ID Based Vehicle Parameter Monitoring System In Heterogeneous Mobile Networks

Moniga.V[1], G.M.Rajathi[2]

[1]PG scholar, Department of Embedded system technologies,
Sri Ramakrishna Engineering College, Coimbatore.
monavijay15@gmail.com.

[2]Associate professor, Department of Electronics and Communication Engineering,
Sri Ramakrishna Engineering College, Coimbatore.
rajathigm@srec.ac.in

Abstract-In the future Internet, where the trillion of devices will be connected through expanding mobile network capacity networks (heterogeneous mobile networks) that may vary in both networking and link technologies. Internet of Things (loT) and Machine to Machine(M2M) communication are expected to be the important model of communications. Either due to mobility or simply switching links, the loT/M2M devices need to remain connected regardless they change their points of attachment frequently to the network. To meet the needs of devices regarding secured connectivity and seamless mobility in heterogeneous networks, an ID-based communication network architecture is implemented. This ID based communication is mainly used to reduce the transmission delay and provides better connectivity. This paper introduce an design of ID based communication network architecture for monitoring the vehicle parameters in heterogeneous mobile network area without any transmission delay.By using the ID based communication the vehicle parameters are monitored using three different sensors, the measured values are uploaded into the local database and transmission delay is minimized and connectivity is improved.

Keywords: IoT, M2M, ID-based communication, Heterogeneous Networks, Mobility

1.INTRODUCTION

The future wireless mobile communication networks should be able to securely interconnect trillion of devices. The devices connected through heterogeneous networks.The heterogeneous networks will vary in both networking (e.g., IPv4 and IPv6) and wired/wireless access technologies (e.g., cellular, wireless LAN, and low-power, low-range wireless links), and they will frequently change their points of attachment to the networks either because of moving physically (e.g., with humans or vehicles) or simply switching links from one overlapped wireless network to another. Differently from the current Internet hosts, these devices need location-independent, ID based communications over heterogeneous networks. The current Internet offers location-based communication.In that communication scheme the communicating endpoints, are identified by network location-dependent IP addresses. The IP address of a host becomes invalid when the host changes its point of attachment from one location to another, and the communication session that has been using the IP address terminates. Moreover, the Internet principle of end to-end connectivity is not favarable for interworking ofheterogeneous network-layer protocols, e.g. IPv4 and IPv6.Therefore, various ID-based communication architectures have been proposed recently for the future networks.

In this paper we describe an ID based vehicle parameter monitoring system for better connectivity and reduce the transmission delay.By using this ID based communications the vehicle parameters are continuously monitored without any delay.The measured parameters are uploaded to the local database continuously. The vehicle parameters (temperature, coolant level,brake failure status) are measured by using the sensors .To indicate that the vehicle is in normal or extreme condition threshold values are fixed.For the normal condition the value is equal to the threshold level.For the extreme condition the values are below or above the threshold. The measured values are stored in the local data base.The transmission delay minimization is implemented by using NS2 simulator.

2.BLOCK DIAGRAM

The block diagram for the vehicle parameter monitoring is shown in the Figure 1.1. The system consists of three different sensors to detect the temperature, level and brake failure indication. The temperature sensor and the level sensor output is connected to the Analog to Digital converter.The output of these sensors will produce the analog signals. To convert the analog signal into digital signal the output is given to ADC. Then the ADC output is connected to the Raspberry pi module.The output of brake failure indication is directly connected to the Raspberry pi module. Then Raspberry pimodule outputs are connected to the RS232 which consist MAX232 ic.Then the values are display to the PC by using RS232 to comport converter.The vehicle parameters conditions are displayed in the PC.

3. HARDWARE DESCRIPTION

The Raspberry pi 2 microcontroller is used since this is compact in size and the power consumption is too low. Broadcomchip BCM2836 SoC is placed in it and it has a memory of 1GB RAM with 900MHz frequency. Raspberry Pi 2 board is selected because it is fast when compared to the earlier versions. Many sensors or peripherals can be interfaced with it at the same time and can work very fast as the quad core processor is used here. This processor allows us to interface many modules at a time. It has 40 GPIO pins and 4 USB ports also which allows us to connect our Wi-Fi module etc. The temperature sensor used here is Thermistor 743. As it is a analog sensor so it is connected to ADC to convert to digital signal and the ADC output is interface with the raspberry pi board. It is used to sense the ambient temperature of the coolant of the vehicle. This sensor is connected with the GPIO pins. Theworking of the sensor is based on the temperature .The temperature value varied means the resistance varies.

Level sensor is used in order to sense the water level in vehicle.Float is the one type of transducer which is used to measure the water level in the tank. The float changes the resistance value depending on the water level. Float changed means the resistance value also varied. If resistance value increased means output also increased. The resistance value and output is a directly proportional one.

In communications, RS-232 is a standard for serial binary data interconnection between two terminals(*DTE* and*DCE)*. It is commonly used in computer serial ports for data transmission.In this circuit the MAX 232 IC used.It used as logic level converter. The MAX232 is a dual driver/receiver.It includes a capacitive voltage generator .This is used to supply EIA 232 voltage levels from a single 5v supply. Each receiver and driver converts supply voltages from EIA-232 to 5v TTL/CMOS levels and TLL/CMOS input levels into EIA-232 levels respectively.

The MCP3208 12-bit Analog-to-Digital Converter (ADC) is a high performance and low power consumption, making it ideal for embedded control applications. The MCP3208 features a successive approximation register (SAR) architecture and an industry-standard SPI serial interface, allowing 12-bit ADC capability to be added to any PICmicrocontroller. The MCP3208 features 100kpbs, 8 channels as input, low power consumption , and is available in 16-pin PDIP and SOIC packages.Microchip Technology Inc. MCP3208 device is a successive approximation 12-bit Analog-to-Digital (A/D) Converter with on-board sample and hold circuitry. The MCP3208 is programmable one and to provide four pseudo-differential input pairs or eight single-ended inputs.

4. SOFTWARE DESCRIPTION

The raspbianos is used in the raspberry pi controller.It is a free operating system that is based on Debian which is particularly optimized for the Raspberry Pi controller.It comes with over 35,000 packages and pre-compiled software bundled in a simple format for easy installation in the Raspberry Pi.

The coding for all the sensors are done using the python coding. Python is preferred since it is a simple and a minimalistic language. It is also a free and a open source software. This can be used in many platforms such as Linux, VxWorks, PocketPC etc. Also, it supports procedure-oriented programming as well as OOPS.The web browser is created by using HTML.

NS-2 stands for Network Simulator version 2.Is a discrete event simulator for networking research.Provide substantial support to simulate bunch of protocols like Transmission Control Protocols(TCP), User Defined protocol(UDP),File Transfer Protocol(FTP),Hyper Text Transfer Protocol(HTTP) and DSR. It will simulate wired and wireless network. Is primarily Unixbased. NS2 uses TCL as its scripting language.Network Simulator 2 (NS2) is a program designed to enable the simulation of networking scenarios withouthardwares. It can be used to test many aspects of a networking environment including the development of new protocols. The program itself is notoriously difficult to install and runs on either windows or Linux.

5.PROPOSED WORK

The main idea of the proposed method is to design an ID based vehicle parameter monitoring system implemented by using the Raspberry Pi board.The Raspberry Pi module have the ability to build enough powerful mobile sensor devices that can easily include various types of sensors and it also can run code for monitoring and mobility functions.It requires a significant amount of power (5V, 700-1000mA), running on a battery for a long time (i.e., more than a day) is possible. The three sensors called temperature,level and brake failure status are fixed in the vehicle to monitor the parameters and the values are collected from raspberry pi module to PC and it will uploaded to the database.The thermistor which is used to measure the temperature and it will produce the analog output.The output is given to the ADC to convert it into a digital value and then connected to the raspberry module.To measure the level the probe is used. Whenever the probe change its resistance value also changed.The output is given to the inverting amplifier and again passed to the gain amplifier. The analogoutput converted into digital then connected to the Raspberry pi.Brake failure status is monitor by using the NOT gate IC. And the output is given to Raspberrypi.From the module the outputs are connected to the RS232 which consist MAX232 can transmit data to the PC.

6. ALGORITHM FOR PARAMETER MONITORING

Step 1: Give power supply to the raspberry pi kit board.
Step 2: Open VB.NET software in the PC
Step 3: Open file and select open in that open website.
Step 4: Copy the location from that open website link and click open.
Step 5: Then click debug and select start debugging.The new website is opened.
Step 6: If the temperature and level values are equal mean it display as normal otherwise it display as sensor is in below level.

7. EXPERIMENTAL RESULTS

The remote monitoring and control of devices is possible by using this ID based communication in heterogeneous networks.This ID based vehicle parameter monitoring system consists sensors. By sending the monitoring parameters range, the user can get information about the vehicle's current status such as if it is in normal or extreme condition.

The following are the experimental results. Figure 1.2 shows the screenshot of the created web browser and vehicle parameter monitoring system. The sensors are interfaced with raspberry pi with ADC the values are displayed to PC using RS32 to serial port converter.

A.PARAMETER MONITORING RESULTS

During Normal condition, the temperature and the level sensor values are equal to the threshold values and the brake failure status is normal.The normal condition is as shown in the Figure 1.3.

During extreme condition, the temperature and the level sensor valueare not equal to the threshold values and the brake failure status is failure.The value is below or above the threshold value.The different extreme condition is as shown in the Figure 1.4 and Figure 1.5.

B.DELAY MINIMIZATION RESULTS

The normal location based system consists delay because of changing position of the hostname from one point to another.When moving one point to another it will take sometime to capture the next host name.The below result show that the location based communication consist two different points to cover the different regions.From the two different road side units the information will be transmitted to the base station.

The location based communicationconsists delay. This delay is minimized by using ID based communication. In this a single ID is used to cover the entire region instead of using the two different units. Vehicle parameter conditions are transmitted to this single ID and it will transmitted to the base station. So the delay will be minimized by using this scheme. The figure 1.7 shows that it consists single ID and base station

8.CONCLUSION AND FUTURE WORK

Thus the ID based vehicle parameter monitoring system monitors the extreme temperatures, coolant level and brake failure status by using the sensors. The measured values are read from ADC then stored in the raspberry pi .The measured values are uploaded to the database by using the VB.NET. The transmission delay time is minimized by using the NS2 simulator. As ID based vehicle parameter monitoring system monitor the three parameters such as temperature, coolant level and brake failure status and values updated to the database and the delay is minimized. In future, this project is extended to tracking moving objects such as animals and humans without any disconnection and also in remote health care application.

9.REFERENCES

1 .The 5G Infrastructure Public Private Partnership, http://5g-ppp.eu,Accessed on 17 February 2015.
2.Recommendation ITU-T Y.3031, Identification framework in futurenetworks, International Telecommunication Union, March 2012,pp 1-24.
3.Kafle V.P and Inoue.M, "HIMALlS: Heterogeneity inclusion andmobility adaptation through locator ID separation in new generationnetwork," IEICE Transactions onCommunications., vol. E93-8 no. 3, March 2010, pp.478-89.

4.Raychaudhuri.D,Nagaraja.K, and Venkataramani.A, "MobilityFirst: Arobust and trustworthy mobility- centric architecture for the futureInternet," ACM SIGMOBILE Mobile Computing and Communcations Review 2012, vol. 16(3), pp. 2-13.
5 .Jacobson.V ,Smetters D K, Thornton J D,Plasss M F, Briggs N H,Braynard R L "Networking named content," Proceedings of the 5th international conference on Emerging networking experiments and technologies,Conext'09,2009,pp. 1-12.
6.Dannewitz.C Kutscher D,OhlmanB,FarrellS,AhlgrenB.Kairl H , "Network of Information (NetInf) – Aninformation-centric networking," Computer Communications, 2013,36 (7) pp. 721-75.
7.Teranishi .Y, "Large-scale Internet of things testbed in Japan," FIREForum 2014, http://www.ict-fire. eu/events/past-events/fire-forum-2014.html, Accessed on 17 February 2015.
8. Kafle V P,Fukushima Y, and Harai H, "ID/Locator split-baseddistributed mobility management mechanism," Wireless PersonalCommunications,2014,76(4),pp. 693-12..
9 .Kafle V P, Fukushima Y, and Harai H, "Dynamic mobile sensornetwork platform for ID-based communication,"Procedings of 2014 ITU KaleidoscopeAcademic Conference:Living in a converged world-Impossible without Standards,2014,pp. 153-59.
10 .Wi-SUN Alliance, www.wi-sun.org, Accessed on 17 Februarys 2015.
11.AmirHoseinJafari, HadiShahriarShahhoseini," A New Economic History-Based Algorithm forNetwork Selection in the Heterogeneous Wireless Networks", Indian Journal of Science and Technology,2014 Jan, 7(12), Doi no:10.17485/ijst/2014/v7i12/50944

12.R. Lakshmi, K. Diwakar, K. Rajan ,"Simulation and Implementation of the Two Switch Serial Input Interleaved Forward Converter",Indian Journal of Science and Technology,2015 June, 8(11), Doi no:10.17485/ijst/2015/v8i11/71807

13.J. K. R. Sastry, J. Viswanadh Ganesh, J. Sasi Bhanu,"I2C Based Networking for Implementing Heterogeneous Microcontroller Based Distributed Embedded Systems",Indian Journal of Science and Technology,2015 July, 8(15), Doi no: 10.17485/ijst/2015/v8i15/68739

11.LIST OF FIGURES:

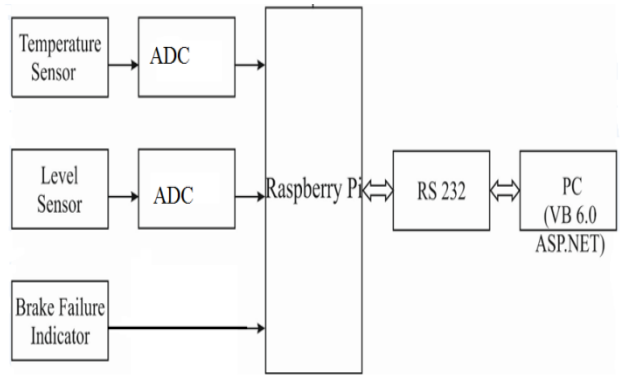

Fig 1.1 Block diagram

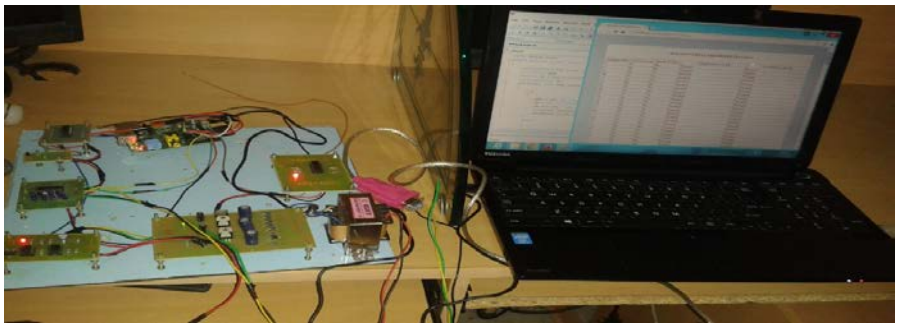

Fig 1.2 Vehicle Parameter Monitoring System

Figure 1.3 Normal Condition

Figure 1.4 Different Extreme condition 1

Figure 1.5 Different Extreme condition 2

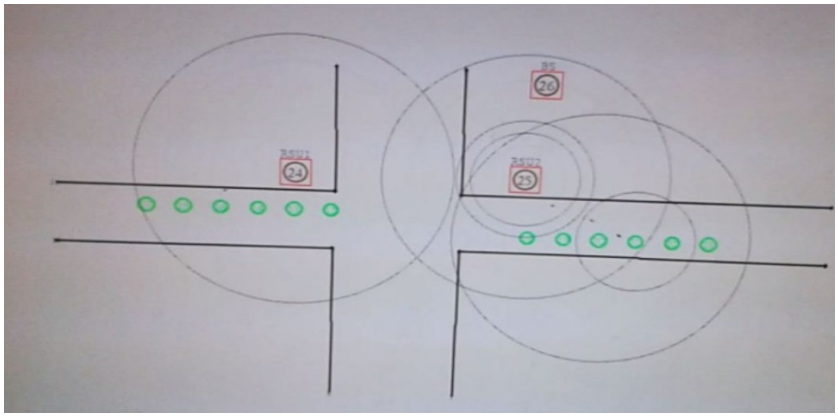

Figure 1.6 Locator based communication result

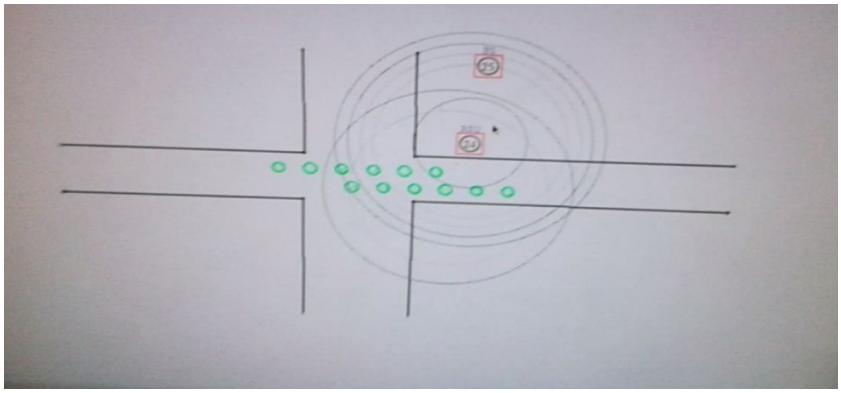

Figure 1.7 ID Based Communication Result