

VEHICLE COLLISION DETECTION SYSTEM METHODOLOGY – REVIEW REPORT

Sumit Yewale	Rahul Gupta	Prof. Rahul Wantmure
Student, NCRD's Sterling Institute of Management Studies, Nerul, Navi Mumbai s.t.yewale@gmail.com	Student, NCRD's Sterling Institute of Management Studies, Nerul, Navi Mumbai amitkumar841994@gmail.com	Assistant Professor, NCRD's Sterling Institute of Management Studies, Nerul, Navi Mumbai rahul_wan2003@yahoo.co.in

ABSTRACT:

The Existing system provides an alert and safe driving scenario to improve the crash prevention performance. This system uses an LCD display device to display a warning to vehicle driver who's coming from behind. Other than display device it uses microcontroller for processing on input and to generate an output. It accepts input from three different ways like Input Touch Device, Voice Recognition Device and Distance Sensor. If vehicle driver wants to display a warning to other vehicle which is at behind, so he just need to click on type of warning button and that warning will be displaying on output device. It uses wireless transceiver to accept input from input device. It also uses transmitter to transmit output from microcontroller to output device. This system can be implementing at less cost and also it is completely networking free since it does not require any type of connection between vehicles. This system can be implemented in all type of vehicles easily. This system displaying accurate results in order to alert other drivers.

The following paper describes the simple method which has been used to implement this system. It also explains an entire architecture used to develop this system. Although it does not follow any type of standard protocol but it works. If this technology is implemented in India, then it will helpful to reduce road accidents. This paper also shows the User Interface of this system

Keyword: *Vehicle to Vehicle Communication, Microcontroller, Collision Detection System, Network Free System.*

1. INTRODUCTION

In recent years' accidents on road had been drastically increased due to careless driving of drivers. Common reason behind this is less sleep, over stress, drunk. One of the main reasons is day by day increasing of vehicles on the road. There is a need for vehicles to communicate with each other. To make a communication between vehicles many automotive industries have implemented a network based technology for Vehicle to Vehicle communication. In this paper we review an embedded system that is used for communication. With the help of this system the vehicles will be able to send message to

its neighbouring vehicles. This will help to reduce the accidents caused due to collisions. This paper review the architecture and working of the embedded system used in Vehicles. This system was developed by Mohammed Ateeq Alanezi- **A Proposed System for Vehicle-to-Vehicle Communication: Low Cost and Network Free Approach**. Basically this methodology is simple and relies on network free architecture and it does not require any external infrastructure. This methodology was developed on simple and easy way.

2. OBJECTIVE

To detect nearby obstacles and alert vehicle driver is the most important thing to avoid collisions between vehicles. It's difficult to identify how a vehicles get collide with each other by the mistake of the driver or the obstruction that can suddenly come. A person who studied in Shaqra University, Kingdom of Saudi Arabia, finds the solution regarding this problem and build a small scale system to detect collision. We have reviewed methodology, characteristics and working of this system.

What is Embedded System?

Embedded System is an advanced trend in the era of computers. It provides many opportunities for advanced computing. They are engineered or intended to perform specific functions. The most important device which needs to be selected is the Embedded Chip Set which includes a microcontroller and microprocessor. This chip is to be fed with instructions to handle the entire process of working.

3. LITERATURE REVIEW

- 1) Proposed System for Vehicle-to-Vehicle Communication: Low Cost and Network Free Approach: Described simple and easy implementation on collision detection system. It describes how easy we can display warning to neighbour vehicle driver. It also describes about how two cars comes within 10m of range then display a warning message on output device which is attached at backside of the vehicle.
- 2) Vehicle collision detection and reporting: It uses Data Filtration and Analysis technique. It uses Gyroscope and Accelerometer values for calculation. It uses an Angle for calculation to get accurate orientation angle. This orientation angle helps to identify vehicle is going to rollover or not. And it also uses notification and notification and Global System for Mobile (GSM) system in it.
- 3) Real Time Vehicle Monitoring and Tracking System: The proposed system is a complicated vehicle monitoring and tracking system supported Embedded Linux Board and android application is meant and implemented for monitoring the varsity vehicle from any location A to location B at real time. The proposed system would observe use of latest technology that supported Embedded

Linux board namely Raspberry Pi and Smartphone android application. The proposed system works on GPS/GPRS/GSM SIM900A Module which includes all the three things namely GPS GPRS GSM. The GPRS sends the tracking information to the server and GPS current location of the vehicle and therefore the GSM is employed for sending alert message to vehicle's owner mobile. The proposed system would place inside the vehicle whose position is to be determined on the online page and monitored at real time.

- 4) Remote Vehicle monitoring System: keeps track of vehicle and also monitor group of the vehicle status. Here two problems are dealt with. First one is that the anywhere any time monitoring of the vehicle status can't be done through manual monitoring and therefore the other is that the system behaviour change consistent with user changes. As it is fully software related system, the Driver / owner won't be ready to alter the system consistent with his needs. Monitoring might not be possible in case of absence of network.
- 5) Accident Detection and Alert System: The proposed system deals with the accident alerting and detection. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Vibration sensors are going to be activated when the accident occurs and therefore the information is transferred to the registered number through GSM module. Using GPS, the situation often sent through tracking system to hide the geographical coordinates over the world. The accident often detected by a vibration sensor which is employed as major module within the system.

Architecture of Existing System:

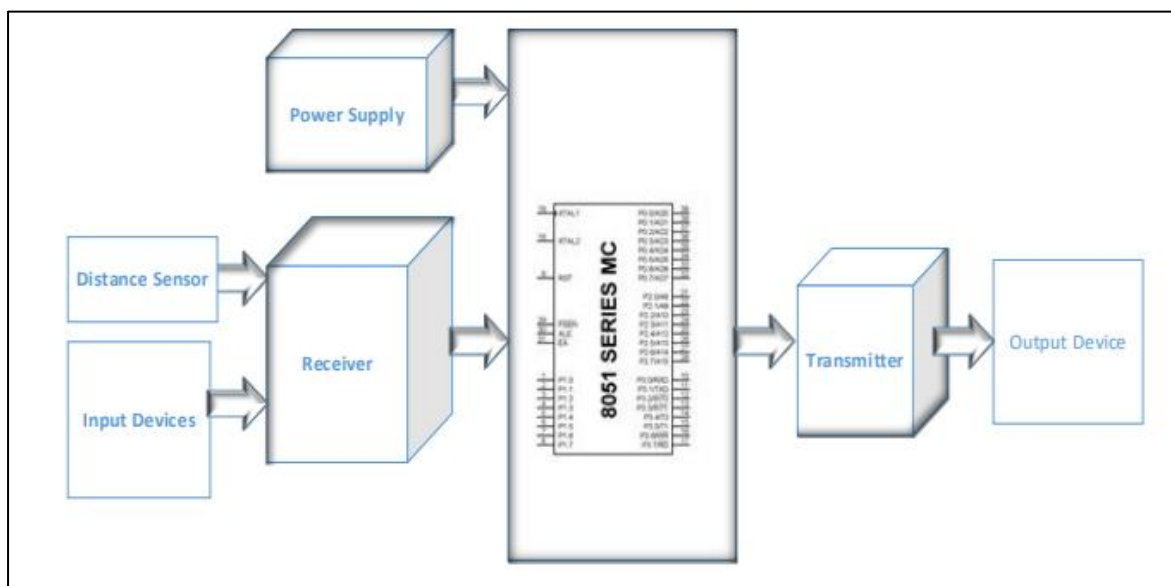


Fig.1: Architecture of Simple Methodology

This is architecture of Collision Detection System. It does not follow any standard protocol. It contains all necessary components like Input Device, Distance Sensor, Microcontroller and Transmitter etc. Input device accepts input from vehicle driver. Input has been received by Receiver and encoded into machine understandable language and further it transfers to the microcontroller for processing. An AT89v651 microcontroller is used to perform the complete tasks present in this methodology. Then processed input transfer into the Transmitter. And transmitter transfer this output to the Output Device to display the result. It follows simple methodology to perform operation.

4. WORKING METHODOLOGY

In this developed system 8051 series microcontroller and AT89v651 microcontroller has been used for processing input and output operation. Although it uses other different type of embedded components as well. By using input device system allows a vehicle driver to send an alert or warning to other vehicle drivers.

This warning has been displayed on LCD display device which has been attached at the backside of the vehicle. For getting an input from vehicle driver, this system uses some input devices. It uses two types input devices which has been mounted on dashboard of the vehicle. It uses Touch based input device and Voice Recognition Sensor for getting an input. It contains two types of languages Arabic and English in it. It contains predefined different types of warnings within it like Wrong Entry, Sandstorm and Accident etc. When the person who drives the vehicle is encountering or approaching any type of inconvenience in the road, then he can just simply click on the button present in the touch device so that the exact content present on the button is displayed in the output device which is mounted on the backside of the vehicle. This system has an application with it, which is used to send a warning message.

Following components are used in Architecture of Existing System:

8051 Series Microcontroller:

An 8052 series microcontroller is connected to the Receiver, Transmitter, and other output devices. Also, it accepts input from the Wi-Fi device and sends it to the transmitter to transmit it and then warn the driver by displaying a message on the LCD display.

AT89v651 microcontroller:

This microcontroller is a relay between all the components present in the system. Basically is uses to identify the signal. It analyzes which type of input signal came like weather it is touch-based or voice-based input. After analyzing the input signal, it sends the command to the activators. After activators activated the corresponding device gets activated to process microcontroller command.

Distance Sensor:

Distance sensors installed on the backside of the car. This sensor emits the signal in the form of an electromagnetic field. Sensors receive back the signal in the form of a result and always check the changes in the return signal. If the detected distance is maximum, then it's called a Nominal Range. In this system sensors also attached on the right and left side of the car. These sensors sense the signal from all sides around 10 meters from a car. This distance is a normal defined range in the sensor. Whenever any vehicle comes inside this 10 meters range then this sensor senses the object and sends a signal to the microcontroller. This microcontroller sends the respected signal to the microcontroller every time.

LCD Display:

This LCD display is placed on the dashboard of a vehicle. This LCD is used to display an alert message. When sensors sense the message they transmit this message to the transmitter. Then the transmitter sends this message to the microcontroller and a microcontroller display this message on the output device LCD display.

Transmitter:

A transmitter is a device which is used in telecommunications systems which produce radio signals for the purpose of transmitting or receive data with the help of an antenna based architecture. A radio frequency alternating current generated by the transmitter which is then forwarded towards the antenna. The antenna further converts or transmits it as radio waves. In general, there are many types of transmitters are available which depends on the standard. In recent devices, transmitters based on Wi-Fi, Bluetooth, NFC, and cellular are being implemented and used. A receiver is a device which is used in telecommunications systems which receive the radio signals sent from the transmitter with the help of an antenna based structure. The receiver receives the signals from input devices and sends it towards the microcontroller. [1]

It displays following type of different warnings:

Sr.	Type of Warning	Description
1	HAZARD	Any possible source of danger on the road or near the road which leads to a crash.
2	WRONG ENTRY	Any possible entry of vehicles which is in wrong side
3	ROAD UNDER CONSTRUCTION	Appearance of a construction in the road
4	FOG / MIST	Appearance or sudden arrival of FOG/ Mist
5	SANDSTROM	Appearance or sudden arrival of Sand Strom
6	ACCIDENT	Appearance or sight of an accident

7	DAMAGED ROAD	Appearance of a damaged road
8	CROWDED	Appearance of a busy road
9	CROSSING AHEAD	Appearance of a crossing in the middle of the road
10	KEEP DISTANCE	Encountered a forth coming vehicle as too closer

Table 1: Types of Warning Signs and its Detailed Description

In Vehicle Display:



Fig.2: Welcome window screen

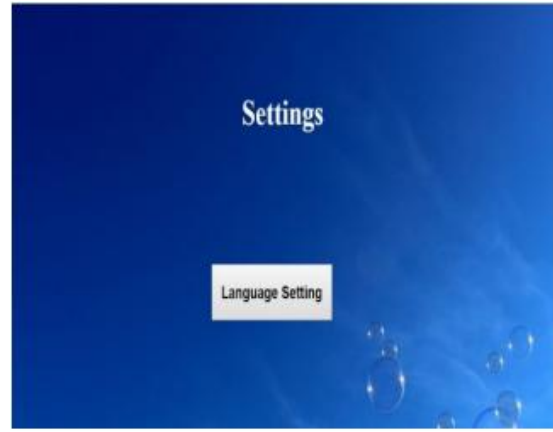


Fig.3: Language setting window screen

HAZARD	WRONG ENTRY	DAMAGED ROAD
ACCIDENT	SANDSTORM	CROWDED
CROSSING AHEAD	KEEP DISTANCE	FOG / MIST

Fig.4: Types of warning message

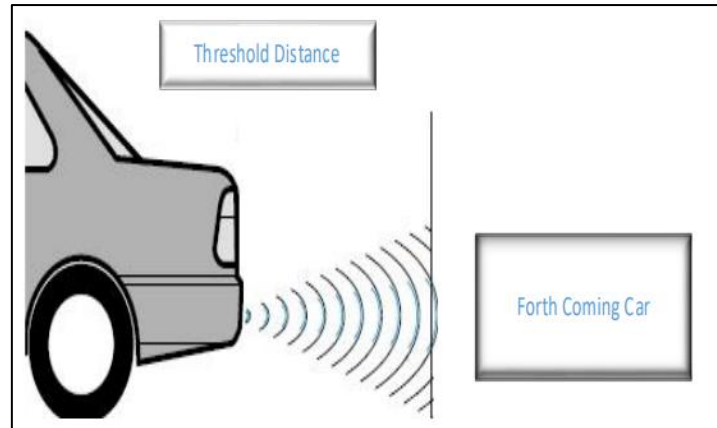


Fig.5: Distance Sensor Working Methodology

5. CONCLUSION

The paper review the methodology used in Collision Detection System. It does not follow any type of standard protocol. It is simple in use. It displays the warning when vehicle driver wants to display it and when two vehicles come within 10m distance. This warning display on the output device which is attached at the backside of the vehicle. It accepts input in three different ways. For accepting input it has touch based device, Voice recognition device and Distance Sensor. In Distance sensor, threshold has been defined within 10 m distance. The more focus of this methodology on displaying warning message to perform Vehicle to Vehicle communication. This methodology has been performed on small practical project. Although it contains less and low price hardware components, this system is cost effective.

6. REFERENCES

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