Embedded Ethernet Monitor and Controlling Using Web Browser

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Abstract: - Now a day's so many useful technologies are coming out to make our life style more comfort, luxurious and secure. Especially internet technology brings up many applications and advantages for present and future generations. Present world mostly is being controlled by internet. Previously internet is limited to only computers but because of the advancement in technology especially in mobile communication, now internet is completely being accessed by latest phones like Smart phones. The aim of this project is to monitor the parameters of industry from anywhere in the world from PC or phones through internet. In this project we will create an application to monitor the industry parameters like monitoring temperature and voltage from webpage. Whenever we open this application it gives the current status of industry. At industry side we have Ethernet module, micro controller, temperature sensor, voltage sensing circuit. This micro controller will keep updating these parameters data on webpage. We can check these values from anywhere on PC by opening this webpage. The communication between internet and micro controller is established using Ethernet module and the controller is used in this project is ARM7 based LPC2148 32 bit controller. We can also control loads of that industry from this webpage.

Keywords:- Embedded Ethernet; ARM processor; SPI; Web server.

I. INTRODUCTION

1. Background

The main aim of our project is to implement industrial automation console that can be easily accessible from distant places through a simple web server running inside the industry. The basic functionalities in this proposed system includes automatic control of Lights and monitoring temperature. Internet-enabled hardware products are slowly becoming popular. A real web server can be implemented in a device in your own home connected to your pc via a local area network. This will allow you to do things like display temperature, control heater/geyser and switch light/fan remotely from any web browser in the house. This project comprises of two sub-parts. The front end involves designing a web page application using HTML language to communicate with remote microcontrollers over the Ethernet.

The back end involves building a network of microcontroller based prototypes to emulate devices used at residential locations for the purpose of home automation such as TV ON/OFF control, speed control of fan, lighting control etc. Micro-controllers communicate with each other via Ethernet a wired communication. Because these systems use hard-wired Ethernet, communication between components is reliable and fast.

This kind of systems is particularly useful for the disabled or elderly, improving the life quality and avoiding special aid expenses. The industrial Automation System integrates electrical devices in the house with each other in order to control domestic activities such as pet feeding, smart lighting or entertainment systems. These devices are often connected through a computer network, allowing them to be controlled by any personal computer or mobile device (smart phones, tablets, etc.). The communication technologies used in the systems are mostly determined by the house topology. Pre-existing houses use PLC or wireless networks (radio or IR), while new homes can be out fitted for dedicated wiring through the walls, avoiding some interference issues and lowering the final cost.

The NXP (founded by Philips) LPC2148 is an ARM7TDI-S based high-performance 32-bit RISC Microcontroller with Thumb extensions 512KB on-chip Flash ROM with In-System Programming (ISP) and In-Application Programming (IAP). 32KB RAM, Vectored Interrupt Controller, Two 10bit ADCs with 14 channels, USB 2.0 Full Speed Device Controller, Two UARTs, Two I2C serial interfaces, Two SPI serial interfaces Two 32-bit timers, Watchdog Timer, PWM unit, Real Time Clock with optional battery backup, Brown out detect circuit General purpose I/O pins. The application of microcontroller in such an instrument will reduce cost. Primarily, the microcontroller is capable of storing and a programming. The microcontroller contains a CPU (central processing unit), RAM (random-access memory), ROM (read only memory), IO (input/output), serial and parallel ports, timers, and sometimes other built-in peripherals such as A/D (analog-to-digital) and D/A (digital-to-analog) converters.
There is a large variety of microcontroller on the market today. We will focus on a few versatile microcontroller chips called programmable interface controller ARM7 chips from PHILIPS. PHILIPS uses ARM7 to describe its series of ARM micro controllers.

At controlling system side we have Bluetooth module, micro controller and load controlling circuits. Whenever this blue tooth module receives command from its paired blue tooth transmitter then it transfers this command to micro controller. Micro controller will control the respective loads depends upon the command it received.

II. PROBLEM OUTLINE IN EXISTING SYSTEM

Various wireless technologies that can support some form of remote data transfer, sensing and control such as Bluetooth, Wi-Fi, RFID, and cellular networks have been utilized to embedded various levels of intelligence in the industries. The studies have presented Bluetooth based home automation systems using Android Smart phones without the Internet controllability. The devices are physically connected to a Bluetooth sub-controller which is then accessed and controlled by the Smart phone using built-in Bluetooth connectivity. However, due to limited range of operation (maximum up to 100 m) the system is unable to cope with mobility and can only be controlled within the vicinity. A GSM based communication and control for home appliances has also been presented by where different AT commands are sent to the Home Mobile for controlling different appliances. The drawback of this system is that users are not provided with a graphical user interface and users have to remember different AT commands to control the connected devices.

III. PROPOSED SYSTEM

The goal of this project is to develop industrial automation system that gives the user complete control over all remotely controllable aspects of industry. The automation system will have the ability to be controlled from a central host PC, and the Internet. In this project we will create an application to monitor temperature, voltage and control electrical appliance like light. from webpage. This web page can be opened from anywhere using computer. In this web page we have some options or buttons to control the appli, whenever we operate this application then it sends command to controlling system through internet link.

At controlling system side we have Ethernet module, micro controller and load controlling circuits.

Whenever this Ethernet module receives command from its web application then it transfers this command to micro controller. Micro controller will monitor temperature and voltage then control the respective load depends upon the command it received. The communication between internet and micro controller is established using Ethernet module and the controller is used in this project is ARM7 based LPC2148 32 bit controller. We can also control loads of that industry from this webpage.

Ethernet is the family of wired network technology. And Ethernet is standardized as IEEE 802.3. The data of Ethernet is grouped into bytes often called frame. The start of the frame is preamble which is of 7 bytes length. It contains sets of 0”s and 1”s arranged alternately. The SFD or start frame delimiter is a 1 byte binary value. Its left most end contains a „11” by identifying it, the receiver gets information about arrival of the new frame. Then comes the 48-bit MAC address that contains both source and destination address. The type of length which is of 2 bytes gives information about the protocol bound in the succeeding data payload. The frame terminates with a 32-bit checksum that performs CRC checking to identify if any error is present [4].

Hardware Implementation Of The Project

Block Diagram:
Software

Microchip’s TCP-IP stack full featured TCP-IP stack, very easy to configure and use with PIC microcontrollers. Microchip provides a driver for the ENC28J60 and a TCP/IP stack including an HTTP web server. Web pages are stored in external or internal eeprom. This firmware is written in C (Compatible with Microchip C18 compiler).

IV. RESULTS

The implementation and realization of “EMBEDDED ETHERNET MONITOR AND CONTROLLING USING WEB BROWSER” is done successfully. The communication is properly done without any interference between different modules in the design. Design is done to meet all the specifications and requirements. Software tools like keil uvision simulator, Flashmagic to dump the source code into the microcontroller, orcad lite for the schematic diagram have been used to develop the software code before realizing the hardware.

The objective of this system is to monitor the industrial process parameter on real time basis using Ethernet. This system has advantages that is has small size, Realiability, and low power consumption.

V. CONCLUSION

This is low cost method for monitoring the industrial parameter like temperature remotely LM 35 is better because it is suitable for all industrial application in which temperature from -200 C to 600 C. It is accurate, less expensive and easy to use. Its output is relatively large changed with temperature as compare with thermocouple. The ARM can communicate with PC using serial port using RS 232, It support online supervision using not only private LAN but also using Public network. By using embedded hardware and software we can control the require industrial parameter and industrial automation using Ethernet with high accuracy. If we select the proper sensor depending on the range of temperature measure or industrial environment, we can increase the sensitivity of this system.

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