International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 04 | Apr-2018 www.irjet.net p-ISSN: 2395-0072

Automotive Collision Avoidance System

Athira M[1], Maithrika M[2], Aiswarya S[3], Akshay Sivadas[4], Ashilly N[5]

[1,2,3,4]*Final year Students, Dept. of ECE, Ammini College of Engineering, Palakkad, Kerala, India*
[5]*Asst Professor, Dept. of Electronics and Communication Engineering, Ammini College of Engineering, Palakkad*

Abstract – *In this work a modern vehicle security system for any type of vehicles has been designed. When a vehicle collides with another, the vibration sensor detects and the details of the vehicles are transferred to each other automatically via zigbee communication. It will help to find the vehicle easily which met with the accident. Another feature implemented here is the ultrasonic sensor based collision prevention system. The microcontroller is programmed to continuously read the values from ultrasonic signals and display on an LCD screen. The ultrasonic sensor consists of a transmitter and a receiver. The transmitter continuously transmits sound waves. When any obstacle comes across this, this signal will reflect and the receiver receives this signal and give it to the microcontroller. The program loaded in the controller calculates the time duration between the transmission and reception and the distance between them. If the distance is less than the safe limit, the speed of the vehicle decreases automatically by the program loaded in the controller.*

Key Words: Vibration Sensor, Zigbee, Microcontroller

1. INTRODUCTION

In this Hi-Fi modernization world coping up with road safety and traffic congestion is the need of the hour. Many research works are proposed and undergoing in this particular thrust area. In this work an Intelligent Transport System (ITS) that provides an effective Vehicle to Vehicle (V2V) communication mechanism using Zigbee is implemented. Especially in V2V communication Zigbee proves vital and it is the key protocol for wireless sensor network applications. The key features of Zigbee include long battery life, low-cost for installation and ease maintenance. These features in Zigbee enable uniform mesh networking, which effectively supports the wireless communication between many vehicles, routers and receivers. Here periodic monitoring of vehicular movements are recorded which enhances road safety and handles traffic congestion. Since these two above mentioned issues are the core aspects in transportation industry and an important problem which the world faces today, this system deals with effective inter communication of vehicles using Zigbee protocol. Connection of the output signal to the mechanical system.

1.1 BLOCK DIAGRAM

The block diagram that showing vehicle to vehicle communication is given in figure 1 and 2 below.

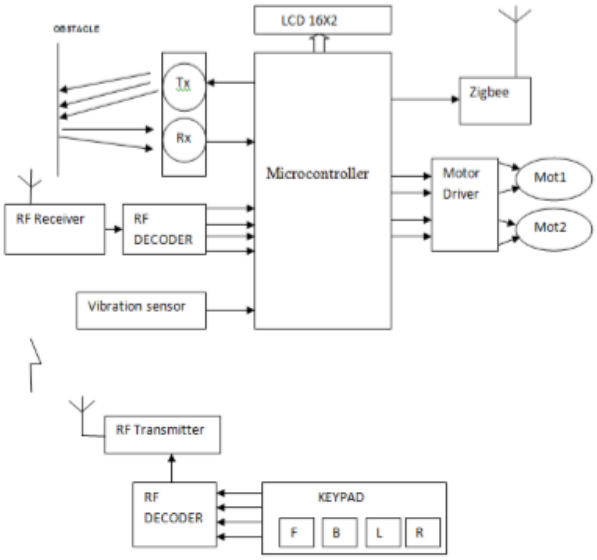


Fig -1: Block diagram of Main vehicle

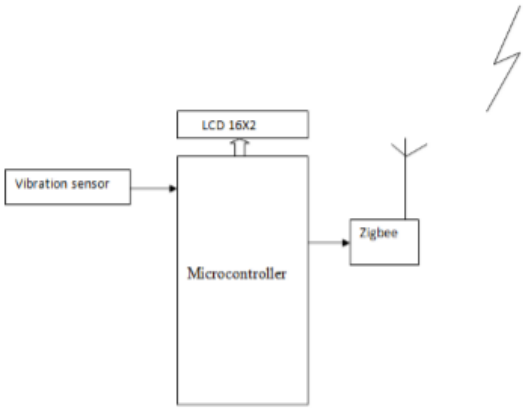


Fig -2: Block diagram of Dummy vehicle

1.2 Ultrasonic sensor working principle

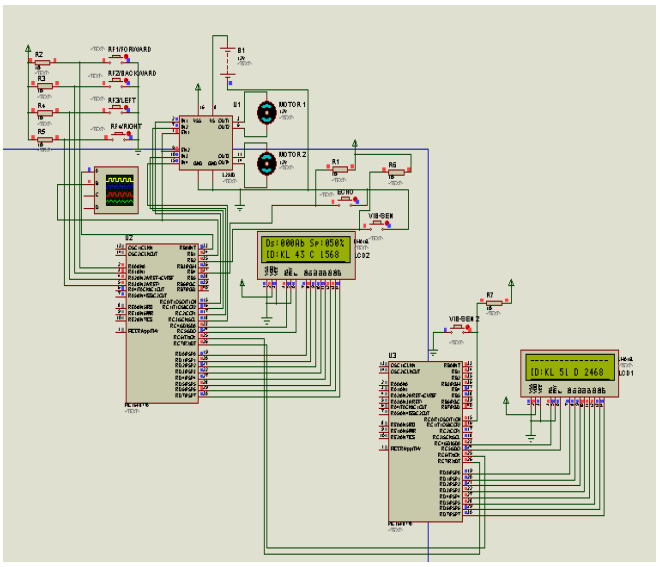
Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo.

1.3 Zigbee Communication

Zigbee communication is specially built for control and sensor networks on IEEE 802.15.4 standard for wireless personal area networks (WPANs), and it is the product from Zigbee alliance. This communication standard defines physical and Media Access Control (MAC) layers to handle many devices at low-data rates. These Zigbee's WPANs operate at 868 MHz, 902-928MHz and 2.4 GHz frequencies. The date rate of 250 kbps is best suited for periodic as well as intermediate two way transmission of data between sensors and controllers.

2. SIMULATION OF THE SYSTEM

Simulation of the complete system is done by the software Proteus 7 Professional and MP Lab for PIC. The 16F877A is a capable microcontroller that can do many tasks because it has a large enough programming memory (large in terms of sensor and control projects) 8k words and 368 Bytes of RAM. This is enough to do many different projects. Among the peripheral features of PIC here we have used the Port programming, ADC programming, LCD programming and PWM programming. The simulation for Automotive collision avoidance system is as shown in figure 3 below.



3. HARDWARE SECTIONS

Main hardware sections used in this project are PIC microcontroller, Zigbee module, Ultrasonic sensor, Vibration sensor, Motor driver and LCD for display the distance between the two vehicles and the details of the vehicle which caused the accident if accident is occurred. Fig-4 shows the setup for the Automotive collision avoidance system.

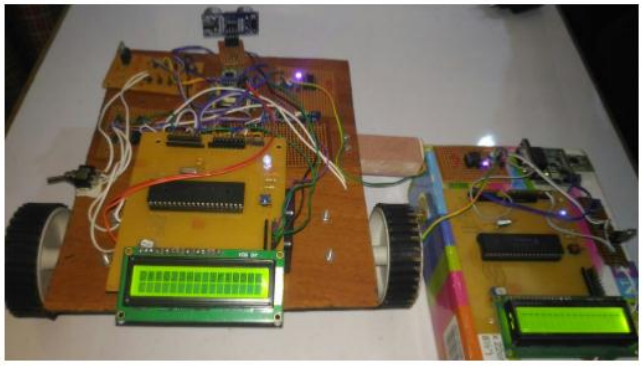


Fig-7: Set up for the Automotive collision avoidance system

3.1 Microcontroller-PIC16F877A

The 16F877A is one of the most popular PIC microcontrollers and it's easy to see why - it comes in a 40 pin DIP pin out and it has many internal peripherals. The microcontroller is programmed to continuously read the values of the ultrasonic sensor. If the distance is less than the safe limit, then the program loaded in the microcontroller will cause the speed of the vehicle to reduce. The midrange PIC Microcontroller offer several features that help to achieve these goals. The special features include:

- 5 Digital I/O Ports –Port A,B,C,D,E
- Three timer/counter modules
- A 10-bit ADC with 8 inputs
- Two Capture, Compare, PWM modules
- Synchronous Serial Port (SSP) with SPI (Master mode) and I2C (Master/Slave)
- Universal Synchronous Asynchronous Receiver Transmitter (USART/SCI) with 9- bit address detection
- Parallel Slave Port (PSP) 8-bits wide, with external RD, WR and CS

3.2 Ultrasonic Sensor

The ultrasonic sensor should be placed on the front end of the vehicles. The sensor will continuously transmit sound waves. If an obstacle comes across this, the waves will reflect and thus the distance between the vehicle and that obstacle is calculated. This result is then given to the microcontroller to decide whether the speed of the vehicle has to be reduced or not.

3.3 Vibration Sensor

The vibration sensor is to detect the collisions between the vehicles. Vibration sensors are placed in both sides of the vehicle. The vibration sensor detects the collision through mechanical vibrations and these vibrations are converted

into electrical voltage and are given to the comparator for comparison with a pre-set voltage. Now the result of the comparator is transferred to the microcontroller which intern activates the zigbee module for data transmission and reception.

3. 4 Zigbee Module

The transceiver module used here is Zigbee. Zigbee module should be placed on every vehiclefor the transmission and reception of data. The operating frequency is about 2.4 GHZ.

3.5 LCD Display

A 16x2 LCD (Liquid Crystal Display) screen is used to display the distance between two vehicles and the details of the vehicle which caused the accident whenever collision is occurred.

4. CONCLUSION

Front and back collisions can be avoided at a maximum by using Automotive collision avoidance system.

Since inter vehicular communication is provided in this system, it is possible to get the information about the vehicle which caused the accident.

ACKNOWLEDGEMENT

We wish to express our deep sense of gratitude to our beloved Chairman Sri. K. G. Madhu and all trust members of Ammini College of Engineering for providing all the necessary facilities to conduct our project work. We express our sincere thanks to the Principal Dr. Shasi Dharan for his support. We express our gratitude to Head of the Department Ms. Susan Varghese, department of Electronics and Communication Engineering, for the support and guidance she has extended to carry out the project work successfully. We extend our sincere thanks to our guide Ms. Ashilly N. , Assistant Professor and staff members of the Department of Electronics and Communication Engineering for their valuable suggestions and help throughout our project work.

REFERENCES

[1] "An Overview of the DSRC/WAVE Technology." by Yunxin (Jeff) Li

[2] "Vehicle-to-Vehicle Communications: Readiness of V2V Technology for Application." by Harding, J. Powell, G. R. Yoon, R. Fikentscher, J. Doyle, C. Sade, D. Lukuc, M. Simons

[3] "Building a Stand-Alone Application" by National Instruments.

[4] "Vehicular Ad-hoc Network (VANET) - Privacy and Security." By Anil K. R. Panghal, Sharda Rani

BIOGRAPHIES

Athira M. is doing her B.Tech in Electronics and Communication Engineering at Ammini college of Engineering, Calicut university, Kerala.

Maithrika M. is pursuing her B.Tech in Electronics and Communication Engineering from Ammini College of Engineering, Palakkad, Kerala.

Aiswarya S. currently doing her B.Tech in Electronics and Communication Engineering at Ammini college of Engineering, Calicut university, Kerala.

Akshay Sivadas is with Ammini College of Engineering doing his B.Tech in Electronics and Communication Engineering, Calicut university, Kerala.

Ashilly N. is with Ammini College of engineering, Palakkad as Assistant professor in the ECE dept. She received the B.Tech degree in Electronics and Communication Engineering from Royal College of Engineering and Technology, Thrissur and M.E in Communication Systems from Maharaja Prithvi Engineering College, Avinasi. She published 1 paper on the topic related to Error control coding in one of the international journals.