 3mm mounting holes. Based on the Ublox Neo 6M, the Ublox Neo EM GPS Module is a full GPS module. This module provides the greatest positional information available by utilizing the newest technologies from Ublox. It also has UART TTL connectors and an external GPS antenna. This module features an inbuilt rechargeable lithium-ion battery, which enables it to get the GPS lock more quickly and, in most circumstances, hot start.

Fig.3.5.GPS.

3.6 SIM800l GSM/GPRS module

A low-cost micro SIM GSM/GPRS development module is called the SIM800L. Without the need for further data converters like MAX232, the Module can readily interface with Microcontrollers thanks to its support for TTL connection. A module with an IPX connection is also supported by the antenna. With the SIM800L module, you can utilize GPRS, TCP/IP, send and receive text messages, make and receive phone calls, and connect to the internet. Additionally, the module may function internationally because it supports quad-band GSM/GPRS networks. Because of its small size, the SIM800L GPRS GSM Module may be utilized immediately in finished designs. The on-board LED flashes rapidly in the absence of a signal and gently in the presence of one to show the connection status of the board.

Fig.3.6 GSM.

3.7.WIFI MODULE

An affordable and easy-to-use gadget for giving your projects internet access is the ESP8266-01. This module may link to any WiFi network or be used as a hotspot for WiFi. With the help of this module, we can quickly collect and analyze data and enable our applications to be IoT enabled. The ESP-01 may be utilized in your project and can also retrieve data from the internet. Its most significant feature—which also makes it far more user-friendly—is that it can be programmed using the Arduino IDE. The fact that this module only has two GPIO pins means that you will either need to use it in conjunction with another controller, such as an Arduino, or you may utilize other modules, such as NodeMCU, ESP-12, or ESP-32. It is utilized in home automation, robotics, wireless data logging, portable electronics, etc.

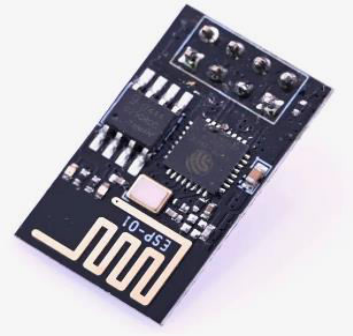

Fig.3.7 Wi-Fi

3.8 L293D Motor Driver

The L293D Motor Driver IC is this module, which is an L293D motor driver. This IC is a half H bridge motor driver, with 16 pins. It may simultaneously operate two stepper motors or DC motors. Both motors can be controlled independently of one another in terms of direction, but four DC motors can be used to simply switch a motor on or off. It is used to operate motors with a total DC current of 600mA and voltage ratings ranging from 5V to 36V. High current circuits employing digital circuits like 555 timers and MOSFETs or microcontrollers like Arduino, Raspberry Pi, PIC, etc. may be driven by this l293d motor driver board. It works well with robotics projects as well as other mechatronic projects, such as RF vehicles, robot arms, and follower robots.

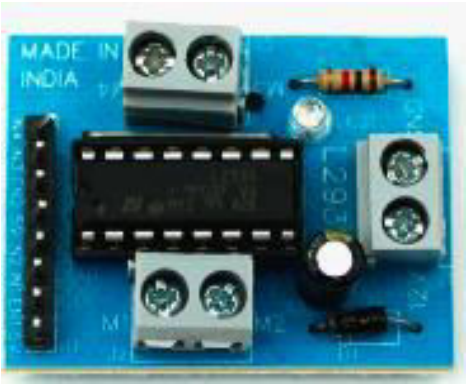

Fig.3.8 L293D driver.

4. Flow chart

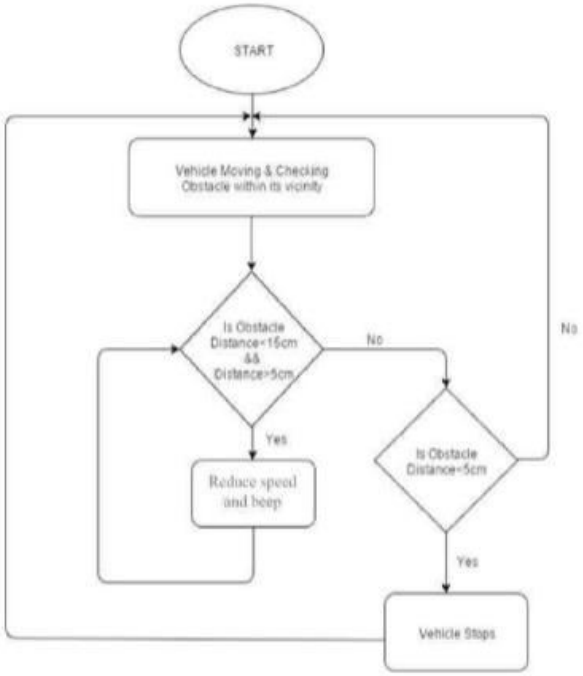

Fig.4.1 flow chart.

5. RESULT AND DISCUSSION

Using a distance sensor, a pre-collision alert system can assist in identifying obstacles in the driver's path and providing prior warning. The distance sensor gauges how close objects are to one another. If it detects a possible collision, the system sounds a warning, allowing the driver time to brake or respond. By lowering the chance of crashes and issuing early warnings, this improves safety.

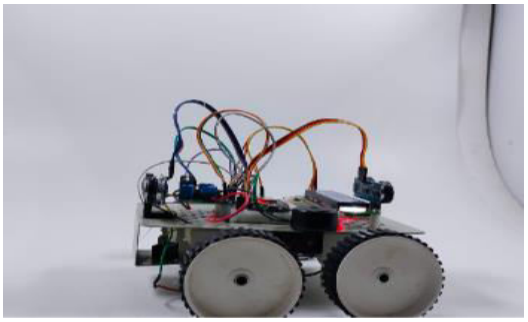

Figure 5.1: Pre car collision system

When an automobile's pre-collision alarm system detects objects or other cars in the

path of the vehicle, it usually uses distance sensors. These sensors may consist of cameras, lidar, or radar technology. Here is a broad description of how a distance sensor-based pre-collision alarm system may operate:

Driver Intervention

Pre-collision alarm systems are primarily designed to warn drivers and allow them a chance to make amends. After that, the driver might choose to swerve out of the accident, use the brakes, or take other action.

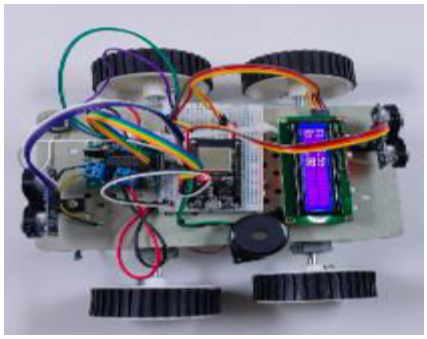

Figure 5.2: Pre-collision alert system

These technologies are a component of a larger group of devices called Advanced Driver Assistance technologies (ADAS), which are designed to improve car safety and lessen the probability and impact of collisions. One of the many safety measures that contemporary cars may include to safeguard drivers, passengers, and pedestrians is pre-collision alert systems.

6. CONCLUSION

In summary Prior research has indicated that PCS systems can lessen the severity of collision damage by slowing down typical accident patterns, including as rear-end and frontal collisions at junctions. In order to help lower the number of fatalities and injuries from traffic accidents, this study has documented the construction of a PCS system with pedestrian collision avoidance aid. This system uses one of the fastest rates of deceleration for a PCS system in the world to enable autonomous braking, which attempts to further minimize the number of individuals killed or wounded in traffic accidents. In order to facilitate the wider use of these systems, future objectives include cutting costs, creating technology that will enable omni-directional sensing, and improving collision avoidance performance even more. By taking these steps, technology advancement may support the creation of a mobile society that is safer and more pleasant.

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