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Smart Vehicle

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Abstract: ***This article gives a summary of the existing state of affairs and potential developments for smart vehicles while taking into consideration social, technological, and transportation aspects. Additionally, it examines the strategies for turning the smart into a generic vehicle, potential future developments, 5G, ADAS, and power source characteristics. This will make it possible for linked automobiles to take center stage in smart cities. Information may be exchanged between vehicles and road infrastructures as well as from one vehicle to another thanks to the vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communication frameworks. It attempts to improve mobility, prevent or lessen auto accidents, and offer additional advantages for road safety. Motivations, open problems, and suggestions from other academics were taken into account to enhance and understand the various histories and characteristics of the business .All publications about data transfers in the V2I communication system were thoroughly searched. They use DSRC and 5G, Bluetooth and WIFI technology but there are many problems and data. I exploited RF frequencies to spontaneously broadcast the data in order to get around that.***

Keywords: Smart Vehicle, Radio Frequency, V2I and V2V Communication.

1. INTRODUCTION

Due to the increased number of cars on the road, accidents and traffic bottlenecks have increased dramatically. Messages are sent through multi-hop broadcasting, and connection of wireless multi-hop networks is crucial for the design, development, and assessment of vehicular ad hoc networks.
The main element of intelligent transportation (ITS) vehicle ad hoc network (VANET) is an extension of the mobile ad hoc network in which nodes move objects. Vehicle to vehicle (V2V, vehicle-to-infrastructure (V2I), and vehicle-to passenger (V2P) communication are three communication types used by VANETs (Malik et al., 2019). Road infrastructure can

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communicate with each other through vehicle-to-infrastructure (V2I) communication. Due to its high implementation costs and ongoing maintenance needs, the V2I technology is not as widely used as vehicle-to-vehicle communication in vehicular ad hoc networks. To highlight the value of the V2I communication technology, several studies have been done on it (Malik, et al., 2019). Although manual vehicles lack this capability, V2V communication is mainly used to send information between vehicles. Therefore, V2I communication is needed to convey vehicle status information without changing the internal processes of the vehicle manual (Milanés et al., 2010).

This system is designed to provide drivers with warning alerts such as lane change assist, crossing warning and collision warning. Lane changing helps reduce the risk of collisions with vehicles completing the lane change, and overtaking vehicle warnings prevent collisions between vehicles in overtaking situations.
Intersection collision warning reduces the risk of lateral collisions for vehicles approaching road intersections. When vehicle2 alerts vehicle1 to stop overtaking, a collision between the two vehicles is avoided. Head-on collision warning: By issuing early warnings to cars moving in the opposite direction, the danger of a head-on accident is decreased. This use case is also known as "Do Not Pass Warning" rear-end collision alert since it lessens the risk of accidents when there are obstacles or curves in the road (such as hills or bends). A probable danger of a rear-end accident is disclosed to the driver of a car (Lianghai, Liu, Weinand, & Schotten, 2017). In addition, the relative system provides warnings such as "Do not pass warning" when there are obstacles or curved road areas. It also provides additional notifications for emergency vehicles, such as ambulances. Summaries of the same traffic signal alerts and other essential pedestrian notifications are also conditioned by this system (Lianghai, Liu, Weinand, & Schotten, 2017).

While Arduino-based smart vehicle systems can play a role in their actual implementation. An ultrasonic sensor used by an Arduino-based collision detection system estimates the distance between two cars and issues visual and audible alerts to help drivers avoid crashes.There are two settings for the automobile headlight bulb: high beam and low beam. Low beam has a shorter range and less brightness, but it is still enough for driving. High beam improves reach and increases light intensity, but the surplus light that strikes cars traveling in the other way might make it difficult to see. An accident avoidance gadget is created to solve this issue (Kaur, Das, Borah, & Dey, 2019).

Literature Survey

Malik et al. (2019) argued in their research that cars can improve the situation around them b y communicating with other cars and other things (such as traffic management). A solution p owered by cutting-edge sensor and wireless technology is designed to manage traffic at intersections and reduce waiting times in heavy traffic. The wireless module and ultrasonic sensor on the Arduino Mega board are connected to the vehicle. When the ultrasonic sensor detects the vehicle. Wireless modules connected to their range will show the vehicle's distance, speed and priority to the driver (in the case of an ambulance or other emergency vehicles)(Malik, et al., 2019).

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In an experimental study of IEEE802.11n, Jansons, Petersons, and Bogdanovs (2012) discuss the use of off-the-shelf devices in a vehicle-to-production configuration at lower costs compared to legacy devices (e.g., IEEE802.11g). .). In their work, we present an analytical model that uses Buzen and Markov processes to characterize the connectivity of WLANbased communications in order to evaluate the V2I connection type language in important situations.(Jansons, Petersons, & Bogdanovs, 2012).

Karagiannis, et al., (2011) has also presented their work. Vehicle networking has the potential to allow applications for entertainment, efficiency, and traffic safety. The basic characteristics of vehicle networks, applications and needs, difficulties and solutions, and significant ITS programs and initiatives in the USA, Japan, and Europe are all covered in their survey and instructional article.

Jeffery Miller also studied this system and found some important answers. This article describes vehicle-to-vehicle (V2V2I) architecture, which is a combination of vehicle-to-infrastructure (V2I) and vehicle-to vehicle (V2V) architecture. It takes advantage of the V2I architecture's rapid querying and response, and also has the advantage of no design and no failures. In each region of the V2V2I architecture, one vehicle is designated as the master vehicle, and only the master vehicle can interact with the central base or other master vehicles. A study using FreeSim describes the advantages of V2V2I created by pure V2I or V2V architectures, as well as the trade offs encountered depending on the size and number of fields in the transport system.(Miller, 2008).

Lianghai, Liu, Weinand, & Schotten (2017) dicsueed the evaluation of to meet standards, 5G needs to use new performance indicators (KPIs) rather than traditional metrics like those used in mobile phones. In this study, they use network-controlled direct V2V connection for vehicle-to-vehicle information sharing. In this communication mechanism, packets are sent directly between cars in a U-plane without the need of network infrastructure.

If an important vehicle needs to be attended to from a distance, prioritizing cars and signaling become difficult. Given the volume of real-time traffic, the size of the search area, and the dynamic nature of the traffic, it is desired to have smart devices connected to cars that use high-speed and low-power signal processing algorithms. Sharp beams to a specific device are formed using beamforming (BF), which also creates nulls in the wrong directions.
Access the cloud through the Internet of Things (IoT) network that detects, collects and trans mits relevant information in real time was said by (Ulhe, et al., 2020).

V2V communication is a wireless network that exchanges data between mobile nodes connected to cars using 5.9 GHz transmissions. Communication techniques must be employed for high speed and long distance applications since it is not practical for high priority vehicles like ambulances. Signal processing methods must be integrated with the communication modules in order to eliminate interferences. V2V communication greatly benefits from millimeter wave (MMW) beamforming (BF), which directs beams in the desired directions and nulls in the undesirable ones(Vochin & AL-Amily, 2017).

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Problem Statement

Design and development of a system that transfers data between vehicles and infrastructure over long distances and with a minimal data transmission rate. Using this method, the information is broadcast, and another vehicle receives it. By employing this strategy, we may stop traffic and accident before they start.

Objective and Scope of Study

In vehicle-to-vehicle communication, information is sent in multiple directions between two or more vehicles.

- Select driving distance sensor, brake level, pressure sensor, voltage sensor and other data as input and output.
- The data collected from the sensors is given to the microcontroller central unit.
- MCU recognizes this and generates a warning.
- Radio frequency transmission for private vehicles.
- Required Software: Keil software is used when using this machine.Methodology

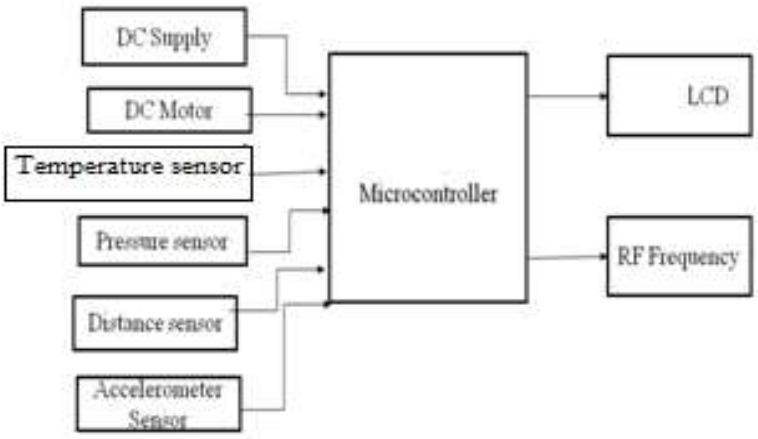

Figure 1: Proposed System

There are variety of components need to implement for the successful running of the system. Here author would like to discuss each element in brief with their operation of working and relative information.

DC Motor: DC motor is an electric motor that works with direct current. It provides ease of s tartup as it can be used directly from the rechargeable battery. DC motors are often used to dr ive machines without the use of local generators or internal generators. Today, DC motors are still used in applications such as small toys and DC drives. Modern DC motors generally run on electric current.

Power Supply: Provides power to the circuit. We use 12v power supply in our project. It usu ally provides DC voltage to the ship's components. Lpc2138 uses 3.3V power supply and Wi Fi module uses 4.2V power supply. The power used for the relay should be 5V.

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LCD: LCD can be used to control the output of various modules related to the microcontroller. Therefore, the LCD plays an intelligent role in calculating the output and debugging the system modules so that the problem can be corrected in case of system failure. Here we use 16*2 LCD i.e. 16 rows and rows. So we have 16 characters in each line. Therefore we will display all 32 characters of the 16*2 view.

Distance Sensor: The distance sensor is used to measure the distance between two vehicles and all obstacles on the vehicle. Use distance sensors to know the distance.

Acceleration Sensor: This sensor is used to determine the speed of the vehicle.

Radio Frequency: This is often used in wireless communications and broadcasting traffic information.

Working of System

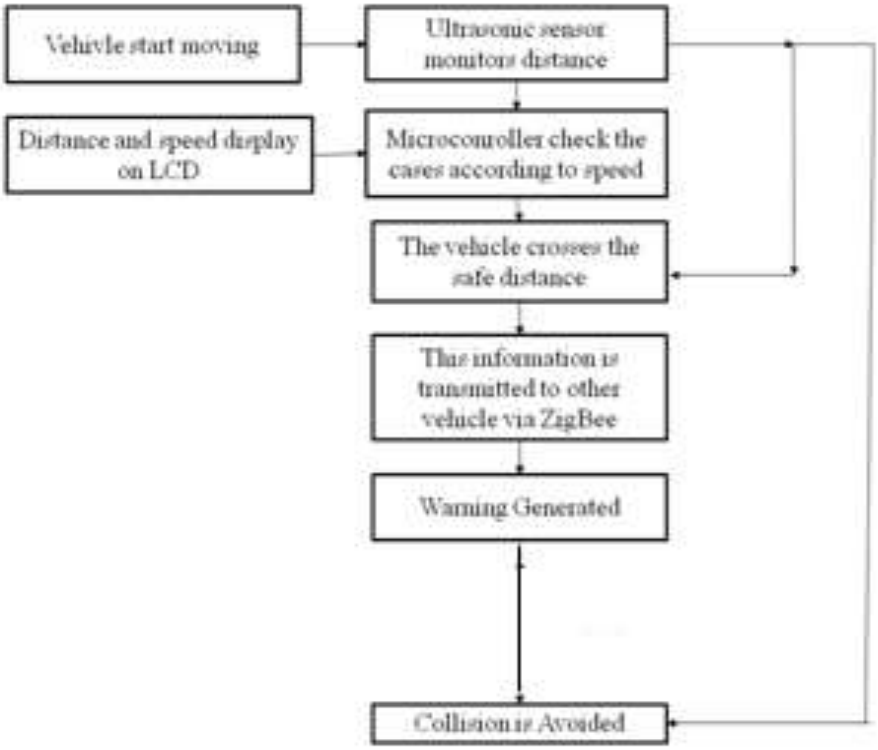

Figure 2: Flow chart of the proposed system

The system's sensor detects the space, tire pressure, and lane change speed of the car as soon as it begins to move on the road. Then data was gathered by the sensor and sent to the microcontroller. Microcontroller evaluates the situation based on distance and speed. If a vehicle travels at a modest speed and distance, it is safe; otherwise, a warning is created and the speed of the car is controlled. And this information is transmitted publicly across the frequency, thereby preventing collisions or accidents.

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2. CONCLUSION

This work presents a project plan to provide direct V2X communication based network management.. Additionally, a service provider plan that can be adjusted according to current V2X communication needs is created. Moreover, some important technologies have also been proposed and evaluated to improve the performance of direct V2V communication.. Last but not least, to provide accurate simulation results, create process-level simulators and synchronize them with reality.
Our assessment study shows that in arrange to empower coordinate V2X communication and boost activity effectiveness and security, all linked technologies need be built upon one another.

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