Implementation of VANET Scenarios

Prof R.M Mandi [1],Pratiksha Hake [2], Pratiksha Salunke [3], Priyanka kumari [4]

[1] *Prof R.M Mandi, Electronics & Telecommunication, Sinhgad Institute Of Technology & Science, Maharashtra, India.*

[2] *Pratiksha Hake, Electronics & Telecommunication, Sinhgad Institute Of Technology & Science, Maharashtra, India.*

[3] *Pratiksha Salunke, Electronics & Telecommunication, Sinhgad Institute Of Technology & Science, Maharashtra, India.*

[4] *Priyanka kumari, Electronics & Telecommunication, Sinhgad Institute Of Technology & Science, Maharashtra, India.*

ABSTRACT

VANET is a newly introduced technology. It is a key component of the intelligent transport system. This technology is identified for improving road safety and transport efficiency. The communication occurs between two vehicles and vehicle to roadside unit forming an intelligent transport system. In this paper we measure some parameters like alcohol, vibration, speed and distance using MQ3, piezoelectric, RPM and ultrasonic sensors.

Keyword :- *MQ3, RPM, VANET, DSRC, V2V, V2I, I2I, ITS, GPS, GSM, IoT.*

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1. Introduction

When it turned into the twentieth century various kinds of vehicles have been introduced to provide comfort and luxury in daily life and the new developments in technologies, makes the vehicle accelerating easily and running fast. It's on the contrary which brings in some problems such as the accidents due to drunk driving and bad visibility of roads during heavy rainfall etc. The accidents which sometimes costs human lives and loss of belongings, therefore it became a necessity to implement measures for a safe driving and the development of models, to monitor driver's behavior have been proposed and brought in a promising result.

India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. The country's population is increasing at a fast rate which eventually results in the increase of vehicle density and leads to many road accidents. Road safety is emerging as a major social concern around the world, especially in India. Drinking and driving is already a serious public health problem, which is likely to emerge as one of the most significant problems in the near future. Taking safety into consideration in traffic roads, alcohol plays a vital role in creating high risk which has become controversial topic than other topics. A driver who is filled with alcohol becomes a potential murderer since he/she cannot control their behavior nor their normal tasks without risks, which results in unsafety of roads. An intensive drive against drunken driving is the need of the hour to promote road safety. And also lack of proper Security Systems has also become a major social concern leading to many vehicle thefts. An efficient Security system is also the need of the hour in the present world. Here we implemented Security from a combination of something you know and something you have. It is important to initiate necessary steps to achieve this by overcoming all the challenges.

1.1 VEHICLE TO VEHICLE COMMUNICATION (V2V)

The V2V communication is a wireless protocol called DSRC that is dedicated short-range communication. It provides a 360-degree view of similarly equipped vehicles within communication range. Transmitted messages common to all vehicles include each vehicle current position, vehicle speed and vehicle control information such as brake status starring wheel angle as well as the vehicle path history and path prediction. It is also called as inter-vehicle communication as shown in figure 1.1

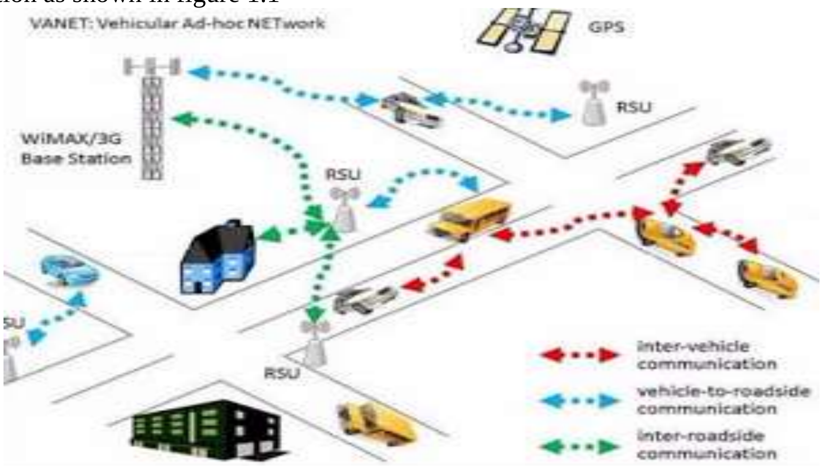

Figure 1.1 Types of communication in VANET [1]

1.2 VEHICLE TO INFRASTRUCTURE (V2I)

It is the wireless exchange of data between vehicles and infrastructure on the highway. It represents a one-way hop where on-road unit send information to all vehicles. Information to drivers is broadcast through road display or wireless connection directly. It is also called as a vehicle to roadside communication as shown in figure 1.1

1.3 INFRASTRUCTURE TO INFRASTRUCTURE COMMUNICATION (I2I)

It helps in exchanging information amongst the infrastructures about any dangerous situations in order to reduce the inconvenience to commuters.

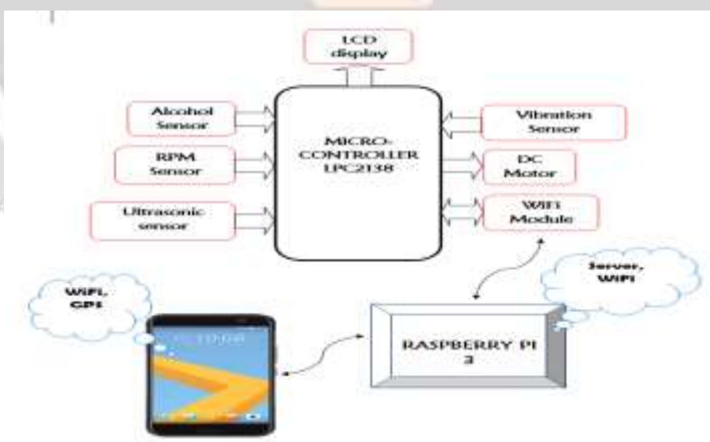

Figure 2.1 block diagram of V2V and V2I communication [2]

1.4 DESCRIPTION OF BLOCK DIAGRAM

It consists of blocks such as LCD, alcohol, rpm, ultrasonic and vibration sensors, dc motor, Wi-Fi module, raspberry pi3 and mobile phone as shown in fig 2.1. The LCD will display the message on the screen. Alcohol sensor will sense the amount of alcohol consumed by the driver. The rpm sensor will monitor the speed of the vehicle and sent to the server. This speed measurement is shown by measuring the speed of dc motor interfaced to the microcontroller. The raspberry pi 3 acts as a server. The ultrasonic sensor will measure the distance between the vehicle and vibration sensor is used to detect the accidents. Whenever accident ,speed, distance and consumption of alcohol detected the information is received by the server will inform the other vehicles on-road by sending this information on their Android phone via Wi-Fi connectivity which vehicles are near to that location.

2. EXPERIMENTATION

2.1 V TO I COMMUNICATION

The different sensors interfaced to the microcontroller for monitoring respective parameters related to the vehicle. The parameters which are useful in order to drive vehicle easily on road without causing accidental conditions as possible. All the parameters monitored with the help of respective sensors are sent to the Raspberry Pi server designed for our application via Wi-Fi module connectivity. So that one can access the data afterward from the server (which is nothing but a Raspberry Pi server present on the road side) even if the vehicle gets damaged. The RPM sensor continuously monitors the speed of the vehicle and is sent to the server. This speed measurement is shown by measuring the speed of Dc motor interfaced to the microcontroller. The surrounding Distance between vehicles will be measured with the help of ultrasonic sensor which is itself a distance measurement sensor and is also continuously sent to the server. If a driver has consumed alcohol or not is detected with the help of Alcohol sensor used in the system. The accident detection of vehicle is detected with the help of Vibration sensor interfaced to microcontroller unit. The vibrations sensed by the sensor go above threshold As soon as accident get detected by the sensor the proposed unit will update all this information on server. The raspberry pi will show the Information related accidents on the monitor connected to it.

2.2 V TO V COMMUNICATION

The Android application we are going to design for our application will help the user in order to view information related accidents happened on-road. Along with the vehicle, relevant parameters from microcontroller unit, the android phone present in the vehicle having certain algorithm will continuously send its current location to the server designed with the help of Android phone's GPS facility. So that whenever accident detected information is received by the server the server will inform the other vehicles on-road by sending this accident information on their Android phone via Wi-Fi connectivity which vehicles are near to that particular accident location.

3. ANDROID ACTIVITY

Activities in the system are managed as an activity stack. When a new activity is started, it is placed on the top of the stack and becomes the running activity -- the previous activity always remains below it in the stack, and will not come to the foreground again until the new activity exits. If an activity in the foreground of the screen (at the top of the stack), it is active or running. If an activity has lost focus but is still visible (that is, a new non-full-sized or transparent activity has focus on top of our activity), it is paused. A paused activity is completely alive (it maintains all state and member information and remains attached to the window manager), but can be killed by the system in extreme low memory situations. If an activity is completely obscured by another activity, it is stopped. It still retains all state and member information, however, it is no longer visible to the user so its window is hidden and it will often be killed by the system when memory is needed elsewhere.

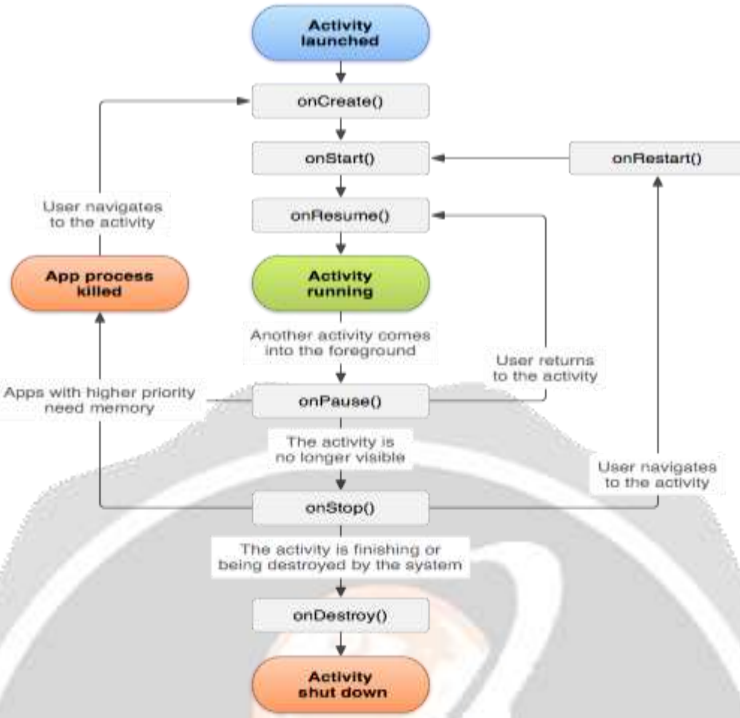

Figure.3.1 android development

4. RESULT AND DISCUSSION

Following simulation in fig.6.1 shows the interfacing of LPC2138 with LCD display.

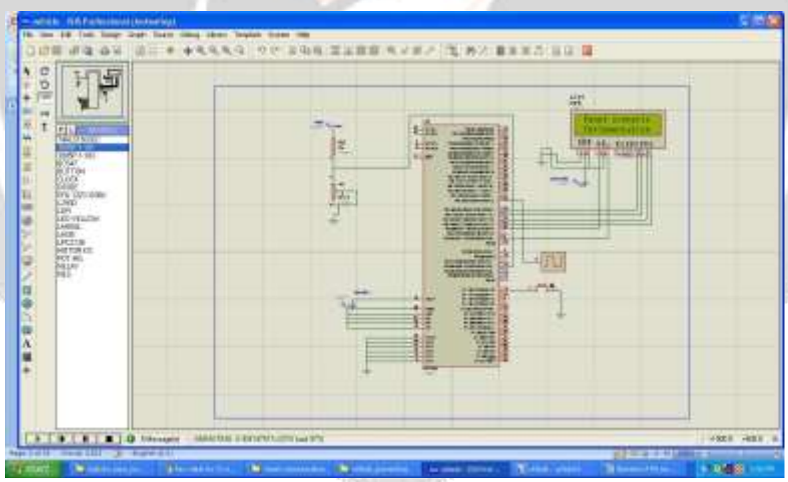

Figure.4.1.Simulation of VANET scenario

4.1 LCD DISPLAY INTERFACING

The LCD is interfaced to the LPC2138 using 4-bit configuration is as shown in fig.6.1. The 4 data lines are connected to the Port 0 pins P0.16, P0.17, P0.18 and P0.19 respectively. The RS (Register Select) pin is interfaced to the pin P0.20.The En (Enable) pin is interfaced to the pin 0.22.The R/W pin is connected to the GND. Other power pins are connected to the VCC and GND respectively.

4.2 ALCOHOL SENSOR INTERFACING

As alcohol sensor is an analog sensor having Resistance output which cannot be directly interfaced to the microcontroller because controller understands only Digital Voltage signal. Hence Alcohol sensor's varying output resistance is connected in series with another fixed resistance which will convert the resistance into a voltage signal. And this converted analog voltage is then given to ADC input (P0.27/ADC 0.1) of the microcontroller for analog to digital voltage conversion.

4.3 ADC CALCULATION

4.3.1 ALCOHOL SENSOR

I/p voltage= 5V

Formula for output voltage

Vout = [R2/(R1+R2)]*Vin

1step change=verf/2^n

Vref=3.3v=vcc

N=10 bit resolution

=3.3v/2^10

=3.3v/1024

= 3.2mV

So for the input for 1638.4mV, Count=1638/3.2

=511

So LCD will display 511 counts on LCD means. So in order to display the alcohol amount in percentage form so we need to do software calibration as

Count=511/10

=51%

Soon the LCD 51 % is displayed

4.3.2 VIBRATION SENSOR

One switch is used for showing vibration sensor input interfaced to the P1.15 pin. When that switch gets pressed i.e. when accident gets detected the LCD will display accident detected.

4.3.3 RPM SENSOR

The clock pulse is given to the P0.15 pin of microcontroller, which is shown for RPM measurement.

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6. CONCLUSION

We have successfully received all the sensor values interfaced to the microcontroller for monitoring respective parameters related to the vehicle and are sent to the android phone. We have designed one application for monitoring all the vehicle parameters and are sent to the server running on Raspberry Pi via Wi-Fi connectivity. The communication between all the modules established successfully.

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