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Real Time Traffic Information Using Wireless Network

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Abstract:

Vehicular Ad-hoc Networks (VANETs) must dependant on Vehicle to Vehicle Communication (V2VC). The vehicles are to be used as node and they are having the metal sensors and two switches. Driver using the keypad can allow transmitting the data to base station from the node. Driver can press the buttons depending on the situation and the message (traffic jam, road block) is transmitted to others vehicle and hence this can help and contribute the drivers in the process.

The system is need to transmit real time data rigorously in the intelligent transportation system. In our project zigbee is used as wireless technology which has an important ascendency on the future development of information technology because of its low cost, low power usage, usimg of this automatic network protocol flexibility and the convenient of applications traffic problems can be communicated to all other drivers in that contiguity.

Keywords — **VANET, Zigbee, Metal Sensor, Switches.**

1. INTRODUCTION

Each year traffic accidents have been taking thousands of lives and this smashup can be averted if the operator of vehicle provided warning before at least half second prior to smashup. Human driver suffers from cognition limitation on road way emergency events, result in, and large delay in propagating emergency warnings. In our project we are suggesting a commercial model through which Vehicle to Vehicle Communication (VVC) can be consider as a future application.

A key point of our design is standardization of VANET modelling and effective communication by using zigbee. As we are working on a VANET technology, that uses running cars as a node to form a mobile network. VANET, or Intelligent Vehicular Ad-Hoc Networking, defines an intellectual method of using Vehicular Networking. VANET integrates multiple ad-hoc networking technologies such as Wi-FiIEEE802.11, WiMAXIEEE802.16, Bluetooth and ZigBee for simple and rigorously, easy communication between vehicles.

2. DESIGN APPROACH

Let us consider two vehicles as node 1 and node 2. In our project we are using the metal sensor for a feasible accident and the driver has two emergency buttons for traffic jam and Road block. These two nodes have a built in sensor. Let's assume that in case if node 1 is included in an accident the data is sent to the node 2 with information about the accident. Now the driver using the keypad can allow access to transmit the data to the base station from node 2.

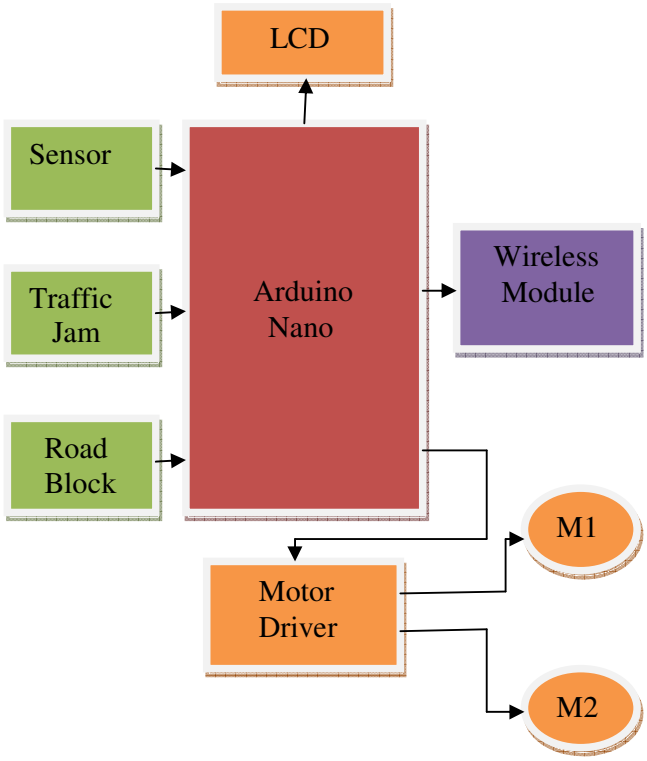


Fig: Controller Unit

Let's assume that the base station is afield a from the car included in the accident. The transmitted data from the node 2 is then received at the base station and the station operator will get to know from which node the data has been received.

He can transmit the message to all the other vehicles using the ZigBee and at that time send data to the other base station. Now the base station can do the same work as done by base station 1. In the same way the driver can switch the buttons depending on the circumstances and the message is transmitted to others base station or node and hence this can help and aid the drivers in the process. In our model we are just showing the base station 2 is getting the message from the base station 1. Thus we can see that if it's done for two nodes, it can be done for many numbers of cars. In our model we have taken the node 1 and node 2 as vehicles which work on battery. As our main focus is on VANET .

At the time of implementation we used Metal Sensor, Arduino, ZigBee, Motor driver and Adapter to these devices and Embedded C is used to implement this model.

At the base station side we required to develop the software using arduino on the windows platform and also communicate to the arduino which is connected to the base station pc.

In this model there are three types of demeanor in message passing from node to node, node to base station and base station to node. In first case if button '1' is pressed then it displays and sends message of accident through ZigBee to vehicle. In second case if button '2' is pressed then it displays and sends message of traffic jam with agoing position of vehicle. While in third case if button '3' is pressed then it displays and sends message of road block with agoing position of vehicle. However in case of receiving end (vehicle) the demeanour of model is that it only receives and displays the message according to message number and also forwards it to closer base station.

Demeanor of base station with ZigBee and PC is to receive the message sent by the vehicle and according to message type and area, display the message and encore send that message with position to another base station or vehicle.

3 WORKING OF COMPONENTS

To make effective performance of this model we required to divide the entire model into two parts, first one is hardware and second one is software comprising of embedded C.

Knowledge of every component plays a important role in the working of model, so it is very important part to know all the technical knowledge of the components. In this section we are going to explain all the features of the components.

1. Ardiuno Nano ATmega328p as Controlling Unit
2. ZigBee as Communication Device

3.1 Arduino Nano ATmega328p as controlling Unit

The Arduino Nano is a small, implicit, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, and in a different package. It lacks only a DC power jack, and the works with a Mini-B USB cable is instead of a standard one.

The Arduino Nano can be powered via the mini USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically choose the highest voltage source.

The ATmega168 has 1 KB of SRAM and 512 bytes of EEPROM the ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

How to use Arduino

Arduino projects can be seprate or they can communicate with software on running on a computer. Arduino is a cross-platform program.

Arduino can sense the environment by receiving input from a different of sensors and can affect its surroundings by controlling lights, motors. The microcontroller on the board is programmed using the Arduino programming language and the Arduino progress environment (based on Processing).

First **Plug the Arduino to your PC via USB cable.** Now you are actually ready to "burn" your first the program on the arduino board. To select "blink led", well known programming of the physical translation of "hello world", select **File>Sketchbook>Arduino-0017>Examples> Digital>Blink** Once you have your skecth you'll see something very close to the screenshot on the right. In **Tools>Board** select Arduino NANO and with the ATmega you are using (probably 328).
Now you go to **Tools>SerialPort** and select the right serial port, the one arduino is attached to.

3.2 ZigBee Used For Communication Device

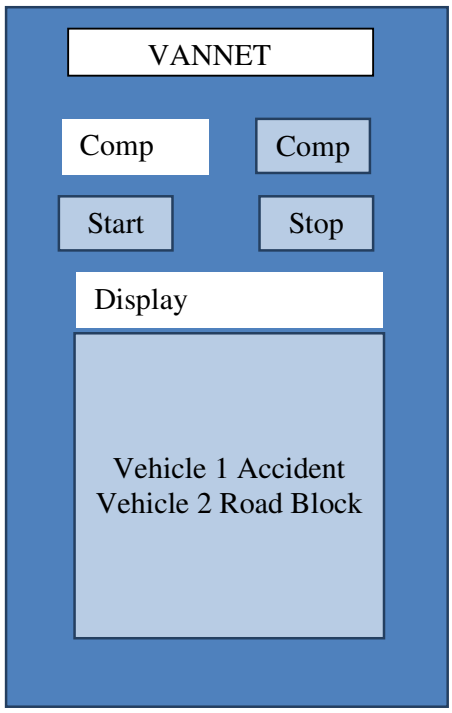
ZigBee is an IEEE802.15.4 standard for data communications with business and consumer devices. ZigBee have been developed to meet the increasing demand for competent wireless networking between many low power devices. It is a low-cost, low-power, wireless mesh networking standard. It can operate in Industrial, scientific and medical(ISM) radio bands. The low cost allow the technology to be largely installed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high reliability and larger range. In model we are going to multicast the message.

We using ZigBee in the nodes and base stations. When any accident takes place or emergency message has to be send or receive for that purpose ZigBee is used. Suppose an emergency message has to be send to other nodes and base station then through ZigBee message will be multicast to nearby nodes. From the nearby nodes that message will be transfer to the base station via ZigBee. ZigBee is a low cost and low power consuming device than other devices such as Bluetooth or wifi. Also it works in ISM band and has range up to 100 meters that is why we used ZigBee in our project. In our model we are using 2.4 GHz (ISM) bandwidth with 16 channels which is worldwide used. It has data rate of 250 kbps. As it has such high speed, message can be transmitted to many nearby nodes. Thus it handles many number of nearby nodes in the area of a ZigBee device. This is useful in the situation of traffic jam.

Features of ZigBee:

1. Power supply voltage(Vcc): 3.3to3.6V.
2. Operating frequency: ISM2.4GHz.
3. Indoor/Urban range: Upto 30meters with antenna.
4. Outdoor range: Upto 100to150meters with high gain antennas.
5. RFD at a rate: 250kbps..
6. Low power usage and low cost. Battery life is for several years.
7. It is flexible. Often used in mesh network form to transmit data over longer distances.

4. BASE STATION



Let's assume that the base station is far away from the car involved in the accident. The data transmitted from the node 2 is then received at the base station 1 and the station officer will get to know from which node the data has been received. He can transmit the message to all the other vehicles using the ZigBee and at the same time send the data to the other base stations, for example for base station 2 using the internet only

4.1 Base station implementation through GUI:

In our model communication between vehicle to vehicle, vehicle to RSU(Road Side Unit), RSU to vehicle is handled by ZigBee in addition to that if message is needed to pass in a distance greater than 100m which is range of any single ZigBee module from the originator of message then RSU is capable to send respective message via internet to a RSU thus passing message across any distance is possible with the usage of internet.

5. METAL SENSOR:

Features

1. Color: Silver + Black.
2. Material: PVC + metal.
3. Working voltage: DC 6~36V.
4. Output type: Three-wire PNP positive logic output.
5. Detection distance: 0~4mm.
6. Switch type: Electric sensor.
7. Diameter: 12mm.
8. 12cm threaded installation.
9. High susceptibility and fast frequency response, high repeatability, infallibility, short change process, hefty output power, high anti-interference performance, working stability and reliable, long life, anti-shock and water resistant.
10. Suitable for iron, stainless steel, aluminium, copper, etc detection

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