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Short Range Inter Vehicle Communication, Sharing Information Using DSRC

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Abstract — Vehicular communication systems are a type of network in which the vehicles are the communicating nodes, providing each other with information, such as safety warnings and traffic information. As a cooperative approach, vehicular communication systems can be more effective in avoiding accidents and traffic congestions than if each vehicle tries to solve these problems individually. Generally, vehicular networks are considered to contain two types of nodes: Transmitters and Receivers. Conventionally these Transmitters are on the road sides and Receivers on the Vehicles. However the proposed system provides uses Dedicated Short-Range Communications (DSRC) to communicate between the constant moving terminals (Vehicles).

Keywords — Dedicated Short Range Communication, Inter-Vehicular Communication, Vehicular Ad-Hoc Networks, Global Positioning System.

I. INTRODUCTION

News like traffic jams, water logging on roads and potholes is very common in our country. Everyday almost all of us face such type of problems while commuting, whether it might be getting stuck for countless hours in traffic or reaching late to our destination due to bad roads or due to both. The roads in India are filled with potholes and puddles and water logging is a common scenario in the rainy seasons in most part of the country. This can be very
dangerous since the driver cannot see the road. Thus we feel an acute need of a solution which can help reduce the impact of these external factors by providing information about upcoming traffic, road conditions and other factors. The proposed Inter Vehicle Communication System allows a driver to not only get the information about the upcoming road conditions but also to share their own commute experience with other drivers, thus allowing a driver to be aware of upcoming situations so that he can take early decisions and avoid any situation. The system can be further modified in the future to provide more advance information sharing among vehicles.

II. BACKGROUND

The main motivation for vehicular communication systems is safety and eliminating the excessive cost of traffic collisions. According to World Health Organizations (WHO), road accidents annually cause approximately 1.2 million deaths worldwide; one fourth of all deaths caused by injury. This number can be significantly lowered by deploying local warning systems through vehicular communications. Departing vehicles can inform other vehicles that they intend to depart the highway and arriving cars at intersections can send warning messages to other cars traversing that intersection.V2V (short for vehicle to vehicle) is an automobile technology designed to allow automobiles to "talk" to each other.

III. PROPOSED SYSTEM

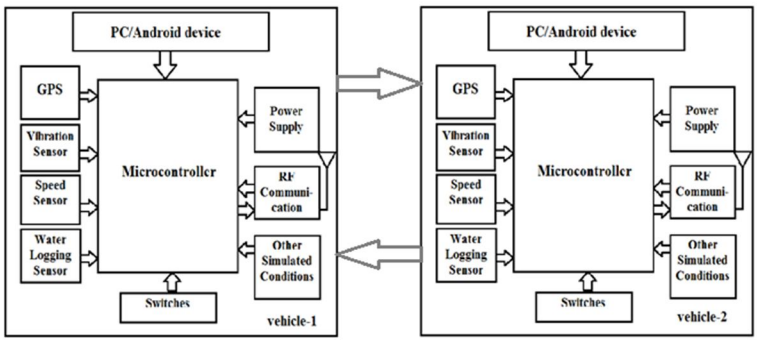

Fig. 1. IVC block diagram

Proposed system of IVC is shown in the block diagram in Fig.1. It consists of Microcontroller that has various peripherals like vibration sensor, speed sensor, water sensor, and GPS unit interfaced to it. Each vehicle collects various information like its location, road condition, and traffic condition, water level on the road via the GPS, vibration sensor, speed sensor and fluid level sensor and keeps a record of it. Each car can share or exchange this information from other cars coming from opposite direction. The car can select the information of interest received from other cars and can display it on a PC or an Android based device like a mobile phone or a tablet. This will provide the driver with all the details of the upcoming conditions like road condition i.e. if the road is good or not, traffic condition informing him about a traffic jam and other conditions like water logging, alternate routes etc so that the driver can take suitable decision.

The vehicle has a wireless transceiver UART CC2500 which operates at 2.4GHz frequency range. It works on 5-9DC voltage. It is used in half duplex mode and has multiple baud rate .No external antenna is required. The proposed system consists of a microcontroller PIC18F44K22 based embedded system which has 32 bit ADC,7 timers,40 pin IC,2 UART and 5 ports named A,B,C,D,E. Port A,B,C,D has 8 pips and port E has 3 pins. It has 4 registers namely TRIS register, ANSEL register, LAT register and PORT register.

In vibration sensor senses the vibration depends on the gravity present on the centre of the sensor. The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. There are X,Y,Z pins which measures 3D. Depending on the tilt of the angle the voltage rises. The maximum voltage is 3.6V and minimum voltage is 2.98V. The speed sensor MOC 7811 is a n opto- isolator module with IR transmitter and photodiode. It is mounted on the motor wheel. It has IR emitter and receiver mounted facing each other. It can be used with encoder to detect wheel speed, angle detection.

GPS- Global Positioning System: It has a network of about 30 satellites orbiting the earth at an attitude of 20000km.it is developed by US government for military and navigation purpose in 1935. Speed of transmission rate is 2Ghz. It gives information about date, latitude, longitude, east-west, south-north information.

IV. RESULTS

Water level indicator senses water level on the road. A switch is used to provide high and low state, when switch is high water level is high and information is transmitted at a distance of 5m.This proves that RF communication is suitable for short range communication. To sense the traffic density we place an opto-coupler at the rim of the wheel of each vehicle which communicates along with speed sensor MOC.7811 and records the information on PIC 18 Microcontroller which displays the average speed of the vehicle in order to determine traffic accumulated at a junction .Depending on this information every oncoming vehicle towards the junction can decide on taking up alternate routes. The average speed calculation of the car can be calculated which is moving at 10km/hr.

While detecting the vibration a spring is placed on the model of the car with the vibration sensor attached to it. Then the model car is pressed simultaneously with spring and depending on the number of spring movements i.e. spring vibration. An accelerometer detects it and communicates with microcontroller and display on LCD as vibration high or vibration low.

V. CONCLUSION

It is seen that that by using short range IVC traffic jams can be avoided. The proposed system gives the live traffic updates without any historical information. By providing water level information on roads, sinking of vehicle or water entering the engine can be avoided. Due to RF communication being used in IVC, the IVC happens for only up to 10 meters. This can be increased by using Wi-Fi or Bluetooth.

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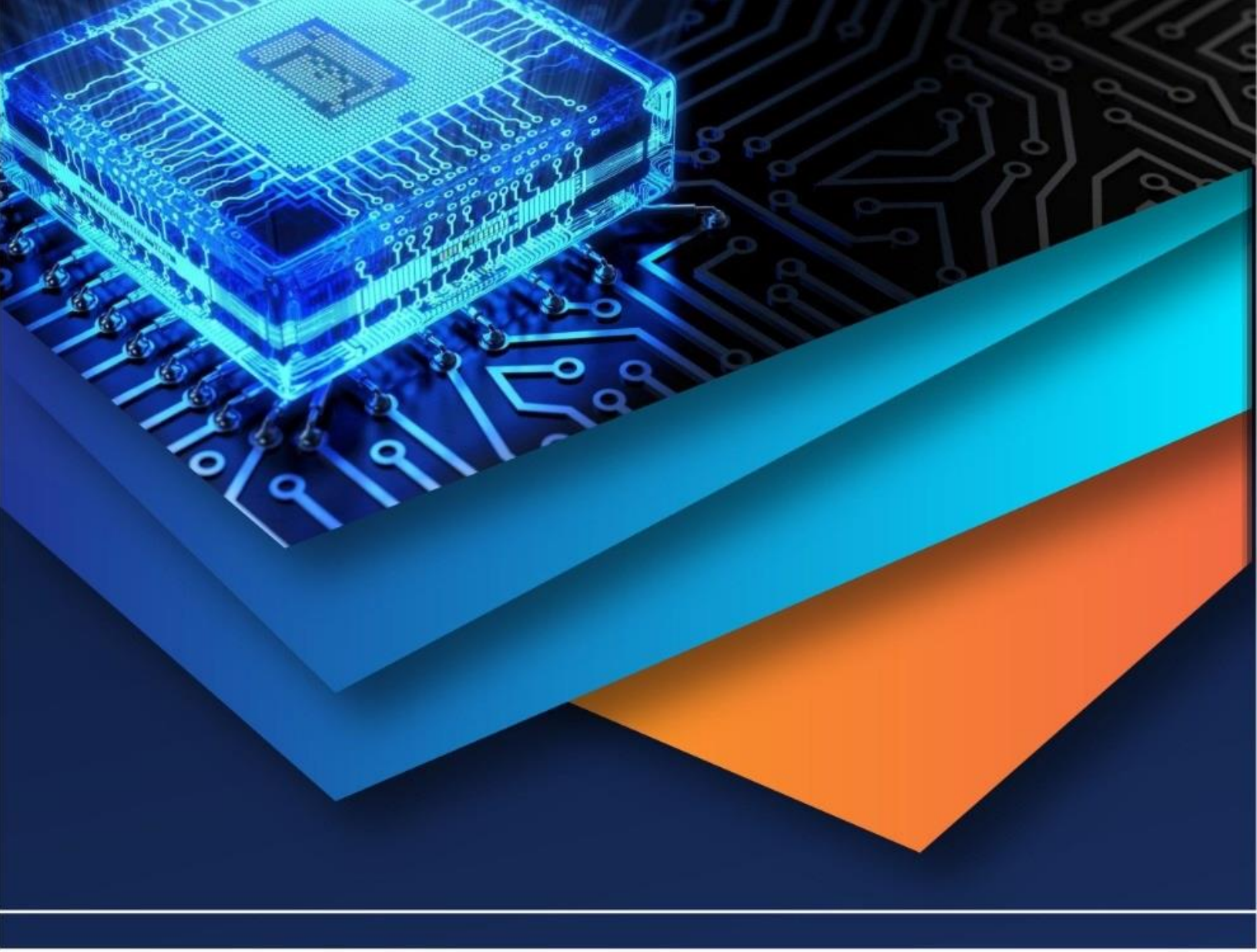

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