Development Kits Help Speed System Designs for Internet-Ready H8 Microcontrollers

Intriguing control system applications become possible when connectivity technology from emWare combines with Hitachi MCUs and the capabilities of the Internet.

Using the Internet as the communication backbone of a distributed embedded control system opens fascinating design opportunities. A powerful new Internet connectivity technology from emWare®, Inc. makes it feasible to remotely access, monitor and control any embedded system from a standard web browser running on a computer anywhere around the world. As a result, control systems now can be "distributed" to a degree not previously possible.

Hitachi teams with emWare to offer a cost-effective solution for networking popular H8 series 8-bit and 16-bit microcontrollers (M CUs). Tools from emWare and Hitachi help speed the design of systems that allow access, monitoring and control functions via the Internet or any other network. As a result, any embedded system with an H8/300-, H8/300H- or H8S-series MCU can now offer real-time local or long-distance communication capability. This enables the development of systems that have geographically dispersed components, and that are far more sophisticated and user friendly than ever before.

H8 becomes a micro web server

When compact (1 to 2 K Byte) emWare EM IT® (EM bedded Internet Technology) code is embedded in an H8 or H8S MCU, the chip can function as a micro web server. The MCU communicates with the Internet through a gateway. Communication between the MCU and the gateway is through a "light-weight" communication protocol: RS-232, RS-485, Ethernet, modem, IrDA, RF wireless, and the like.

The gateway hardware—a single-board computer, PC, Handheld PC, H PC), PDA, or a similar computing product—runs emGateway® software that implements a proprietary interface. The emGateway requires an operating system and a TCP/IP stack to enable communication over the Internet.

The emGateway software currently runs on Windows® 95/98/NT platforms (ports to other operating systems are planned). It uses well-known standards such as java, HTTP, and a web browser interface.

Add capability, not complexity

The emGateway software enables Internet connectivity even for H8-based embedded systems with low memory densities because it efficiently divides communication processing between the H 8 and the gateway.

The emGateway and EM IT software can both be resident on the MCU if sufficient on-chip memory available. However, installing the emGateway on a separate platform greatly reduces the MCU’s code space requirement. This allows less-expensive M CUs with smaller memory densities to be networked, so it saves cost. (The cost savings rise as the number of M CUs connected to a gateway increases.)

Software development kit

To aid the design of Internet linked embedded systems, emWare sells an H8S/2134-based software development kit (SDK 3.0) on its Web site (www. emware.com). The EM IT, emGateway, and Flash programming software is included with this kit, as is visual café software for browser interface design. The reference board’s H8S/2134 Flash MCU is pre-programmed to be Internet-ready. It can be programmed for code storage while the device is in the system.

To facilitate complete application development, additional standard boards are available at emWare Web site, and custom boards can be stacked on top of the reference board.

HVAC system shows capabilities

An interesting HVAC (Heating, Ventilation and Air Conditioning) control system demonstration unit showcases the user-friendly networked control capabilities that can be achieved by embedded systems. The unit enables lamp brightness and fan speed to be varied directly by turning knobs on a circuit board, or remotely via an Internet-connected PC on which a web browser displays a control panel. This system uses Hitachi’s H 8/3644-based EDK (Evaluation and Development Kit).

Vending machine demonstration

A complex distributed control demonstration system, developed by Hitachi and emWare, explains Internet-based control system design and illustrates the opportunities it makes possible. The real-time remote vending machine monitoring and control system was featured at the Hitachi booths at Embedded Systems Conference trade shows.

At the heart of the real-time monitoring/control system are vending machines (canned drink dispensers) that normally would be in different locations. Each dispenser is controlled by an Internet-ready H8S/2134 MCU.

The drink dispensers are networked via a RS-485 local network. They can also communicate through an IR or wire-
A key point of the demonstration system is that the PC could easily be located hundreds or thousands of miles away from the vending machines. Even so, using a web browser, an operator sitting at that PC can check the machine’s status or vend a can. Updated sales summaries for each machine can be determined remotely in real time, and the data can be presented in formats that are specifically tailored for sales, marketing or purchasing.

In an actual vending machine application, the Internet connectivity could be used to improve service to customers and boost sales efficiency. It would allow just-in-time restocking and provide quicker data on trends in customer demand.

For more information on emWare products, visit: www.emware.com
For more information on H8 series microcontrollers, visit: www.hitachi.com/semiconductor/h8

Dividing the data communication software between the embedded system and the gateway allows 8-bit or 16-bit MCUs with low memory densities to be networked to the Internet.