

Real Time Monitoring & Control of Electrical Drives using Embedded Networks

Mr. R. Saravanan¹ Mrs. C. T. Anuradha²

¹Assistant Professor ²Sr. Grade Assistant Professor

¹Department of Electrical & Electronics Engineering ²Department of Physics

¹Pandian Sarawathi Yadav Engineering College, Sivagangai, Tamil Nadu, India ²Mepco Schlenk Engineering College, Sivakasi, Tamil Nadu, India

Abstract— This paper presents an application of the Embedded Networks to Industrial/Home automation. This concern with monitoring of Electrical Drives Parameters using web browser from anywhere of the world. This proposed system describes real time parameters of remotely placed running motors monitoring that parameters with the help of Webpage. The sensors are used for measuring voltage, current and speed of the motor and their output is send to the PC via Ethernet which is acts as the server. The client can monitor the parameters of the motor from remote place. By this proposed system we can enhance the monitoring of electrical drives parameters through web server.

Key words: ARM Microcontroller, Ethernet Device, Sensors

I. INTRODUCTION

The Internet is a worldwide publicly accessible series of interconnected computer networks. It have many private, public, academic, business, and government networks that are linked by a broad array of electronic, wireless and optical networking technologies. The main objective of designing an Electrical drives monitoring system using embedded network is to overcome the drawbacks of wired monitoring system. In this system real time parameters of remotely placed running motors monitoring with the help of Webpage Here we are used the induction motor for system implementation. Using this we obtain the voltage, current and speed values of the motor through the webpage. It's fully controlled using internet and reduce multiple manual operation and get the real-time updated information from anywhere in the world. The PC connected to the Microcontroller acts as the server and in the server, the server web page monitor information will be stored (embedded) in the microcontroller (ARM Core), such that when client access the server from worldwide with the help of IP address and requests the information, that will be transmitted to server with the aid of IP address. The webpage which is created using the HTML web pages from the server PC is then transferred to the client as the response for the requests.

II. EMBEDDED WEB SERVER

The embedded web server mainly used to reduce the size of a web server to a very small area while maintaining the same functionality of a large size web server. The Embedded system can be connected to the system can be connected to the Internet in the two ways:

- 1) Using the PC act to server and the microcontroller connected to it access the Internet with the aid of the PC connected to the Internet.
- 2) All the network protocol like TCP/IP, HTTP and SMPT is embedded in to the microcontroller itself, hence the

client access the microcontroller server with the help of the IP of network embedded in microcontroller.

In this project, the first method is used. It is important to note that the server provides the webpage as the response when client request the server with the aid of IP address. Since the later method is used, which is the entire network protocol embedded in to the microcontroller itself and directly connected to Internet is more costly and mainly used for high end applications. Hence the microcontroller connected to the PC (server), where that system connects to the Internet.

A. Web Server

A web server delivers content, such as web pages, using the Hypertext Transfer Protocol (HTTP), over the World Wide Web. The term web server can also refer to the computer or virtual machine running the program. A computer that is responsible for accepting HTTP requests from clients, which are known as Web browsers, and serving them HTTP responses along with optical data contents, which usually are web pages such as HTML documents and linked objects (images, etc.).

The web server features are:

- 1) Bulk storage area residing somewhere in the world.
- 2) Storage as many Web pages as it can hold.
- 3) Requires an ID to retrieve pages and is called IP address.
- 4) Requires HTTP request and sends data as packets via TCP.

B. Embedded Webserver

An embedded kit is responsible for accepting HTTP requests from client's limited storage area especially for automation and stores only few WebPages. Some features are:

- 1) Requires an ID to retrieve pages and is called IP address.
- 2) Requires HTTP request and sends data as packet via TCP.

C. IP Address

In the most widely installed level of the Internet Protocol (IP) today, an IP address is a 32-bit number that identifies each sender or receiver of information that is sent in packets across the Internet. At the other hand, the recipient can see the IP address of the Webpage requestor or the e-mail sender and can respond by sending another message using the IP address it received. An IP address has two parts: The identifier of a particular network on the Internet and an identifier of the particular device within the network.

The IP address needs both the unique network number and a host number (which is unique within the network). Relationship of the IP address to the physical address-The machine or physical address used within an

organization's local area networks may be different than the Internet IP address .

D. Application

Embedded web server is mostly used for the embedded device control systems. Through with the aid of Internet, we can control the embedded device from worldwide. The client access the server with the help of IP address, in that server the webpage provides the details of all control and status of the applications as mentioned below, that webpage will be transmitted to the client.

Now the different applications of the embedded web server are as follows:

- a) Controlling home appliance from outside with the help PC connected to those devices with Internet.
- b) Industrial device automation (pressure, temperature, humidity, monitoring and controlling boilers).
- c) Monitoring and controlling the robots.
- d) Monitoring and controlling the vehicles with the help of GPRS.
- e) Patient monitoring from remote place, etc.

III. PROPOSED SYSTEM

In the proposed system Real time data monitored and controlled via web server pages delivered by the Embedded Web server (ARM7). The ARM7TDMI-S (LPC 2148) act as an Embedded Web server. The Embedded web server (ARM board) itself support the Ethernet connection, it convert the data received from the sensor into compatible form (TTL) suitable for Ethernet communication and display the motor parameters in the webpage. The Voltage and current value of the running motor measured by the voltage and current measurement circuits and given to the microcontroller. The hardware implementation connected to the PC to view the Web Pages. Initially it will be open the login and password page on the corresponding system that is used for security purpose. In this application very useful in industry/Laboratory for access the motor parameters and control it from anywhere in the world without the human interaction.

A. Voltage & Current Measurement Circuits

We are using the potential transformer, current transformer and signal conditioning circuit to measure the voltage and current from the running motor and send to the microcontroller.

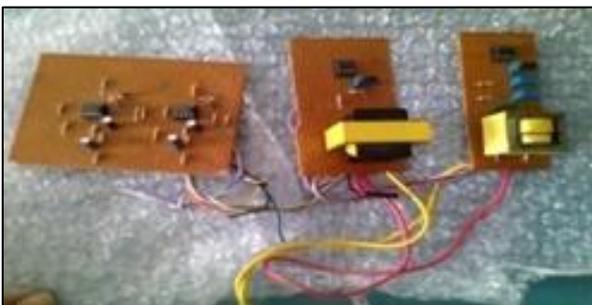


Fig 2: Voltage & Current Measurement Circuits

B. Signal Conditioning

Obtaining, maintaining and improving the quality of physical measurements is the goal of proper signal conditioning. Good

signal conditioning measured conditioning preserves the quality of the measurements available and allows the plant systems to make best use of the control and data acquisition systems installed.

C. Amplifier

The TL082, TL082A and TL082B are high speed J-FET input dual operational amplifiers incorporating well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit. High slew rates, low input bias and offset current, and low offset voltage temperature coefficient are some of the feature for these devices

D. AC to DC Converter

The amplified analog output from the voltage and current measurement circuit is the AC voltage and Current. Its wont connects to the microcontroller directly. So using AC to DC converter circuit the AC value of the analog output must convert into the DC value and send to the microcontroller.

IV. ETHERNET DEVICE

Ethernet is a family of frame-based computer networking technologies for local area networks (LAN). It defines a number of wiring and signaling standards for the Physical Layer of the standard networking model as well as a common addressing format and a variety of Medium Access Control procedures at the lower part of the Layer. While a simple passive wire was highly reliable for small networks, it was not reliable for large extended networks, where damage to the wire in a single place, or a single bad connector, could make the whole Ethernet segment unusable. The single-chip Ethernet controller containing an integrated Media Access Controller (MAC) and Physical Layer (PHY). An Ethernet stack that will run on ARM board. The on-chip Flash memory may be used to store user constants and web server content or as general-purpose, non-volatile memory. Having the unique MAC address stored in the Ethernet controller often removes the necessary serialization step from the product manufacturing process of most embedded systems.

A. RTL8019AS

The RTL8019AS single chip on chip inbuilt in the LPC 2148 to support Ethernet activity. Operating with a 2.5V core to meet low-voltage and low power requirements, the RTL8019AS are 10BASE-T/100BASE-TX/FX Physical Layer Transceivers that use MII and RMII interfaces to transmit and receive data. They contain 10BASE-T

Physical Medium Attachment (PMA), Physical Medium Dependent (PMD), and Physical Coding Sub-layer (PCS) functions. The RTL8019AS also have on-chip 10BASE-T output filtering. This eliminates the need for external filters and allows a single set of line magnetics to be used to meet requirements for both 100BASE-TX and 10BASE-T.

The RTL8019AS automatically configure themselves for 100 or 10Mbps and full- or half- duplex operation, using an on-chip auto-negotiation algorithm. They are the ideal physical layer transceiver for 100BASE-TX/10BASE-T applications.

V. HARDWARE IMPLEMENTATION

Initially had to decide to choose the right controller for this application and decided to use the LPC2148. This LPC2148 has an inbuilt two 10 bit, 14 channel ADC, Single 10-bit D/A converter and also has inbuilt Ethernet interface and serial port. Then designed the Voltage and Current Measurement circuits and the AC to DC converter Circuit as per the circuit diagram got from the website. Then programmed the controller using 'C' language to get the analog inputs from the circuit on two analog channels (since circuit gives voltage and current output) and give a digital output to the Ethernet port via RJ45 cable and monitor that values. For view this, created the Web page in the PC.



Fig. 3: H/W set of Photograph

VI. WEB PAGE

Initially the web page is created and then uploads that web page in the internet; using this page we can monitor the electrical drives parameters. Till now I measured the motor parameters in this web page through the Ethernet. The Web pages are Initially we give the login id and password, here I am sets the three type of users i.e. HOD, Staff and the students

a) Then the next page will open, in this we can monitor the motor parameters like voltage and current.

VII. CONCLUSION

Now, the web server monitoring system was established successfully using the Ethernet connection. Actually main aim of the proposed system is the monitor and control of the electrical drives parameters. Here after upload this system into the internet we can monitor the system after that we try to control the parameters. This system can be implemented in various Industrial to monitor and control the any of the device parameters in the web server. The Manager or Technical person controls the devices from anywhere.

REFERENCE

- [1] A Web-Based Remote Laboratory for Monitoring and Diagnosis of AC Electrical Machines. Authors: Amine Yazidi, Member, IEEE, Humberto Henao, Senior Member, IEEE, Gérard-André Capolino, Fellow, IEEE, Franck Betin, Member, IEEE, and Fiorenzo Filippetti, Member, IEEE. Published year: 2011, IEEE Transaction, Pg. VOL. 58, NO. 10.
- [2] Data Acquisition and Control System Using Embedded Web Server Author: Soumya Sunny, Roopa .Published

year: 2012, International Journal of Engineering Trends and Technology- Volume3 Issue3.

- [3] Extensible Embedded Web Server Architecture for Internet-Based Data Acquisition and Control. Author: Igor Klimchynski, Member, IEEE. IEEE sensors journal, Vol. 6, No. 3, June 2006