ISSN XXXX XXXX © 2017 IJESC

Research Article Volume 7 Issue No.7

Vehicle to Vehicle Network Sharing using MONA (Multi Owner Network Accessor)

Muthyala Prathyusha[1], T.Jyothsna[2]
PG Scholar[1], Associate Professor[2]
Department of ECE
Aurora Technological Research Institute, Telangana, India

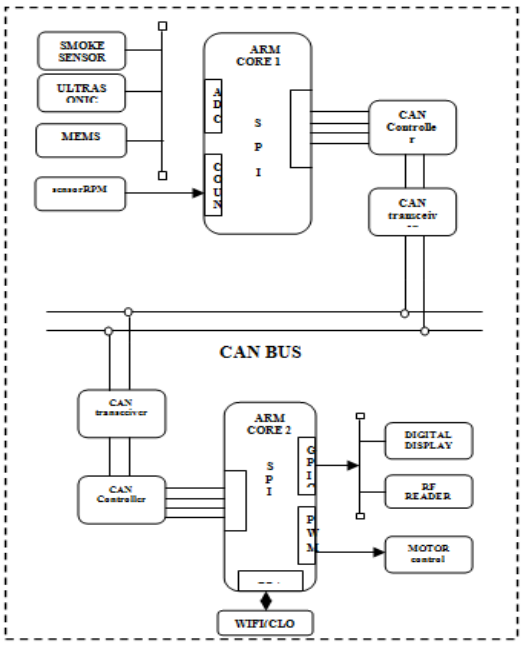
Abstract:
The objective of the paper is to present a conceptual model of a microcontroller based variable electronic speed governor that can be implemented to control the speed of any vehicle depending on the local speed limit. Every city, town or a village, can be marked and divided into individual zones. The division depends upon the area under which the business, residential, and industrial regions come under. The central business district being a very busy traffic zone demands the least speed limit, with the residential and industrial zones having lesser traffic densities, the speed limits will vary accordingly. The CAN bus is used as a communication of a distributed control network. This paper mainly introduces the design of the hardware and the software in detail. Wi-Fi technology is used, which acts as a cloud for servicing the vehicle.

Keywords: CAN MCP2511, Smoke sensor, ARM, Wi-Fi, RF module.

I. INTRODUCTION

Intelligent Transportation System is a crucial part of a country's information construction. With the increasing city holdings of cars, there are more and more traffic jams, so requirements are that Intelligent Transportation needs more improvement. The key technology Of Intelligent Transportation is Vehicle positioning System, while the key of which is vehicle controlling System. Vehicular communication (VC) systems will enable many exciting applications that will make driving safer, more efficient and more comfortable. But this necessitates the introduction of security and privacy enhancing mechanisms. In this paper we focus on practical aspects associated with the implementation and deployment of such a secure VC system. We also provide an outlook to future research challenges. The proposed project is implemented in two sections. First one known runs with ARM as master node and another as ARM data acquisition node to which sensors are connected. Communications between two nodes are accomplished through High Speed CAN communication. Sensors connected are ultrasonic, speed, and Smoke sensors. The master node collects all these information through CAN network. These results will get displayed on the Display system for the easy understand.

Block Diagram:



II. HARDWARE DESIGN

ARM core:
The ARM7 family includes the ARM7TDMI, ARM7TDMI-S, ARM720T, and ARM7EJ-S processors. The ARM7TDMI core is the industry's most widely used 32-bit embedded RISC microprocessor solution. Optimized for cost and power-sensitive applications, the ARM7TDMI solution provides the low power consumption, small size, and high performance needed in portable, embedded applications. The ARM7TDMI core uses a three-stage pipeline to increase the flow of instructions to the processor. This allows multiple simultaneous operations to take place and continuous operation of the processing and memory systems. As the processor is having a high speed it is easy to make the communication between the RF module and the Image acquisition module

Operating modes
The ARM7TDMI core has seven modes of operation:

- User mode is the usual program execution state
- Interrupt (IRQ) mode is used for general purpose interrupt handling
- Supervisor mode is a protected mode for the operating system
- Abort mode is entered after a data or instruction pre fetch abort

The interrupt settings of ARM supports the DHLS to response to the interrupt coming from the server section.

III. WIRELESS COMMUNICATION:

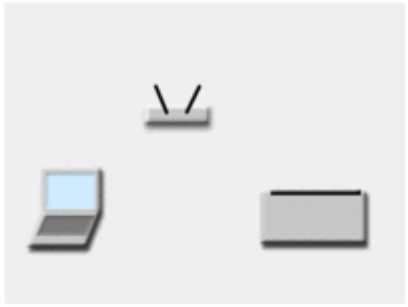
1. RF communication:
Radio Frequency, any frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. Many wireless technologies are based on RF field propagation

Transmitter
The TWS-434 extremely small, and are excellent for applications requiring short-range RF remote controls. The TWS-434 modules do not incorporate internal encoding. If simple control or status signals such as button presses or switch closures want to send, consider using an encoder and decoder IC set that takes care of all encoding, error checking, and decoding functions The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 foot (open area) outdoors. Indoors, the range is approximately 200 foot, and will go through most walls. The TWS-434 transmitter accepts both linear and digital inputs can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy

Figure.1. RF Transmitter

RF receiver:
RWS-434: The receiver also operates at 433.92MHz, and has a sensitivity of 3uV. The WS-434 receiver operates from 4.5 to 5.5 volts-DC, and has both linear and digital outputs. A 0 volt to Vcc data output is available on pins. This output is normally used to drive a digital decoder IC or a microprocessor which is performing the data decoding. The receiver's output will only transition when valid data is present. In instances, when no carrier is present the output will remain low. The RWS-434 modules do not incorporate internal decoding. If you want to receive Simple control or status signals such as button presses or switch closes, you can use the encoder and decoder IC set described above. Decoders with momentary and latched outputs are available

WIFI MODULE:
Wi-Fi (or, incorrectly but commonly, WiFi) is a local area wireless technology that allows an electronic device to participate in computer networking using 2.4 GHz UHF and5 GHz SHF ISM radio bands. The Wi-Fi Alliance defines Wi-Fi as any "wireless local area network" (WLAN) product based on the Institute of Electrical and Electronics Engineers' (IEEE) 802.11 standards". However, the term "Wi-Fi" is used in general English as a synonym for "WLAN" since most modern WLANs are based on these standards. "Wi-Fi" is a trademark of the Wi-Fi Alliance. The "Wi-Fi CERTIFIED" trademark can only be used by Wi-Fi products that successfully complete Wi-Fi Alliance interoperability certification testing. Many devices can use Wi-Fi, e.g. personal computers, video-game consoles, smart phones, digital cameras, tablet computers and digital audio players. These can connect to a network resource such as the Internet via a wireless network access point. Such an access point (or hotspot) has a range of about 20 meters (66 feet) indoors and a greater range outdoors. Hotspot coverage can comprise an area as small as a single room with walls that block radio waves, or as large as many square kilometres achieved by using multiple overlapping access points.



Depiction of a device sending information wirelessly to another device, both connected to the local network, in order to print a document. Wi-Fi can be less secure than wired connections, such as Ethernet, because an intruder does not need a physical connection. Web pages that use SSL are secure but unencrypted internet access can easily be detected by intruders. Because of this, Wi-Fi has adopted various encryption technologies. The early encryption WEP proved easy to break. Higher quality protocols (WPA, WPA2) were added later. An optional feature added in 2007, called Wi-Fi Protected Setup (WPS), had a serious flaw that allowed an attacker to recover the router's password. The Wi-Fi Alliance has since updated its test plan and certification program to ensure all newly certified devices resist attacks

Wired communication:

CAN Overview:

The development of CAN began when more and more electronic devices were implemented into modern motor vehicles. Examples of such devices include engine management systems, active suspension, ABS, gear control, lighting control, air conditioning, airbags and central locking. All this means more safety and more comfort for the driver and of course a reduction of fuel consumption and exhaust emissions. To improve the behavior of the vehicle even further, it was necessary for the different control systems (and their sensors) to exchange information. This was usually done by discrete interconnection of the different systems (i.e. point to point wiring). The requirement for information exchange has then grown to such an extent that a cable network with a length of up to several miles and many connectors was required. This produced growing problems concerning material cost, production time and reliability The solution to this problem was the connection of the control systems via a serial bus system. This bus had to fulfill some special requirements due to its usage in a vehicle. With the use of CAN, point-to-point wiring is replaced by one serial bus connecting all control systems. This is accomplished by adding some CAN-specific hardware to each control unit that provides the "rules" or the protocol for transmitting and receiving information via the bus. CAN or Controller Area Network is an advanced serial bus system that efficiently supports distributed control systems. It was initially developed for the use in motor vehicles by Robert Bosch GmbH, Germany, in the late 1980s, also holding the CAN license. CAN is internationally standardized by the International Standardization Organization (ISO) and the Society of Automotive Engineers (SAE). The CAN protocol uses the Data Link Layer and the Physical Layer in the ISO - OSI model. There are also a number of higher level protocols available for CAN.

I/O pheripherals:

Driver unit:

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits, the link is magnetic and mechanical. Relays are very simple devices. There are four major parts in every realy. They are

- Electromagnet
- Armature that can be attracted by the electromagnet
- Spring
- Set of electrical contacts

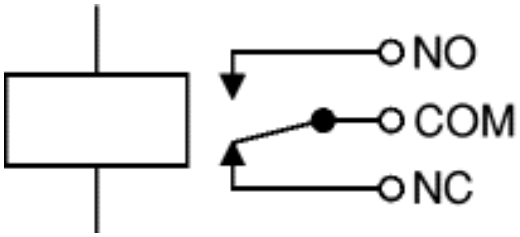


Figure.2. Circuit symbol of a relay

The relay's switch connections are usually labeled COM, NC and NO:

- COM = Common, always connect to this, it is the moving part of the switch.
- NC = Normally Closed, COM is connected to this when the relay coil is off.
- NO = Normally Open, COM is connected to this when the relay coil is on.

Lcd display:

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. One each polarisers are pasted outside the two glass panels. These polarisers would rotate the light rays passing through them to a definite angle, in a particular direction. When the LCD is in the off state, light rays are rotated by the two polarisers and the liquid crystal, such that the light rays come out of the LCD without any orientation, and hence the LCD appears transparent. When sufficient voltage is applied to the electrodes, the liquid crystal molecules would be aligned in a specific direction. The light rays passing through the LCD would be rotated by the polarisers, which would result in activating / highlighting the desired characters. The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations.

Sensor:

Smoke sensor:

Ideal sensor for use to detect the presence of a dangerous LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick repsonse time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke.

Figure.3. Smoke sensor

In this project we are using this for identifying any smoke evolved from any substance. This will be monitored continuously by the data acquisition section and will be transmitted through the CAN network for the monitoring purpose.

Mems technology:
MEMS accelerometers are one of the simplest but also most applicable micro-electromechanical systems. An accelerometer is an electromechanical device that measures acceleration forces. These forces may be static, like the constant force of gravity pulling at our feet, or they could be dynamic - caused by moving or vibrating the accelerometer. There are many types of accelerometers developed and reported in the literature. The vast majority is based on piezoelectric crystals, but they are too big and too clumsy. People tried to develop something smaller, that could increase applicability and started searching in the field of microelectronics. They developed MEMS (micro Electro mechanical systems) accelerometers. In this project work mems is used to identify the rash driving reading from the vehicle.

Ultrasonic sensor:
There is provided an ultrasonic diagnostic system in which an ultrasonic probe is detachably connected thereto, and ultrasonic waves are transmitted from the ultrasonic probe into the subject to obtain received signals through receiving the ultrasonic waves reflected within the subject, thereby displaying for a diagnosis an image carrying information based on the received signals, and is also provided an ultrasonic module including a processing circuit for the received signals, the ultrasonic module being used in the ultrasonic diagnostic system. The ultrasonic module is connected through a general-purpose interface to a computer system. This sensor is used to identify the objects which are approaching towards the end user side and can be predicted before and precautions steps will be taken as per the programming.

IV. CONCLUSION:

This project is implemented in two sections. First one known runs with ARM as master node and another as normal ARM data acquisition node to which sensors are connected. Communications between two nodes are accomplished through High Speed CAN communication. Sensors connected are ultrasonic, MEMS accelerator, and smoke sensors. The master node collects all these information through CAN network and broadcast it through the Wi-Fi module which can be monitored by the server section. This will bring quicker response in the vehicle network to overcome any problem.

V. REFERENCES:

[1]. N. Fernando, S. Loke, and W. Rahayu, "Mobile Cloud Computing: A Survey," Elsevier Future Generation Computer Systems, vol. 29(1), pp. 84 – 106, July 2013.

[2]. "Vehicle-to-Infrastructure (V2I) Communications for Safety, U.S. Department of Transportation," http://www.its. dot.gov/research/v2i.htm.

[3]. J. Huang, F. Qian, A. Gerber, Z. M. Mao, S. Sen, and O. Spatscheck, "A Close Examination of Performance and Power Characteristics of 4G LTE Networks," in ACM MobiSys, June 2012.

[4]. E.-K. Lee, J. Lim, J. Joy, M. Gerla, and R. Gadh, "Multi-factor authentication and authorization using attribute based identification," UCLA CSD", Tech. Rep. 140003, 2014.

[5]. Steve Corrigan, "Introduction to the Controller Area Network", Published by Texas Instruments Application Report, SLOA101A, August 2002–Revised July 2008

[6]. U. Lee, E. Magistretti, B. Zhou, M. Gerla, P. Bellavista, and A. Corradi, "MobEyes: Smart Mobs for Urban Monitoring with a Vehicular Sensor Network," IEEE Communications Magazine, vol. 13(6), pp. 52 – 57, Oct. 2006.

[7]. P.M. Knoll and B.B. Kosmowski, "Liquid crystal display unit for reconfigurable instrument for automotive applications", Opto-Electronics Review, 10(1), 75 (2002)

[8]. "Smart Dust Project,"http:// robotics. eecs.berkeley. edu/~ pister/ SmartDust/.