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VEHICLE COLLISION AND AVOIDANCE IN A VEHICULAR AD-HOC NETWORK USING V2I PROTOCOL

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Abstract: *Vehicle collisions in high ways are increasing day by day and death rate increases rapidly. To control The Death Rate Problem, Driver Safety, Vehicle Traffic Control we should be think prevention of vehicle accidents on highways. For that we proposed a new model of Vehicle collision and avoidance in network called VANNET. This paper planned a framework for vehicle correspondence that tends to this issue. Vehicular Ad-Hoc Network (VANET) innovation is made in a circulated arranges permitting the trade between cars for an enormous scope for the execution of Vehicle-to-Vehicle (V2V), or Vehicle-to-Infrastructure (V2I) correspondence conventions. The point of the exploration is to make a VANET domain and calculation for crash recognition. In the proposed article of Accident avoidance system using RF V2I protocol for safe and secure for vehicle and RF smart zones. This proposed system is implemented using RF frequency. When the transmitter section RF frequency matches with receiver section of RF frequency this system automatically control the speed of the vehicle.*

Keywords: *Ad-Hoc Network, Arduino, RF, Vannet, Vehicle*

I. INTRODUCTION

Safe and secure message transmission is the main challenge VANET face to have a smooth and safe transportation system. High vehicle mobility causes a wide range of problems, such as the disruption of the interaction between vehicles, in which vehicles fail to establish safe communication between them. It makes difficult to transmit a warning message to other

devices in prior time before the deadline. Latency plays a key role in the communication link in sharing alert messages or various physical parameters. Minimum latency is the crucial requirement in providing the collision-free environment in VANETs. Different sensors are integrated into the vehicle to measure various physical parameters like acceleration, speed, and distance from the nearby vehicle. These parameters are displayed on the Human Machine Interface (HMI) device which is already connected with the vehicle. Communication of alert/warning messages, certain physical parameters helps to avoid wrong actions of the driver which in turn prevents the occurrence of collisions. Numerous vehicle applications include efficient traffic control, active road safety, etc. The main goal is to eliminate car accidents and to provide a collision-free, driver-safe environment by sharing information on the danger of collisions and obstacles. To extend the driver's perception by allowing him/her to respond much more quickly is the fundamental idea

II. LITERATURE OVERVIEW

A more efficient model has been developed by San- Ian Sou [1] that evaluates working and efficiency of DSRC sensors and devices and also measures the efficiency during emergent circumstances, via wireless collision protection system. The model is also used to determine the movement of vehicle dichotomies. To promulgate the mobility of the vehicle Greenburg logarithmic model is adopted. A relationship is established between vehicles in emergency condition. The model helps in detecting chances of back end collision that travels in same direction .During critical situations the when the vehicle is unable, to receive the major information, the probability is calculated accordingly. [2, 3]. The FCC has provided with spectrum band of 5.9 GHz for the use in ITS (Intelligent Transportation System) [4]. Around August 2008 a spectrum is used merely of 40 MHz in the band of 5.9 GHz for intelligent transportation system by the famous European Telecommunications Standards Institute. By 2003, Japan and Europe used it for electronic toll collection. [5,6] In Japan, Europe, dedicated short range communication systems are incompatible and consist of many important deviations infrared, different protocols, and different baud rates). In order to replace its ERP1 overhead gantry method, some scheme plans for Electronic Road of Singapore had been implemented to use dedicated short range communication technology for road safety computations. The benefits of application are multiple in nature like the warning system for vehicles in emergency situations, cooperative forward collision warning, cooperative adaptive cruise control, collision avoidance at any juncture, approaches for warning in any emergency for vehicles, safety inspection for vehicles, sending signals on priority in case of any vehicle emergency, commercial vehicle clearance and safety inspections, payments of parking electronically, In-vehicle signing Rollover warning, collection of survey data, warning at a highway-rail crossings, collections of electronic payment.[7] During the past decades, ITS (Intelligent Transportation Sys- tem) has undergone many phases of research and development, also considering its performance in a real-time passing into enhancement to retrieve the best outcomes is increasing exponentially. Currently, topics of Intelligent Transportation System (ITS) are depending on solid ground.USA and some European countries started to implement and use them. The infrastructure is not established well with a large number of challenges in the developing countries (example cost of infrastructure) [8]. This research paper mainly concentrates on the implementation of V2V communication which will be used independently for an architecture of ITS in the developing countries without RSUs infrastructure to over-

come the currently facing challenges. To fulfill the desired response, a simulation for different (VANET) routing protocols implemented using Opnet simulator to choose the finest of routing protocol for the execution of vehicle to vehicle communication. The best routing protocol for vehicle to vehicle communication depends on the Key Performance Indicators and viewpoint will be applicable and utilized to differentiate among two distinct architectures, one is an execution of a vehicle to vehicle with road side unit and the other one is proposed implementation of a vehicle to vehicle only. In developing countries, the outcomes indicate that the proposed architecture of ITS depends on vehicle to vehicle only without road side unit is having the ability of ITS implementation. The dedicated short range communication channel is characterized by passionately changing influences of multi-access interference and multi- path interference, including shadowing. To demonstrate typical characteristics, the analysis results, which were performed using suitable 5.8 GHz modeling tools for propagation, are introduced. A shaped beam has been figured for the beacon antenna plus the horizontal polarization plus a phased array antenna, that provides assumption in emergent and unusual situations, and an Omni directional vehicle antenna which were implemented [9,10].

III. EXISTING SYSTEM

Present existing framework is does not automation of controlling road light framework, all believes are going on in manual mode simply because of that long time for working not efficient in nature. Also, expended vitality by the load is show in simple mode at showcases. No information move to other area through wirelessly. Monitoring the information is delayed by officials and robbery controlling is exceptionally difficult. To stay away from this issue we are going to presenting this framework.

IV. PRAPOSED SYSTEM

In this proposed system we are going to control Accidents avoidance in same zone and as well as accident detection. For that we are using Arduino microcontroller as interfacing module, ultrasonic sensor used for vehicle detection sensor and RF used for VANET environment creation using V2I protocol. The Arduino Uno is connected to an LCD Display which produces a visible image on a surface using a liquid crystal in it. The characters will be displayed in 2 lines with 16 characters in a line. The warnings and indications can be displayed to the neighboring automobile using the LCD screen to alert the driver. The Relay units are switches that operate electro mechanically, that connects to the Arduino Uno and can be used where low power signal is used to control a circuit or where one signal is utilized to control many circuits

V. METODOLOGY

The vehicle collision and avoidance in a vehicular ad-hoc network using v2i protocol is designed to find an optimal solution to accident rate reduction in highways. The design implements VANET Environment using Radio Frequency Module which creates the VANET Environment surrounding the vehicle. If any vehicle enters into the vanet zone information give to the micro controller it controllers the speed of the vehicle automatically. A main controlling

unit (MCU), ultrasonic sensor which is connected to microcontroller to tell about accident alerts. Buzzer will be initialized when the accident take place to alertness. All the modules interfaced to Arduino micro controller with operating voltage 5V and using Arduino IDE software to programmer development.

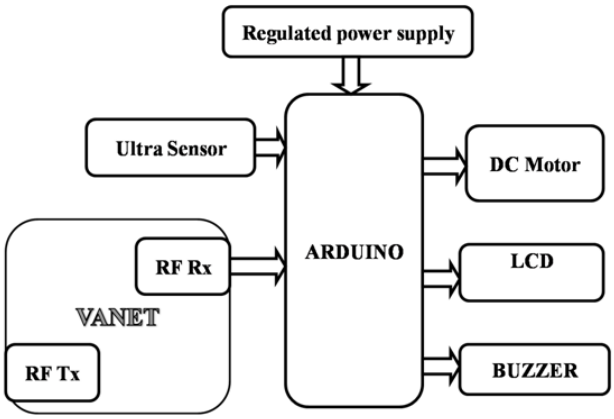

Fig. 1. Block diagram

VI. FUNCTIONAL MODULE

A. Charging Circuit

RPS module helps to provide the required voltage for this proposed model. Normally this system is converts 230V ac voltage to the required 5V dc voltage for system operation.

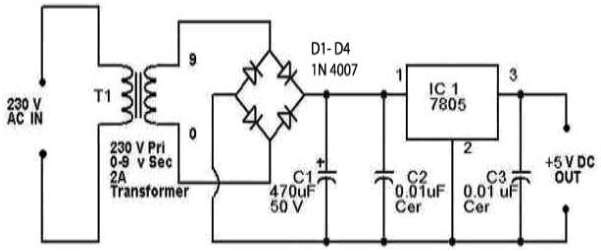

Fig. 2. power supply.

Regulated power supply consisting of step down transformer, bridge rectifier, capacitor filter and voltage regulator which provides constant 5 voltage to Arduino micro controller

B. Microcontroller

Microcontroller will place the important role of operation. This Arduino collect the data from all sensors and control and monitor the module using Arduino program. ATMEGA328 is the IC name used for ARDUNO. Having 32KB ROM and 2KB RAM

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Fig. 3. Arduino

C. LCD Display

LCD modules which display the status of the proposed system. We used16*2 LCD module which have 16 character in row and 2 rows overall 32 characters will be place in this module. All the irrigation parameters like temperature, humidity, pump status all will be status in this module.

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Fig. 4. 16*2 LCD Module

D. RF Remote Control

RF Tran receiver is the wireless communication module for data transmission system. RF module is operated with Radio Frequency. These modules have encoder IC at transmitter section, decoder IC at receiver section which used to transmit the data wirelessly. System is working with 430MHz frequency. Range of the module is around 30 meters.

Fig. 5. RF Module

E. Buzzer

Buzzer is the output module for alerting of any parameter changes. If any sensor increases the threshold value or if increases then micro controller alert us by using this system.

Fig. 6. Buzzer

F. *DC Motor*

DC Motor here used as robot wheel control mechanism. This proposed system we used two dc motors as robot vehicle which automatically speed control for accident avoidance. This robot is controlled forward and back with the help of L293D device driver.

Fig. 7. DC Motor

G. *Software*

Software is the important parameter to make the device automation. The editor, compilation is done by using ARDUINO IDE software. Embedded c program used to design this proposed system.

H. *Ultrasonic Senor*

Ultrasonic sensor acts as object detection as well as range finder. This module having 4 pins voltage, ground, trigger and echo. Echo acts as input and trigger used as output. Operating voltage is 5v. The range of the ultrasonic sensor is 100 cm. the role of the sensor this project is when object detected it gives alert and range to micro controller. Then after MC alerts buzzer. To indicate as accident detection.

Fig. 8. Ultrasonic Sensor

VII. RESULTS

. We obtained to control the speed of vehicle when it enters into RF smart zone. We detected collisions and also prevented anti collision using ultrasonic sensor.

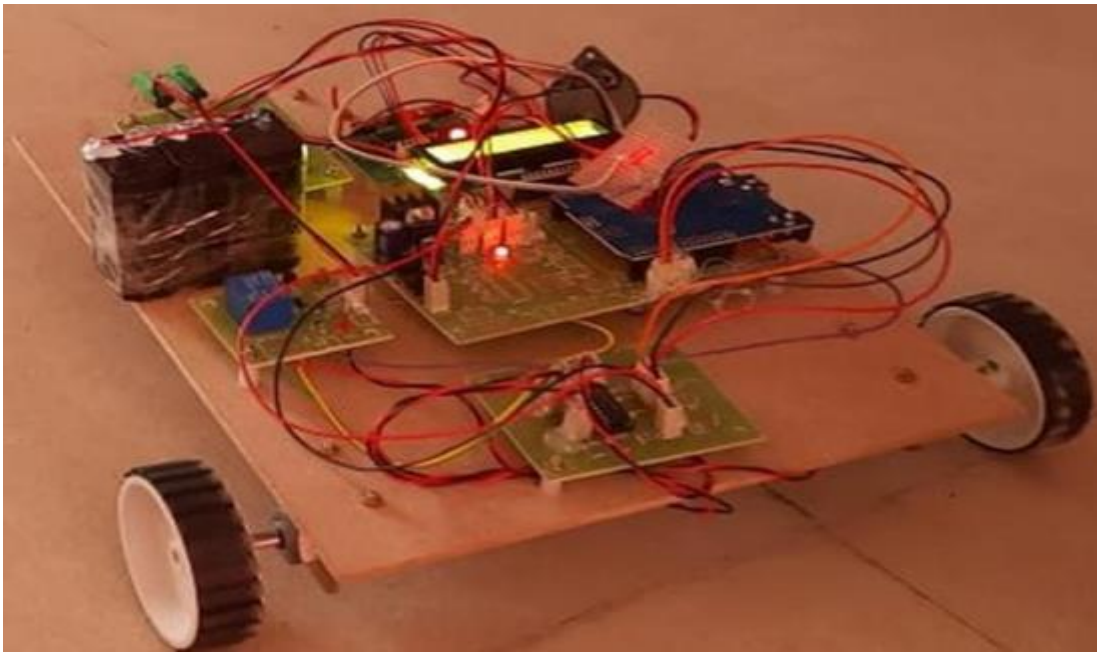

Fig. 9. Recever Hardware setup

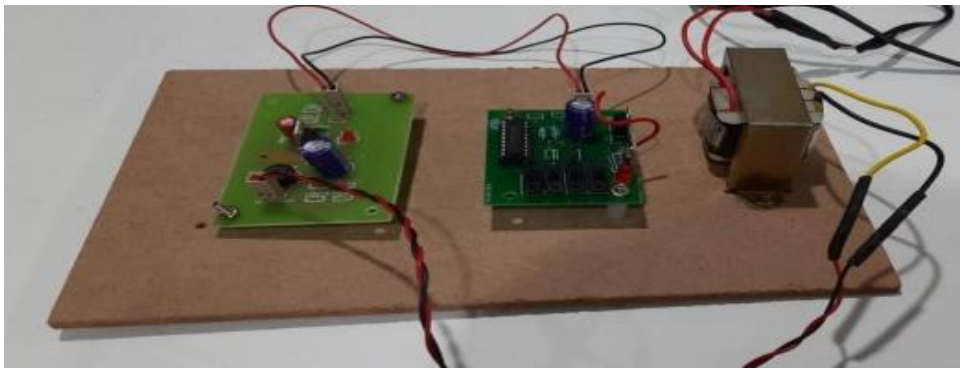

Fig. 10. Tansmitter Hardware setup

VIII. CONCLUSION AND FUTURE WORK

In this project vehicle collision and avoidance in a vehicular ad-hoc network using v2i protocol designed and implemented successfully by using RF Module, ultrasonic sensor to control and avoidance of accidents in Vehicular ad hoc network called VANET using V2I protocol. We designed and implemented RF V2I protocol based accident avoidance system effectively. RF transmitter holding at station and RF receiver module is at vehicle when the vehicle comes to RF zone automatically this system control the speed of the vehicle for accident avoidance.

REFERENCES

[1] Sou, Sok-Ian. "Modeling emergency messaging for car accident over dichotomized headway model in vehicular Ad-hoc networks." Communications, IEEE Transactions on 61.2 (2013): 802- 812.

[2] Sun, G., Zhang, Y., Liao, D., Yu, H., Du, X., & Guizani, M. (2018). Bus-Trajectory-Based Street-Centric Routing for Message Delivery in Urban Vehicular Ad Hoc Networks. IEEE Transactions on Vehicular Technology, 67, 7550-756.

[3] Karimi, R., & Shokrollahi, S. (2018). PGRP: Predictive geographic routing protocol for VANETs. Computer Networks, 141, 67-81

[4] Bitam, S., Mellouk, A., & Zeadally, S. (2013). HyBR: A Hybrid Bio-inspired Bee swarm Routing protocol for safety applications in Vehicular Ad hoc Networks (VANETs). Journal of Systems Architecture - Embedded Systems Design, 59, 953-967.

[5] Sun, G., Liao, D., Li, H., Yu, H., & Chang, V. (2017). L2P2: A location-label based approach for privacy preserving in LBS. Future Generation Comp. Syst., 74, 375-384.

[6] Chen, C., Hu, J., Zhang, J., Sun, C., Zhao, L., & Ren, Z. (2016). Information Congestion Control on Intersections in VANETs: A Bargaining Game Approach. 2016 IEEE 83rd Vehicular Technology Conference (VTC Spring), 1-5.

[7] Patel, N.S., & Singh, S. (2016). A survey on techniques for collision prevention in VANET. 2016 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 1663-1666.

[10] Bitam, S., Mellouk, A., & Zeadally, S. (2015). Bio-Inspired Routing Algorithms Survey for Vehicular Ad Hoc Networks. IEEE Communications Surveys & Tutorials, 17, 843-867.

[8] G. Ahmed Zeeshan "IoT based Mining Workers Safety Monitoring and Alerting System by using Raspberry Pi " IJRECE Vol. 6 ISSUE 3 July 2018.

[9] G. Ahmed Zeeshan "design and implementation of a smart energy efficient dc lighting grid using iot "IJRECE Vol. 6 Issue 3 September 2018.

[10] G. Ahmed Zeeshan "ATM Crime Prevention and theft Detection model by Wireless Technologies RFID and GSM" International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9, Issue-1, November 2019