

# iMCU DESIGN CONTEST

## WIZnet iMCU 2010 Design Contest Winners

The WIZnet iMCU Design Contest 2010 challenged engineers across the globe to incorporate the W7100 Internet MCU ("iMCU") in creative embedded design projects. The W7100 is an Internet MCU integrating a hardwired TCP/IP core with an 8051 processor. It makes an easy-to-

implement platform for applications that require a network connection. By combining the latest hardwired TCP/IP chip with the benefits of the W5100 and 8051 MCU core, the W7100 provides a one-chip solution for all embedded Internet projects. With \$15,000 in cash prizes up for grabs, the competition was fierce, with innovative projects coming in from locations such as the United States, Romania, Australia, India, and Japan. The judges' results are now final. Congratulations to the winners!

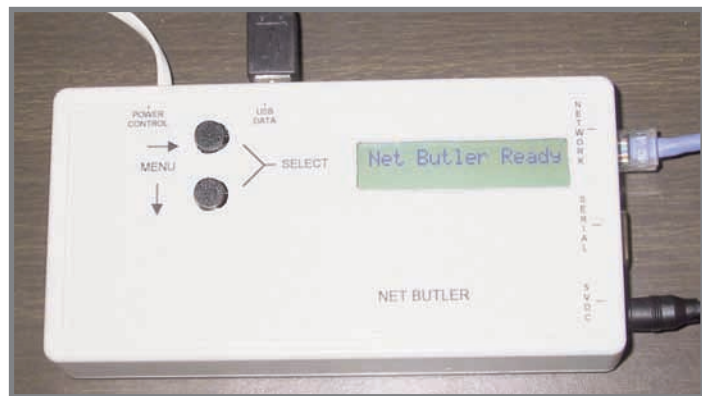
## First Place

**Richard Wotiz**

United States | [dick601@mystics.org](mailto:dick601@mystics.org)

### Net Butler

The innovative Net Butler is a multifunction design used to control, monitor, and automatically maintain a home network. Built around an iMCU7100EVB evaluation board, the design has several functions: it serves as a DNS proxy with a domain name block list and an activity log display; it tracks and reports on connected network devices; it operates as a web server for viewing system activity and configuration settings; it enables you to easily manage a Wi-Fi network via push buttons, a webpage, or a timer; and it downloads and displays up-to-date weather information. Each task can be individually enabled or disabled, and most of them have several configuration settings. The system includes a bootloader for downloading new code over the network, so adding new functions is a straightforward process.



*"My project is a multipurpose device that performs housekeeping tasks for my home network. It's also upgradeable to add new functions as needed. I built it to make maintaining the network more convenient, and to add features that weren't readily available using existing off-the-shelf network products. I used the W7100 as a multipurpose tool to handle many different tasks. Each of its eight sockets handles a different network protocol, so all of its functions can be active simultaneously. The system communicates with the network using the W7100's Ethernet interface, and includes a USB interface module to connect to a printer."—Richard Wotiz*

**WIZnet**

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Visit [www.circuitcellar.com/iMCU/](http://www.circuitcellar.com/iMCU/) for the complete entries.

# Second Place

## A Green Solution to Basement Humidity Control

Humidity control is essential in residential and industrial buildings alike. This handy humidity control system calculates water vapor pressure from temperature and humidity readings. When the design detects that the outside air is drier than the air indoors, it triggers a ventilation system as opposed to a dehumidifier. A W7100 enables a user to monitor and control the moisture removal process via any PC with a standard Web browser. File data is stored on a memory stick so it can be transferred easily to a PC.

**David Penrose**

United States | david.penrose@comcast.net



*“The Green Solution to Basement Humidity Control balances the use of a dehumidifier and an outside air supply to maintain low basement humidity with minimum energy use. The W7100 communicates to I2C remote temperature and humidity sensors to sample the indoor and outdoor conditions. The W7100 has done all the hard work of interfacing to the Web while maintaining the standard features of the 8051 architecture. This allowed me to start in a comfortable development environment and immediately see results.”—David Penrose*



*“The m7100os is a network operating system for the WIZnet W7100 iMCU. It consists of a full operating system with a full RTOS with an unlimited number of tasks, priorities preemption, and a reentrant interface for the TCP/IP stack. The W7100 was designed to ease development. It uses a very well-known 8051 core and a hardwired TCP/IP stack. The m7100os just takes advantage of the existing hardware to provide an easier platform for development.”—Naubert Aparicio*

## m7100os: A Network Operating System

The m7100os is an original network operating system for the W7100. It can run several simultaneous tasks and enhances the W7100 TCP/IP core interface by allowing it to be reentrant, which simplifies programming. For debugging, the operating system also has a kernel-based monitor/debugger that can check on different tasks and their registers, modify memory, and start the program.

**Naubert Aparicio**

United States | naubert.aparicio@usa.net

# Third Place

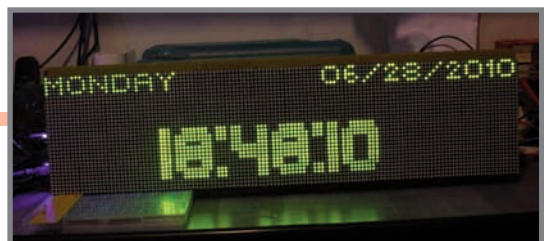
# Fourth Place

## Moonlight Programmable LED Display

The Moonlight project is a creatively designed W7100-based intelligent LED display with network connectivity. It uses a W7100 as a network coprocessor with a 32-bit microcontroller, which runs embedded Lua (or “eLua,” an open-source project based on the Lua programming language). The two CPUs communicate through a powerful yet simple remote procedure call mechanism. The 32-bit CPU sends network requests to the W7100, which then executes them and returns the results.

**Bogdan Marinescu**

Romania | bogdan.marinescu@gmail.com



*“My project is a smart two-processor large LED display (128 × 32), in-field programmable, using the eLua open-source project. I built it because I believe that such a display has a lot of practical applications (an educational platform is the first that comes to mind) and because I wanted to see how much eLua can do in an actual real-world application. Also, it was loads of fun. Having a hardware TCP/IP stack has the obvious advantage of letting one focus on the actual application instead of trying to figure out how the TCP/IP stack in the application is working, or why it isn’t working properly.”—Bogdan Marinescu*

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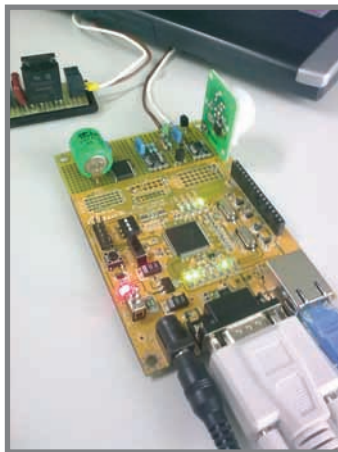
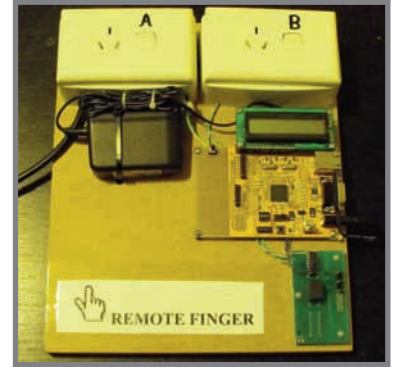
# Honorable Mention

## Remote Finger

The Remote Finger was designed to provide remote access to an embedded device for software development purposes. The W7100-based design provides power control, RS-232 access, and a relay for the likes of a Reset button. Other possible applications for the project include lighting control and advertising signage.

**Clayton Gumbrell**

Australia | clayton@gumbrell.net



## TCP/IP Fuzzy Temperature Controller

This environment-friendly, W7100-based temperature controller uses TCP/IP technology and fuzzy logic to control a room's temperature. A web-based interface is used for device configuration. Two fuzzy control algorithms work to maintain the preselected temperature and consume no more than the preselected power threshold.

**Petru Iulian Stefan**

Romania | spi\_personal@yahoo.com

*"Having many input variables for my controller, I considered the idea of using a fuzzy logic implementation. Each device has its own priority. The priorities change according to the room condition (temperature, human presence, etc). Prior to changing the output, a temperature controller has to check the total power consumption of the other heating systems in the house. All temperature controllers are connected in a TCP/IP network, and each device has a built-in web interface. As you can see, the W7100 fits 100% to my design. It provides the microcontroller itself (fast enough to compute the fuzzy algorithms) with digital inputs, outputs and serial port for the interface with the other pieces of hardware on the board."—Petru Iulian Stefan*

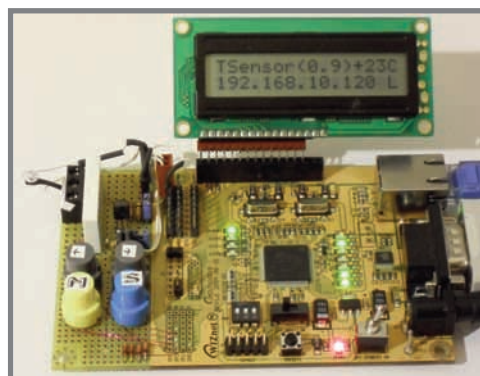
## Ethernet-to-GPIB Interface

The Ethernet-to-GPIB Interface is a smart alternative to purchasing an expensive IEEE-488 card. The W7100-based project enables users to interface a PC to IEEE-488 devices via Ethernet.

**Edwin Sidik and Yanto Suryono**

Japan | edwin.sidik@gmail.com

*"ETGP is a solution for interfacing GPIB (IEEE-488) to Ethernet. The main part is a W7100. The TCP/IP core and 8051-compatible microcontroller are integrated into one chip, making it easy to design the hardware and firmware as well. Plus, the general-purpose I/Os are capable of dealing with TTL input voltage."—Edwin Sidik*



## Remote Temperature Sensor

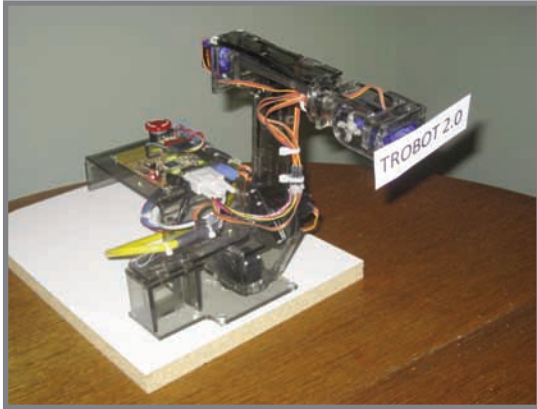
Harnessing the power of a W7100 evaluation board, this extended temperature sensor is used to remotely monitor temperatures. The design supports control outputs for external equipment such as a fan or heater.

**Thomas Rahn**

Germany | rth@zuehlke.com



# Honorable Mention



## TROBOT 2.0

The TROBOT 2.0 is a compact six-axis robot powered by small RC-style servo motors. A W7100 evaluation kit acts as a servo controller interface between the robot and a PC running ABB's Robot Studio.

### Toby Baumgartner

United States | tbaumg@gmail.com

*"The TROBOT 2.0 consists of six small RC-style servos, was assembled from custom laser cut plastic, and is controlled by a W7100 embedded controller. The real power of the system is that it communicates with ABB's Robot Studio software and runs as a virtual Industrial Robot Controller from a PC-based system. The W7100 was a good fit for this project because the Ethernet controller handled the socket messaging between my computer running Robot Studio and the W7100 very well."*—Toby Baumgartner

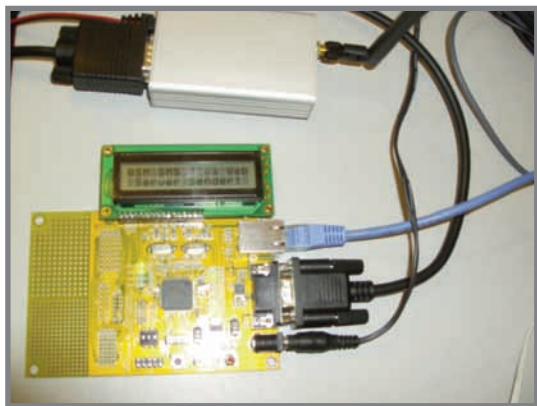
## CDP Finder

The Cisco Discovery Protocol (CDP) Finder connects to a Cisco switch, router, or other device and listens for the Cisco Discovery Protocol. The W7100-based device is used to locate unlabeled and mislabeled connections.

### Robert McCown

United States | robert.mccown@yahoo.com

*"My company needed to identify old unlabeled connections and even some new mislabeled or misplaced cables. One solution was to build something from scratch. I searched for a development board with an Ethernet port, a display, and a processor fast enough to parse the data. The W7100 chip was perfect, and the iMCU prototyping board was everything I needed."*—Robert McCown



## GSM SMS Java Web Server Sender

Sending SMS texts can get expensive. This W7100-based stand-alone Java web server is an affordable solution. Password protection is incorporated for security purposes.

### Anastasios Kanakis

United Kingdom | electronix79@hotmail.com

*"I built this project in order to provide SMS communication for a specific group of users. These users know a password so they can have access. I used a W7100 development board and GSM modem with RS-232 connector. The W7100 works as a web server. It was a perfect choice because it includes everything in one 100-pin chip."*—Anastasios Kanakis

## Lightweight Embedded DHCP Server

The "DHCP lite" is a light-weight embedded DHCP server featuring an iMCU7100 evaluation board and a real-time clock chip. The handy design is meant to be an easy-to-operate system that doesn't require professional configuration and management.

### Perianayagam KS

India | pnyagam@vsnl.net

*"I wanted to use the iMCU to implement a very useful and yet complex application such as a DHCP server. The W7100 is an interesting chip with rich peripherals and built-in TCP/IP Stack and Integrated MAC and PHY. The stack is supported by an elegant memory model. It is enough to implement in any embedded network appliance. One can enjoy developing programs for network applications using this device. I had great fun while writing programs for it."*—Perianayagam KS



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