

NETWORK INTERFACE CARD FOR NODE PC REMOVAL IN LAN SYSTEM

Vaibhav V. Mainkar¹, Sairaj R. Gad², Kunal R. Chavan³, Ashitosh R. Kudtarkar⁴, Prasad A. Warkhandkar⁵

Assistant Professor, Department of Electronics and Telecommunication Engineering¹
Students, Department of Electronics and Telecommunication Engineering^{2,3,4,5}
SSPM's College of Engineering, Kankavli, Sindhudurg, India

Abstract: Currently in industries machines are connected to a server using LAN via PC node. However, a large number of hardware devices don't have the network interface and the data from them cannot be transmitted in network without PC node. Every industry has different machines in various locations, so machine control parameters according to production but the LAN setup is not used for information exchange. The LAN interface is not possible due to different protocols as a microcontroller interface in serial communication. PC node consumes lots of power (approx.200W/hr). In order to control and monitor machines in industries we design a Microcontroller based embedded Ethernet interface. In the design, an existing PC node can be replaced by a NIC controller card to obtain compatibility with the hardware machine. The design mainly consists of NIC communication module, PIC microcontroller module and Ethernet interface module. In the design, communication can take place by using a PIC microcontroller and Ethernet controller NIC module. It has an excellent prospect in Industry of new automation applications. The project is designed to suit industrial environments with a centralized LAN system. The LAN system is used to control different MACHINE PARAMETERS the machine status is monitored and controlled by the SERVER/NODE system. It has an excellent prospect in Industry of new automation applications.

Keyword: NIC [Network Interface Card], PIC Microcontroller.

I. INTRODUCTION

In this project we are going to use LAN TCP protocol for replacing the node or server PC by using an integrated embedded server using NIC card, for industry we know that the LAN system in office is used for software exchange like stock material inward outward dispatch. Every industry has different machines in various locations so machine control parameters according to production but the LAN setup is not used for information exchange. In this project the LAN is a gateway for all industry machines for live online monitoring and control so we can observe various parameters of industry. We are using network hardware gateway using Embedded Technology. We are monitoring all sensors using embedded technology and send all information to LAN using TCP protocol all information is transferred via RJ45 cable. LAN Control is available by user from laptop.

II. SCOPE

This system is capable of communicating wirelessly. In future the machine data can be sent directly to the user by SMS. This system can also be extended by using WiFi module to communicate between machine and NIC controller card. This will help to monitor and control the machines faster. In future, we can modify it such that the system will send an alert message when the emergency situations come like flood, tsunami, earthquake, etc.

III. METHODOLOGY

3.1 Relay

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.

3.2 Power Supply

An ac voltage, a steady dc voltage is obtained by rectifying the ac voltage, then filtering to a dc level, and finally, regulating to obtain a desired fixed dc voltage. The regulation is usually obtained from an IC voltage regulator unit, which takes a dc voltage and provides a somewhat lower dc voltage, which remains the same even if the input dc voltage varies, or the output load connected to the dc voltage changes.

3.3 Temperature Sensor (LM35)

The LM35 is most used sensor to give the output in 10 mv/°C with the reference voltage of stabilized power supply. The temperature sensor is interfaced with the buffer or unity gain amplifier which reduces the burden effect on previous stages.

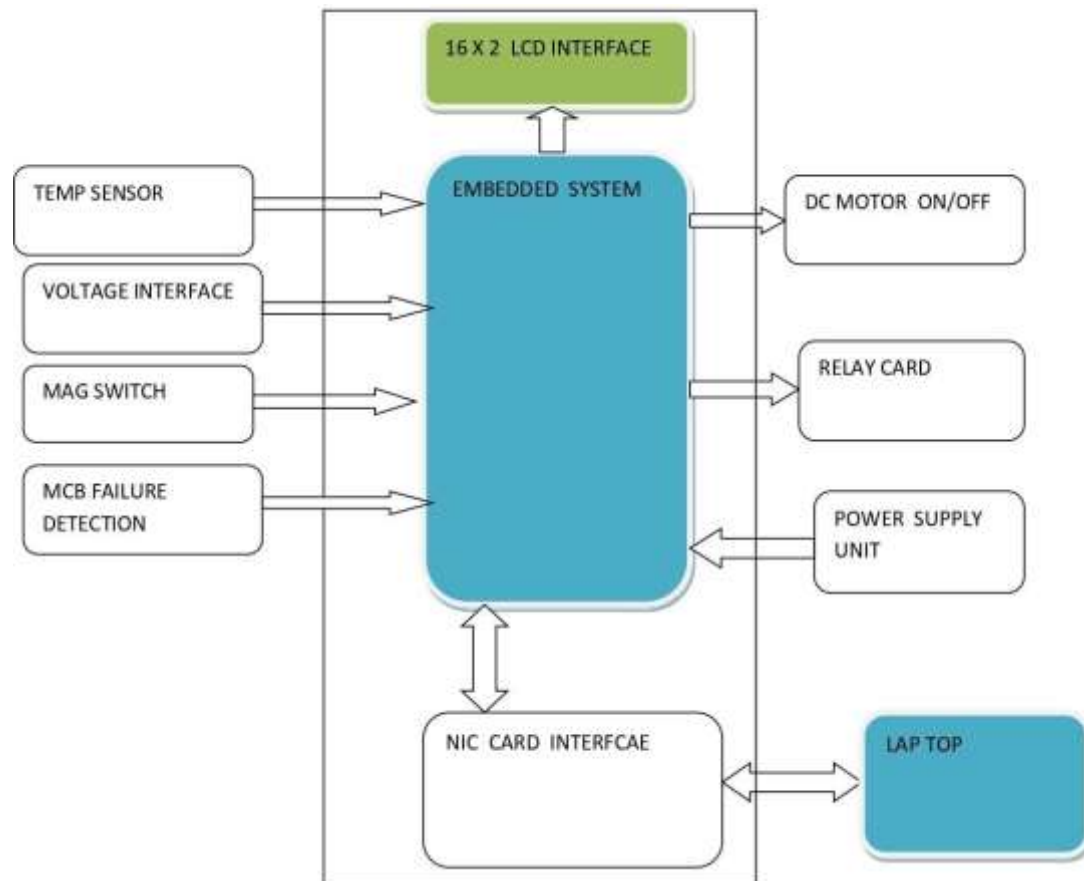


Figure 1: Block Diagram of The Proposed Work

3.4 PIC Microcontroller

A product design may require only a very simple system, the parts needed to make this system as a low cost product. To solve this problem a microprocessor system is implemented with a single chip microcontroller.

3.5 NIC Controller Card

A network interface card (NIC) is a hardware component without which a computer cannot be connected over a network. It is a circuit board installed in a computer that provides a dedicated network connection to the computer. It is also called network interface controller, network adapter or LAN adapter.

3.6 Magnetic Proximity Sensor

Magnetic proximity sensors are used for non-contact position detection beyond the normal limits of inductive sensors.

3.7 MPLAB Simulator

MPLAB SIM is a discrete-event simulator for the PIC microcontroller (MCU) family. It is integrated into MPLAB IDE integrated development environment. The MPLAB SIM debugging tool is designed to model operation of Microchip Technology's PIC microcontrollers to assist users in debugging software for these devices.

3.8 Visual Basic 6.0

Like the BASIC programming language, Visual Basic was designed to have an easy learning curve. Programmers can create both simple and complex GUI applications. Programming in VB is a combination of visually arranging components or controls on a form, specifying attributes and actions for those components, and writing additional lines of code for more functionality.

IV. LITERATURE REVIEW

"Design and Development of Ethernet Interface for Industrial Applications" in this paper, there are many technologies already implemented and used for industrial automation. Nowadays the industry is also using newly developed connectivity solutions like Ether- net, Wireless LAN, LIN, CAN etc. Additional automation solutions are also available in the existing methods. With the help of the software, one can program as per their needs and data process can be modified. This paper focuses on industrial automation for controlling application with the help of Ethernet. In industry, many control units use PLC-based communication interfaces like profinet, device net, RS232, RS485, etc. These interfaces are costly and non-standard embedded systems developed for the specific application in the industry have no proper interface to the central control unit. To overcome these issues, we propose this paper of design and development of industrial Ethernet which can connect various standard interfaces, machines and embedded systems at very low cost.[1]

“Design of Real Time Data Acquisition with Multi Node Embedded System” in this paper it explains about the process of data acquisition system which is used for the measurement of various parameters like moisture, temperature, light, humidity etc. Data acquisition is the process of sampling signals that measures natural signals and convert it into digital numeric values which can be further processed by computer. This information is derived from different sensors which are either located near or away from the user through GSM and DTMF. This collected information is processed, displayed and sent to the master processor named CPLD XC9572 this processor processes the data and then also displays it to the LCD module and to clients using GSM. The master processor is capable of taking action from the user like controlling certain machines like CNC, numeric drives, power supply, motors etc. without physically being there. This project guides toward the idea of saving space, power consumption, manufacturing cost and ease of implementation.[2]

“Developments and current trends in Ethernet Technology” in this paper the overview of the current advantages and developments in Ethernet technology and its appropriate standards, such as Higher Speed Ethernet, Carrier Ethernet Technologies. Ethernet is a family of networking technologies which is initially developed for wired LAN networking Technology implementation. Ethernet is networking technology which covers the Physical layer and Data Link layer of OSI reference model. Ethernet influence in Networking Technology is based on low cost, easy to configure and deploy equipment. The Ethernet was firstly Introduced in the 1980s, Ethernet was sometimes claimed as an outdated technology that should be replaced with new emerging technology. In this competitive world Ethernet has not only survived, but also it was significantly developed and several new techniques were introduced so that today Ethernet is the most widely used Wired Networking technology in the world. Also, in this paper there is briefly reviewed carrier Ethernet as the extended ethernet from LAN to MAN/WAN networks and in the new area of Ethernet expansion. The improved Ethernet standards are also explained in this paper. [3]

“A Review of Designing and Implementing an Embedded System Using Client Server and Web Technology for Monitoring And Controlling of Physical Parameters” in this project, For the monitoring and controlling parameters like temperature and humidity is very necessary in some industrial as well as research, The microcontroller based embedded system is designed. To monitor and control from different client installations, Interconnection with TCP/IP networks can provide a broad interactive. Monitoring and controlling temperature and humidity to intranet and internet users are the basic objective of the system. Both technologies work in different manners. As per the constant request of the client to server for updated values, the user having client server technology continuously receives the updated values of sense temperature and humidity. whereas Internet users using the web technology will avail the same implemented in a three tier system of web browser, web server and embedded server. Internet users will not get continuously updated data due to the stateless nature of web. When users of the system have to send a HTTP request from the web browser to the web server then the same will be forwarded to the embedded server for retrieving the updated values. The values of temperature and humidity through their respective front ends at which necessary control will be initiated by the controller board through relays can be set by both types of users. Internet users can get access by entering passwords to control new values of temperature and humidity. By installing a mail server, the authentication process is implemented. When the sense values of temperature and humidity will exceed the set values stored in the limit value table, hardware control will be initiated. As per the request of users, The system can generate report and graph of recorded temperature and humidity.[4]

V. CONCLUSION

This designed system will have the ability to convert industrial machine parameters into LAN protocol. This system is also capable to monitor machine sensors and to control switches present in the machine. Power consumption of the system will be reduced by using Network Interface Card (NIC) instead of node PC. Our system will be extended using IoT technology to communicate between machine and NIC card.

VI. ACKNOWLEDGEMENT

It gives me immense pleasure to express my sincere hearty gratitude for the constant help, encouragement and suggestion given to us for present our dissertation work Entitled "Network interface card for node PC removal in LAN system" under the guidance of Prof. V. V. Mainkar. His encouragement guidance enabled us to complete this task. We are thankful to Prof. S. S. Mulla (Head Of Dept.) who helped us to build this Project. We would like to thank our principle for this kind permission to complete this Project. We extend our thanks to the staff member of Electronics And Telecommunication Department and all my friends who have extended their co-operation for the completion of this task. Finally, we express our gratitude to Almighty GOD and our PARENTS who have inspired and supported us to complete this work, without their support we could not have completed this task.

REFERENCES

- [1] E. SakthiAbirami, S. Suganya, G. V. Kumar, and R. P. Gowtham, “Design and development of ethernet interface for industrial applications.”
- [2] M. Kumar, S. Sharma, and M. Joshi, “Design of real time data acquisition with multi node embedded systems,” *International Journal of Computer Applications*, vol. 975, p. 8887, 2012.
- [3] D. Valenc'ic', V. Lebinac, and A. Skend'ic', “Developments and current trends in ethernet technology,” in *2013 36th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*. IEEE, 2013, pp. 431–436.
- [4] S. Baruah, A. K. Mahanta, and K. C. Sarma, “A review of designing and implement- ing an embedded system using client server and web technology for monitoring and controlling of physical parameters,” *Int. J Infonomics*, vol. 3, no. 1, pp. 5–15, 2010.