Vehicle to Vehicle Communication

Adhithya P.P[1], Ayana P Dharman[1], Lishmi M.D[1], Sreejith P.S[2]

B. Tech Scholar, Computer Science, Universal Engineering College, Thrissur, India[1]

Assistant Professor, CSE, Universal Engineering College, Thrissur, India[2]

Abstract: In the urban areas, most of the sound pollution are caused because of noisy environment which is created by industrial machineries and vehicle horn. Among all the reasons the vehicle horn is assumed most vital for making the noisy environment which has a hazardous impact on the human health. Therefore, it is become graver to need a system that is able to make the environment safe and sound. To confront this challenge, this study proposes a V2V or Vehicle to Vehicle Communication System. In this study the vehicle to vehicle communication has been accomplished using network and RF reader without using horn. This system reduces sound pollution in the environment. This communication is done via mobile application and RF reader. This system also detects the accident and sent the location to the nearest ambulance or hospital by using a piezo sensor.

Keywords: RF Reader Module, Hit Detection, Wifi Module, Message Passing, Buzzer

I. INTRODUCTION

Most of the sound pollution are caused because of noisy environment which is created by industrial machineries and vehicle horn. Among all the reasons the vehicle horn is assumed most vital for making the noisy environment which has a hazardous impact on the human health. Therefore, it is become graver to need a system that is able to make the environment safe and sound. To confront this challenge, this study proposes a V2V or Vehicle to Vehicle Communication System. In this study the vehicle to vehicle communication has been accomplished using network and RF reader without using horn. The system contain software and hardware. This system reduces sound pollution in the environment. This communication is done via mobile application and RF reader. The vehicle should be on the application when the vehicle starts and driver must use it for easy checking when moving the vehicle. RF reader sense the vehicle in front of the moving vehicle then generate a unique ID for identifying that vehicle then the mobile application send the message to the nearby vehicle by using this unique ID. This unique ID used for identifies the vehicles. All these processes are done by pressing the buzzer. This system also detects the accident and sent the location to the nearest ambulance or hospital by using a piezo sensor.

II. LITERATURE SURVEY

In[1],The expeditious increase in the vehicle populace around the globe, Particularly in India has prompted inquire about in the specialty of Intelligent Transportation System (ITS). Vehicle-To-Vehicle (V2V) communication is a framework intended to transmit data amongst vehicles and different objects on the road in real time. V2V communication is more effective than current automotive original equipment manufacturer embedded system for lane departure, adaptive cruise control, blind spot detection, rear parking sonar and backup camera because V2V technology enables ubiquitous 360-degree awareness of surrounding threats. The main objective of the project is to alert the driver when he closes to the front vehicle. The idea is that, if collision avoidance systems can work between vehicles, then every car on the road will be safer by avoiding accidents before they can ever happen. The importance of autonomous or semi-autonomous vehicles for intelligent transport systems (ITS) is increasing.V2V technologies are simple to implement primarily because of their reliance on wireless communication. Having low power and information rate, ZigBee happens to be utilized broadly in V2V communication. In this paper, propositions are initiated towards enhancing road safety and handling traffic congestion.

In[2],Traffic congestion problem is a phenomena which contributed huge impact to the transportation system in country. This causes many problems especially when there are emergency cases at traffic light intersections which are always busy with many vehicles. A traffic light controller system is designed in order to solve these problems. This system was designed to be operated when it received signal from emergency vehicles based on radio frequency (RF) transmission and used the Programmable Integrated Circuit (PIC) 16F877A microcontroller to change the sequence back to the

normal sequence before the emergency mode was triggered. This system will reduce accidents which often happen at the traffic light intersections because of other vehicle had to huddle for given a special route to emergency vehicle. As the result, this project successful analyzing and implementing the wireless communication; the radio frequency (RF) transmission in the traffic light control system for emergency vehicles. The prototype of this project is using the frequency of 434 MHz and function with the sequence mode of traffic light when emergency vehicles passing by an intersection and changing the sequence back to the normal sequence before the emergency mode was triggered. In future, this prototype system can be improved by controlling the real traffic situation, in fact improving present traffic light system technology.

In[3],Communication has offered many new opportunities for the automotive industry. This paper proposes a technology to improve traffic congestion and road safety. Also we have analyzed situations like collision, delay and redundancy etc. which can be improved or overcome with simple warning message transmission. GPS is used so that V2V system processor can identify the speed, direction and location of the other vehicle. More sensors can be included for better working and accuracy. Future cars will be more intelligent which can make its own decision for the safety purpose. Quick help will be provided by knowing the location if the advance system also embedded in ambulance.

In[4],This paper proposes a novel Vehicle to Vehicle (V2V) communication system for collision avoidance which merges four different wireless devices (GPS, Wi-Fi, ZigBee and 3G) with a low power embedded Single Board Computer (SBC) in order to increase processing speed while maintaining a low cost. The three major technical challenges with such combinations are the limited system and width, high memory requirement and slow response time during data processing when accessing various collision avoidance situations. Collision avoidance data processing includes processing data for vehicles on express ways, roads, tunnels, traffic jams and indoor V2V communication such as required in car parks. Effective methods are proposed to address these technical challenges through parallel Central Processing Unit (CPU) and Graphic Processing Unit (GPU) processing. With this, parallel V2V trilateration and parallel bandwidth optimization, multi-dimensional real time complex V2V data streaming can be attained in less than a second. The test results have shown that there is at least a 4 to 10 times improvement on processing speed with parallel CPU and GPU processing used in V2V communication depending on different road safety conditions.

In[5],Using vehicle-to-vehicle (V2V) communication, a vehicle can detect the position and movement of other vehicles up to a quarter of a kilometer away. In a real world where vehicles are equipped with a simple antenna, a computer chip and GPS (Global Positioning System) Technology, your car will know where the other vehicles are, additionally other vehicles will Know where you are too whether it is in blind spots, stopped ahead on the highway but hidden from view, around a blind corner or blocked by other vehicles. The vehicles can anticipate and react to changing driving situations and then instantly warn the drivers with emergency warning messages. If the driver doesn't respond to the alerts message, the vehicle can bring itself to a safe stop, avoiding a collision.

III.   PROPOSED SYSTEM

Most of the sound pollution are caused because of noisy environment which is created by industrial machineries and vehicle horn. Among all the reasons the vehicle horn is assumed most vital for making the noisy environment which has a hazardous impact on the human health. Therefore, it is become graver to need a system that is able to make the environment safe and sound. To confront this challenge, this study proposes a V2V or Vehicle to Vehicle Communication System. In this study the vehicle to vehicle communication has been accomplished using network and RF reader without using horn. It is one type of software application. This system reduces sound pollution in the environment. This communication is done via mobile application and RF reader. The vehicle should be on the application when the vehicle starts and driver must use it for easy checking when moving the vehicle. RF reader sense the vehicle in front of the moving vehicle then generate a unique ID for identifying that vehicle then the mobile application send the message to the nearby vehicle by using this unique ID. This unique ID used for identifies the vehicles. All these processes are done by pressing the buzzer. These systems also detect the accident and sent the location to the nearest ambulance or hospital by using a piezo sensor.
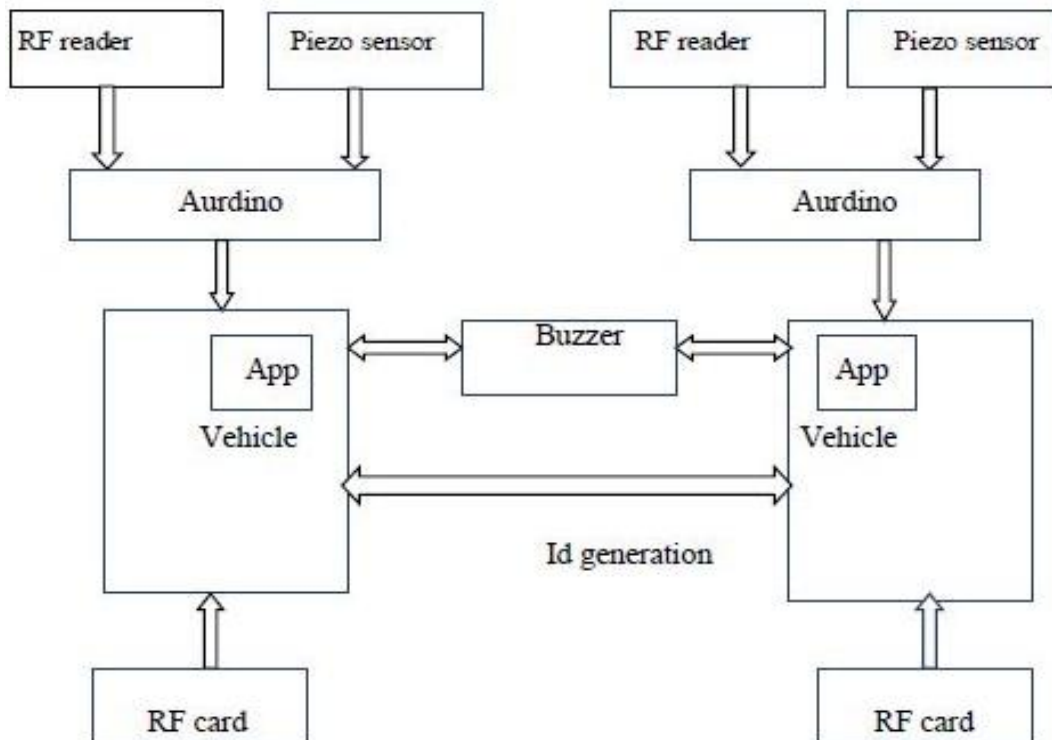
.Fig 1: Block diagram

A.   METHODS

1)   SENSING:

Here we use a RF reader in which reader is placed in front of the vehicle and the RF card is placed back of same vehicle. The RF card is placed in one vehicle will communicate with RF reader of other vehicle. Hence the corresponding signal will generated which will be passed to other vehicle as sound alert that is controlled by microcontroller. In this situation likes curves, turns then the normal horn will be provided. The sensor will not be able to identify other vehicle.

2)   ACCIDENT DETECTION:

If any hit occurred between two vehicles then piezo sensor will be activated at the moment and according to the hit value an accident message will be sent to nearby hospital through GPS with current location. A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge.
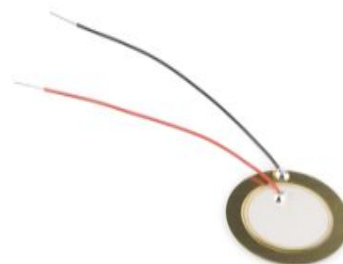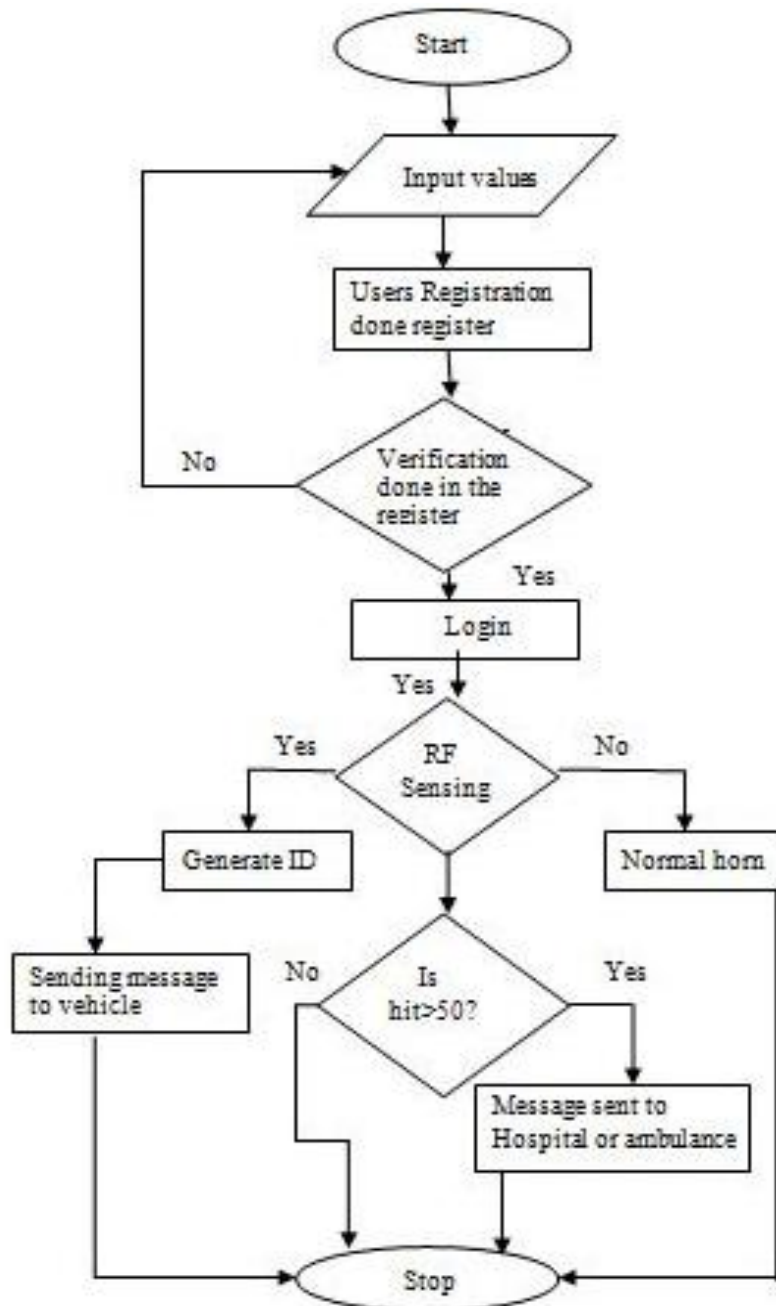

Fig 2: piezo sensor

Fig 3: Flowchart

B. SOFTWARE RERQUIRMENTS

1) XML

Extensible Markup Language is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The W3C's XML 1.0 Specification and several other related specifications all of them free open standards. The design goals of XML emphasize simplicity generally, and usability across the internet. It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on document, the language is widely used for the representation of arbitrary data structure such as those used in web services. Several schema systems exists to aid in the definition of XML-based languages, while programmers have developed many applications programming interfaces to aid the processing of XML data.

2) Android Studio

Android studio is the official integrated development environment for Google's Android operating system, built on Jetbrains IntelliJ IDEA software and designed specifically for android developed. It is available for download on windows, macOS and Linux based operating system. It is a replacement for the Eclipse Android Development Tools as the primary IDE for native Android application development.

3) Firebase

The Firebase Realtime Database is a cloud-hosted database. Data is stored as JSON and synchronized in realtime to every connected client. When you build cross-platform apps with our iOS, Android, and JavaScript SDKs, all of your clients share one Realtime Database instance and automatically receive updates with the newest data.

4) JSP

Java Server Pages is a technology that helps software developers create dynamically generated web pages based on HTML, XML, or other document types.

C. HARDWARE REQUIRMENT

1) NodeMCU

Nodemcu is like brand name of a board that has a wifi module ESP8266 and some associated circuit. ESP8266 module in tune has a micro controller with wifi.

2) Piezo sensor

A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain or force by converting them to an electrical charge.

3) RF Reader

Radio frequency identification uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic identification and Data Capture.

IV. CONCLUSION

This study presents a vehicle to vehicle communication system that would be used as vehicle horn system in a congested traffic area. The proposed system is initiated to draw the attention of the driver without making any external horn. Instead of sending a message wirelessly among the vehicles using mobile applications. The message is displaying and producing a sound alert in particular mobile device which is placed besides the driver so that driver could take movement step based on the received message. The main aim of this system is to make a sound pollution free environment so that people are not be affected by various diseases which caused by unnecessary vehicle horn.

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