

A Development of the Remote Control System for Vending Machine through Internet

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Abstract : In this paper, we develop the remote control device of vending machine through internet. This device can control the temperature, humidity and on/off switch. This device is operated by the Java based TCP/IP control program.

Embedded system is satisfied with real time. Fig.1 is diagram of traditional embedded system.

1. Introduction

Embedded system is that electronic control system which is compounded hardware and software that previously decided to execute specific functions. Sometimes it may include mechanical parts. That is household appliances, control devices were not consist of a circuit but embedded micro-processor which execute specified functions.

Like this it is used our living everywhere and partial household appliances is shipped mounting embedded system. It is named 3A with Office Automation, Household Automation. Of them, factory automation is most quickly developed. So took the lead of automation industry and manufacturing process. Moreover house automation means automated home that is connected a house with computer and communication. Namely it is house which is automated everyday life through the Internet.

Like this, at present electronic goods are shipped mounting Embedded Processor. So system control as luminosity, On/Off, air conditioner, TV is possible.

From now on it is impossible that all of household appliances are controlled without helping Internet.

In this study, we design and implement the Internet Control using Embedded system after connecting relay, switch in experimental kit.

2. Embedded TCP/IP Interface Design

Embedded system differ from the usual system, it designed only for specific work. Early Embedded system is relatively simple. So without operating system, it is executed according successive program and it is against in case of interruption.

Past Embedded system is simple and plain. For that reason using OS is waste and useless. However these days its scale is larger. Because of Network and Multimedia form the foundation and embedded system has many things to do.

Operating system concept is needed. So RTOS(Real Time Operating System) is introduced in terms of trait of

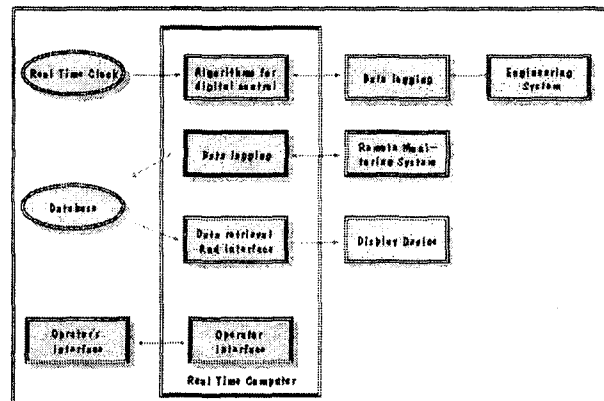


Fig.1 Diagram of Embedded System

2.1. RTOS(Real Time Operating System)

RTOS means to handle the operation within fixed time. Embedded System has plenty of RT(Real Time) elements. So it may be appropriate that Embedded System is equal RT. Embedded OS System is not different from other system specially. It supports task scheduling, communication between task, memory control, IO, interrupt what usual OS execute. There are some differences between OS and Embedded System. First is a time restriction, second is a credit, third is a peculiarity and a wide usage. Embedded OS and RTOS are necessary classification somewhat and it is true that Embedded System has element of RT but all of these are not.

OS that is contained PDA is most appropriate example. Namely Embedded OS includes RTOS.

2.2 Embedded Java

Oak which is developed as Green project on Sun Microsystem is cultivated as software for electronic appliances. It has relatively high transplanting. However it isn't used Embedded System like electronic appliances but discovered possibility from Internet programming. It is Java that oak is made possible using Internet program. Embedded Java of Sun and personal Java made Java which is used Internet program so far uses Embedded system. At present Embedded System isn't occupied one kind of OS almost market like desktop environment. but any Embedded System isn't occupied.

It is good to use all of OS, but it would better use one's own system perfectly.

3. Experiment of Remote Control Through the Internet

3.1 Embedded Simulation diagram

To control and communicate simulation system on the Internet, Board is designed through 10 base-T Ethernet interface. Fig. 2 is diagram of simulation system, Fig 3 is Embedded Card. Power which is used on system is 5V DC±10% and an electric current is used below 200mA. Micro Processor is used scenix Sx52BD 8bit, Ethernet cable connected herb from RJ45, connecting maximum 100m is possible.

On Ethernet, it execute like all of data programming or addressing, an error or a sensing of crash and avoidance etc. Resources of Web page or its own Mac Address is saved on Flash memory, Java Applet which is Web page program made upload.

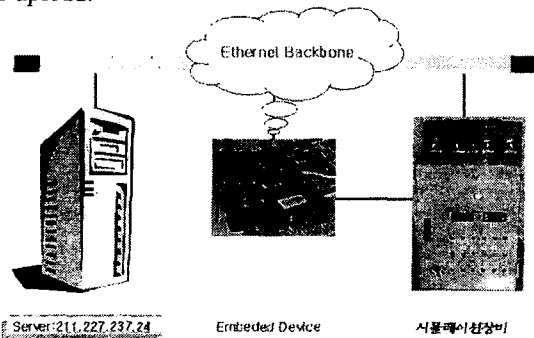


Fig. 2 Diagram of simulation system

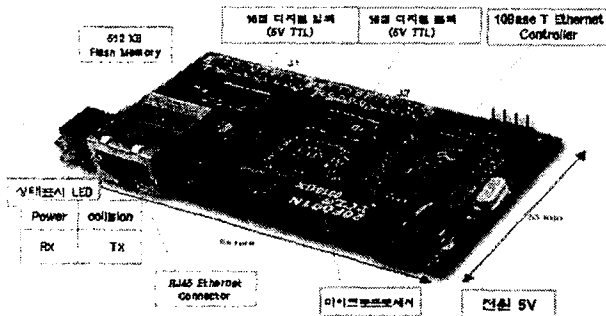


Fig. 3 Embedded Card Unit

3.2 TCP Network Control

Ethernet network control uses TCP(Transmission Control Protocol), Communication Flow for embedded System control is like below(fig 4). It is ordered from user PC to Embedded

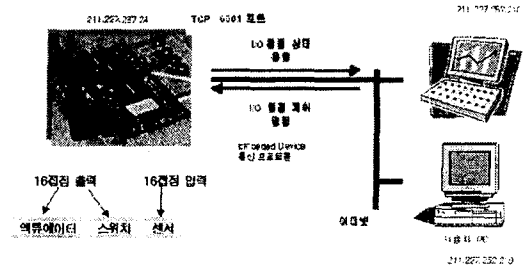


Fig. 4 TCP Network Control Flow System, from TCP 6001 port to TCP, Embedded System responds and executes about I/O contact point.

3.3 A Main Board Design

I/O board of main board is composed of 16 input switch, 16 input mark LED and 16 mark LED. Input switch is designed Low Active, output mark LED is High Active.

Fig. 5 show TCP/IP interface device and Fig. 6 show the I/O pin diagram of TCP/IP interface.

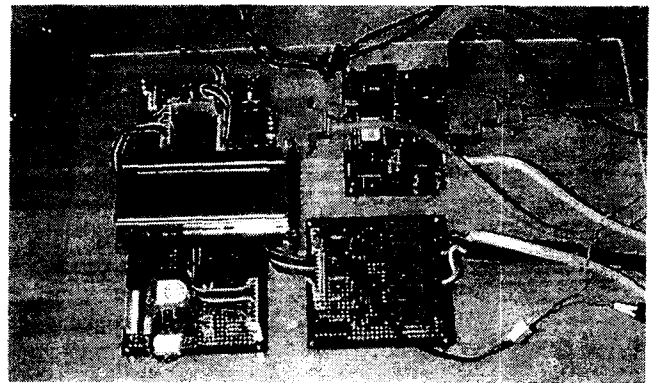


Fig 5 TCP/IP Interface Device

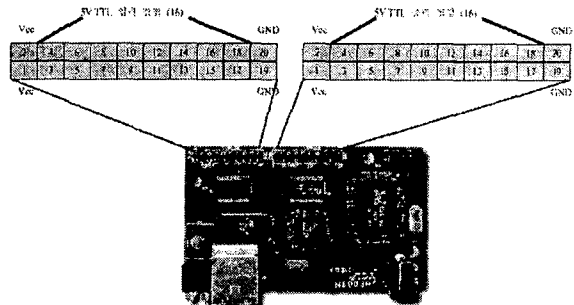


Fig 6. Diagram of digital I/O interface.

3.4 design of I/O section

It is possible that High or Low which input interface 5V TTL. Signifying is possible that High or Low level is marked through photocoupler of user system. That is High or Low input is transmitted when input terminal is on. Fig. 7 is diagram of main board and interface of external input. On design of output section, output 5V TTL level signal of main board is transmitted according voltage level or user system. When Vcc of main board and contact point of

output is acted from High to Low, On/Off control which is connected by relay work.

3.5 Remote control Screen of Embedded System

Main Applet Screen is materialized by Java and shown in Fig.7.

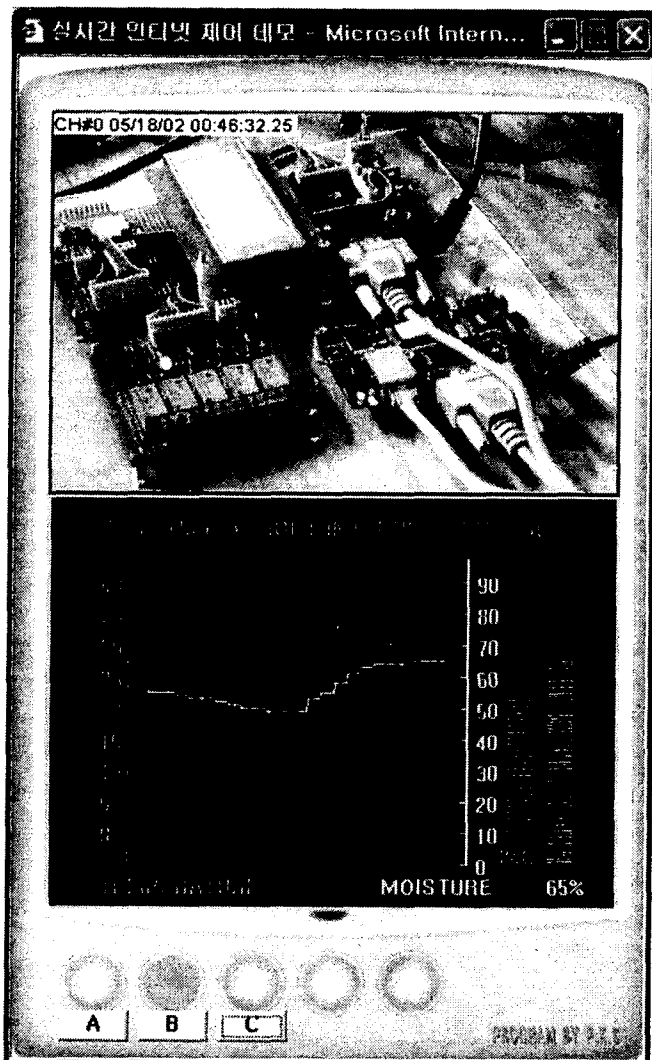


Fig. 7 Remote Control Main Applet

4. CONCLUSION

In this Study, according appearance of Embedded age which communication of household appliances are possible by developing Internet and ADSL, experiments On/Off control through simulation system on Internet.

Like this Embedded is emerged IT section and is developing PDA mounting OS on mobile not only house automation but also other area.

At present Embedded market is not occupied only one OS but began shipments various OS. It had better perform within one's system than use all of OS. Embedded which is a central theme is going to develop.

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