CAN based Intelligent Vehicle Collision Avoidance System

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Abstract: The growth of transportation has tremendously facilitated our job and plays a vital role in our daily lives. One of the most devastating occurrences is regarded to be an accident. Traffic accidents can have a variety of reasons, but the majority are due to driver error and excessive speeding. In this article, we suggest a system for intelligent vehicles to prevent collisions and ensure safety. The system, which is intended to lessen collisions, employs ultrasonic sensors to find and notify the driver of vehicles approaching other vehicles. Additionally, it warns the driver of approaching impediments. The system now includes GSM warnings, and the pressure sensor records the collision and notifies the driver. One of the main factors that lead to accidents is drunk driving. This is so that not every police officer can inspect every vehicle to see if the driver is impaired by drinking. To boost speed and permit quicker communication between end users, CAN is included in system architecture. Therefore, a system that uses an alcohol detector to effectively reduce drunk driving is required.

Index Terms - **Automobile, GSM, alcohol detector, Collision, pressure sensor, CAN**

I. INTRODUCTION

Travelling is a significant need in human existence, and this is currently shown to be risky. Every day, there are more accidents as the number of vehicles on the road rises [1]. However, thanks to rules pertaining to vehicle safety, the number of fatalities and injuries caused by these incidents has decreased [1][2] and fresh developments in the car sector. Miscalculating the distance to the closest car is a contributing factor in some of these accidents. When two vehicles are travelling very closely to one another [3] and the driver is dozing off or oblivious that another vehicle is approaching, a collision frequently results [4]. A number of technologies are utilized to prevent accidents because the safety of both public and private cars is today a key concern. Traffic accidents is a serious threat to populated places.[5] Accidents are primarily due to three main factors: they sleep [6], overtake, and drink while driving. To overcome this circumstance our proposed system detects the alcohol content inside the vehicle, sends SMS very interval of time whenever an accident or threat is nearing. The fitted sensor recognizes when an accident occurs in the car and sends the position of the car to the appropriate institution.

The format of the paper is as follows: Brief information about the review of prior works is provided in Section II. Part III provides information about our suggested study. While sections IV and V gives an overview of the system and the experimental findings.

II. REVIEW OF PREVIOUS WORKS

A. Mohammad Ababneh, et al. [1].

An intelligent vehicle collision prevention and safety system is discussed in this article. This system's purpose is to prevent or lessen the severity of an approaching accident from the vehicle's front or rear by detecting it before it occurs. The system described here makes use of ultrasonic sound sensor technology, which can identify and notify the driver of oncoming cars. The technology calculates the separation between two moving objects in the same lane and direction. The system installs a security mechanism in its own vehicle if the object's course is harmful and toward its vehicle.

B. Md Sanaullah Chowdhury, et al. [3].

One of the most harmful phenomena is thought to be automobile accidents. Traffic accidents can have many different causes, but the majority of them are brought on by driver error and an inability to manage their speed. Additionally, it appears that due to unconsciousness, there was a delay in getting to the accident scene. Accident rates can be decreased by using Internet of Things (IoT) technology as a solution. The intelligent system that warns, regulates, and alerts people in the case of an accident is described in this article. A proximity sensor is always used by the system to keep track of how close the car is to impediments up ahead. When a

predetermined distance is reached, it regulates speed and issues a warning to the driver to slow down. The vehicle information officer receives a warning email whenever an accident happens with unclear circumstances.

While Md Sanaullah Chowdhury, et al. [3] implemented using IoT, which is now very slow in communication, Mohammad Ababneh, et al. [2] implemented using ultrasonic sensor, which is not enough for accident detection and more implementation needs to be done. For speedier communication, CAN has been interfaced with the controllers in our proposed work, and several sensors have been used to prevent collisions.

III. PROPOSED WORK

In an emergency, it's important to save one life every seconds. The use of vehicles is increased by shares. Accidents due to traffic jams are also increasing by 4,444 cases per day.[7] This delays the arrival of the ambulance to the scene or the arrival of the from the scene to the hospital, causing casualties. Therefore, it should take the victim to the hospital whenever possible [8]. It is advantageous if the investigation time can be minimized by forwarding the report to the investigation department, as every incident must be reported to the investigation department. It is to develop a low-cost, broadly applicable retrospective solution that can aid in significantly lowering the number of accidents.

IV. SYSTEM OVERVIEW

Various sensors are used in the system to prevent accidents. Use the LPC1768 with built-in CAN support to improve communication speed between various sensors and controllers. The LCD display is used to show accident detection, CAN communication and alcohol detection if present in the vehicle. Implementation of CAN in the automotive sector. It is developed on the CAN protocol platform using existing embedded vehicle systems. Sensors and actuators are used to acquire data, and controllers are used to execute instructions based on the data received from the sensors. The advantages of implementing this concept are:

- Ensures occupant safety by disabling the vehicle's ignition system when the driver is intoxicated - alcohol detection
- In the event of an accident, the data sent from the controller to the CAN data line is sent with this information. The GSM module will send text alerts to the passenger's relatives and relevant authorities.
- LED is implemented to alert the driver if any accidents or collision occurs. Red LED light glows to detect the threat.
- LCD is implemented to display the alert message to the driver such as alcohol detection or accident as shown in Fig 2 and Fig 4
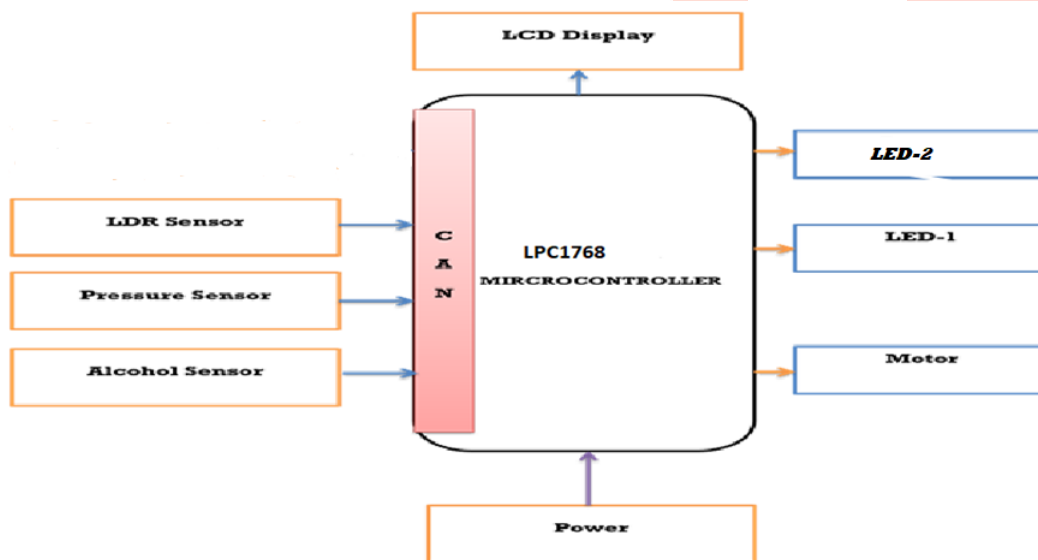- Figure1 depicts the system block diagram

Fig: 1 Block diagram of the system

V. EXPERIMENTAL RESULTS

1. Alcohol sensor: The sensor detects the alcohol inside the vehicle in air. If the alcohol present in air crosses the threshold value, then the alcohol is detected and displayed in the LCD (Fig 2). The engine of the vehicle stops detecting a red LED glow in the system and SMS (Fig 3) is sent to the respective person/authority.

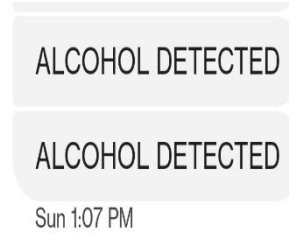Fig 2: Alcohol detection in the system   Fig 3: SMS alert for alcohol detection

2. Pressure sensor: When there is pressure applied on the vehicle, the system it detects it as accident and immediately the engine of the vehicle stops and displayed in LCD (Fig 4). The engine stops and red LED glow is detected in the system and SMS (Fig 5) is sent to concerned person.

Fig 4: Accident displayed in LCD   Fig 5: SMS alert with location

VI. CONCLUSION

The collision avoidance system designed and installed on the model is very simple and easy to understand. Sensors can accurately read distances at shorter ranges. System works automatically without any driver intervention. It has been suggested to use a sensor-based accident prevention system. The results of the paper mainly have three criteria. One of which is designed to prevent and control the vehicles from emergencies caused by obstacle approaching the vehicle, the second is to detect a drunk driver using an alcohol sensor that prevents the driver from starting the vehicle. The third is pressure sensor where the accidents are detected and sends the location via SMS to respective authority and uses a microcontroller to display information on the LCD.

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