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COMPARISON OF IPIC WITH CURRENT TRENDS OF SERVERS

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ABSTRACT
Today we can fit the extensive software needed to drive a World Wide Web server into a computer the size of a box of matches. A Stanford University professor has created what is believed to be the world's smallest Web server, the size of matchbox, which was designed to ultimately be worn by a use

KEYWORDS: TCP/IP stack, SLIP, DEC Alpha, iPic microcomputer etc

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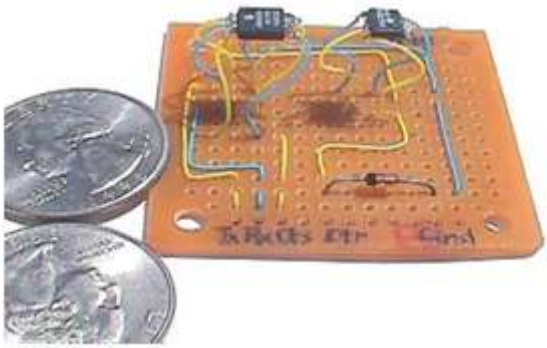
I. INTRODUCTION
It is Jumptec's DIMM-PC, a single-board AMD 486-SX computer with a 66 MHz CPU, 16 MB RAM, and 16 MB flash ROM, big enough to hold a useful amount of RedHat 5.2 Linux including the HTTP daemon that runs the web server. At relatively low usage levels it consumes 800 mill watts from a 5V power supply, rising to 2 watts at 100% CPU usage.

The previous title for world's smallest web server was held by Phar Lap Software, using a custom computer that is 3.6 inches by 3.8 inches by 1 inch in size (more than 10 times the size of the matchbox server)..

By contrast, the new Stanford web server is one of the first projects of a new Wearables Lab that Pratt has started. The lab is modeled after an older and larger program at the Massachusetts Institute of Technology. Both labs are developing computer technology that can be incorporated directly into clothing.

iPic web-server, the world's tiniest implementation of a TCP/IP stack and a HTTP web-server. The chip is a complete micro-computer, and it includes all components of a complete computer on a single tiny micro-chip (this includes the CPU (central processing unit), memory, serial port interface circuitry, and clock oscillator).

II. PARTS OF THE IPIC WEB-SERVER
The chips are so tiny, so they are soldered onto those very fine yellow and blue wires which are holding them up in the air. In a final production version, the chips can be directly bonded to a circuit board, and the entire web-server can fit in an area the size of a match-head



The chip on the left is the iPic microcomputer, based on a PIC 12C509A, in a tiny 8-pin SO8 package. The chip to its right is a 24LC256 EEPROM chip -- it holds all the files that the iPic web-server serves out -- this is roughly like the hard disk on a regular sized computer. The tiny component at the bottom serves as the power-supply regulator

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III. THE TINY IPIC TCP/IP STACK

It is based on the world's smallest implementation of a TCP/IP stack -- which is implemented on a small 8-pin low-power microcontroller .. using a mere 512 words of program ROM. If IPic can fit in a PIC, it can fit in just about anything.

The TCP/IP code itself fits in about 256 bytes (12-bit), and the rest is some extra salt-and-pepper and miscellaneous code.

The features of iPic Web-Server

The chip is a PIC 12C509A, running at 4MHz (Internal RC clock) implementing the IPic tiny TCP/IP stack, a HTTP 1.0 compliant web-server, a simple telnet server (for editing files on the chip), an 24LC256 i2c EEPROM.

IV. COMPONENTS OF THE IPIC TCP/IP CORE

The PIC has 1024 words (12-bits) of program ROM ~256 bytes contain a hand-crafted RFC1122-compliant implementation of TCP/IP including.

HTTP/1.0 and i2c EEPROM Filesystem, using 3 to 99 instructions.

TCP and UDP protocol stack, using 70 to 99 instructions.

ICMP [supports upto ping -s 11], using upto 14 instructions.

IP - Internet Protocol, v4, using 68 to 77 instructions.

SLIP - Serial Line IP packetisation, about 76 inst

Fully buffered UART, up to 115200 bps, using 38 to 56 instructions.

Operating system: RTOS with Rate Monotonic Analysis, using 3 to 15 instructions.

V. HOW THE IPIC CONNECTS TO THE 'NET

The iPic web-server is connected directly to a router running SLIP at 115200bps. There is no intermediary host, no protocol converter, no proprietary magic, no sleight of hand, all the packets from your client are processed directly on the PIC, and all the web-files, pictures, java applets, sound and PostScript files on the web-server are all served directly from the PIC chip.

The iPic was connected to a Dell PC running tomsrbt Linux 2.0.36 configured as an IP router. The IP router served out SLIP at 115kbaud on COM1 , to which the iPic was directly connected. The iPic derived communication signals, as well as power, from the serial port.

The iPic server has now been moved to a temporary location, and is connected to a DEC Alpha .The DEC Alpha is serving out a SLIP connection using SLiRP - TCP Ports 9023 (telnet) and 9080 through 9127 are redirected to TCP port 23 (telnet) and 4176 through 4223 on the iPic.

VI. APPLICATIONS OF WEARABLE SERVERS (iPic)

At Home

We live in a sometimes bewilderingly complex world -- our everyday appliances have become quite sophisticated and complex to operate.

The web-browser changes all this. It has a large screen, user friendly menus and buttons and helpful information and wizards to guide you through the process is just a mouse-click away. However, such a screen and interface would be too expensive to incorporate into every appliance.

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In the Office and Industry
So many appliances in the office, at work, and in the industry are controlled by micro-computers. All of these devices can be connected to the Internet using the iPic technology. Once equipped with the iPic, all of the information can be now available at your computer screen, just by clicking on your web-browser.

On the Road
The Web is a unifier of all media. Radio, television, text, audio, music, photographs, printable material (and some not so printable material as well sometimes) all find their place on the web.

With possible applications of the iPic technology.

VII. DISADVANTAGES

Wearable computers, in some form or another, have been around for a number of years. But they have tended to be bulky and obtrusive, consisting of weighty headgear, antennas, thick vests and waist packs. Right now, the biggest obstacle to producing a truly wearable computer is the lack of a compact method for inputting data. Work is going on a special glove that can recognize a digital sign language, called Thumbcode that is to replace the bulky keyboard.

VIII. CONCLUSION

There is significant potential for wearable computers in the future, according to Rob Enderle, an analyst with Giga Information Group. "This class of product will expand as people reach a point when they are almost always connected." STANFORD - Professor Vaugh Pratt is a man with an obsession: to shrink the personal computer to an undetectable size, say, that of a shirt button.

He most likely will achieve that goal with a glove and a room the size of a walkin closet. One types not just with the hand button .Attached to the glove are sensors. By touching a thumb to the sensors, located on the tip, middle and base of each finger, and by grouping the fingers in different ways, the user can "type" letters and punctuation. All 96 characters found on a conventional keyboard are included in Pratt's digital sign language, which is called as "Thumbcode."

The data glove is a prototype, but the day is envisioned when people will use a glove -- or their bare fingers and thumb -- to type. Conventional computer keyboards would become obsolete. Using wireless technology, the sensors communicate with a pocket-sized PC.

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