Quick-Start Guide for RabbitWeatherServer

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Introduction

RabbitWeatherServer is an example program on how to interface a 1-Wire Weather Station to a WiFi-enabled Rabbit 4000 Microcontroller. This example uses the Rabbit RCM4400W Demo board available from Rabbit Semiconductor at http://www.rabbit.com and with minor modifications, will work with any Ethernet-enable RabbitCore 4000 devices.

RWS is designed to interface to weather sensors using the Maxim/Dallas Semiconductor's 1-Wire Bus. The 1-Wire bus provides power and bi-directional communications with 1-Wire devices over a single twisted pair. There are many weather sensors that employ 1-Wire devices. For more information on 1-Wire weather monitoring, visit weathertoys.net

RWS measures the weather conditions once a minute, updates a weather web page, and then posts the data to the Weather Underground. A built-in web server allows viewing the current weather conditions with a standard web browser. Since the Rabbit RCM4400W has built-in WiFi, no direct connection is required to your network. Note: to use the WiFi interface, you'll need WiFi base station (also called an Access Point).

The WiFi interface allows you to have the Rabbit located near your weather station without having to run long lengths of cable. All that's required is power (12 volts at 500ma). This can be supplied using a simple AC adapter (included with the Rabbit dev board), or for more remote applications, a solar-charged 12V battery could be used.

About the Code

The main code is supplied as a C source code file called rws10x.c. This includes the main program loop, weather data collection routines, web server interface, and Weather Underground posting routines.

There are several settings that need to be configured in the code you're your particular setup. Follow the quick-start instruction below. Note that the 1-Wire device serial number are entered a bit differently that most other weather station programs. You'll enter the serial number byte-by-byte starting with the family first and the checksum last, such as:

```
const char tempSN[8] = {0x10, 0xB9, 0x27, 0x09, 0x00, 0x08, 0x00, 0x26};
```

Included in the download is the Rabbit 1-Wire library, RabbitOW.lib. This library provides a full set of 1-Wire functions based on the Dallas/Maxim Public Domain 1-Wire C Library (without

support for EEPROM programming). A small routine unique for each 1-Wire device is all that's required for full 1-wire support. Code for the standard weather station devices (DS2438, DS18s20, DS2450, and DS2423) is included in the OWDevices.lib library file. Additional devices can be added using the examples provided in Dallas/Maxim's 1-Wire Public Domain Kit at http://www.maxim-ic.com/products/ibutton/software/1wire/wirekit.cfm

Connecting your 1-Wire Weather Station

RWS requires a DS9097U serial to 1-Wire adapter to interface your 1-Wire sensors to the Rabbit. The code assumes that you are using the serial connector supplied with the demo board. This uses the Rabbit's serial port D for communication and serial port C for handshaking. Since the DS9097U 1-Wire to serial adapter uses the handshaking lines for power, serial port C is not used for handshaking and is "turned on" in the code to supply power the DS9097U. If you want to use a serial port other than D, you'll have to edit the serial comm routines in RabbitOW.lib.

The cable supplied with the demo board is a female DB-9, and the DS9097U is also female, so a male-to-male null-modem adaptor is required. You can also build your own cable with a male DB-9.

Bug Note: In the following instructions, OWSearch.c is used to gather your 1-Wire device serial numbers. This code is still in work and is somewhat unreliable. If it doesn't work for you, use one of the available 1-Wire Search utilities for the PC or Mac, or try using the OneWireViewer available on the Dallas/Maxim web site at http://www.maxim-ic.com/products/ibutton/software/1wire/OneWireViewer.cfm

A discussion forum for RWS is available at http://weathertoys.net/forum. You can share your suggestions, applications, as well as issues you encounter with other users.

Standard Disclaimer: This code is provided "as-is" and is meant as example code only. It has been tested in a limited fashion with a standard-configuration WS-1 wind instrument, Humidity Sensor, a DS-2438 based Pressure Sensor, an a rain counter. Always exercise caution when working outdoors with weather station equipment as ESD may build up and damage your electronics. Always make sure your 1-Wire bus is properly connected to earth ground. Never work around weather station equipment during a thunderstorm. For grounding suggestions and surge protection designs, refer to the Weather Toys book. More info can be found at http://weathertoys.net

Quick-Start Instructions

. 1) Before starting, make sure you have Dynamic C installed and properly configured, including the serial port. RWS works with DC 10.11 or higher. The remaining instructions assume version 10.21.

. 2) Check that you have set the Rabbit's clock. Rabbit provides several example files for setting the clock.

0. 3) Connect your 1-Wire Weather Station to the Rabbit. Refer to the section above that discusses the options.

0. 4) Copy RWS10x.zip to your hard drive and extract files.

0. 5) Copy the files in the OWLib Directory to your Dynamic C library directory. If you are using a standard DC 10.21 install, it is located at `C:\DCRABBIT_10.21\Lib\Rabbit4000` Note: adavanced users may choose to create a library directory file. Add the path to your standard libraries along with the path to the OWLib directory.

0. 6) Launch Dynamic C. Close any files that open automatically.

0. 7) Select Options -> Project Options from the menu bar.

0. 8) Click the Compiler Tab.

0. 9) Select Code and BIOS in Flash, Run in Ram

0. 10) Select Enable separate data & instruction space

0. 11) Select Optimize For: Size

0. 12) Click OK to close the Project Option dialog.

0. 13) Open OWSearch.c

0. 14) Click Run (F9)

0. 15) OWSearch will search the 1-Wire bus for all devices and display the serial numbers in a format that can be copied and pasted directly into RWS.

```
Searching 1-Wire Bus...
Found Device(s)
0x10, 0xB9, 0x27, 0x09, 0x00, 0x08, 0x00, 0x26, DS1920/DS18S20 Temperature Sensor
0x26, 0x7D, 0xE3, 0x9D, 0x00, 0x00, 0x00, 0x5B, DS2438 Smart Battery Monitor
0x09, 0x64, 0x0A, 0xB0, 0x01, 0x00, 0x00, 0x54, DS1982/DS2502 Add-Only Memory iButton
 3 devices found
```

0. 16) Open the rws10x.c file

0. 17) Edit the device serial numbers for your weather station.

0. 18) Edit #define _WIFI_SSID "RabbitNet"for your WiFi net name (a.k.a SSID)

0. 19) Edit #define _PRIMARY_STATIC_IP "192.168.1.111"for the IP Address for your Rabbit. Note: You can use DHCP by changing #define TCPCONFIG 1to #define TCPCONFIG 5, but you'll still need to know the IP Address to access RWS from a web browser.

0. 20) Edit the remaining network #defines for your network.

0. 21) Edit the Weather Underground constants for you account and time zone.

0. 22) Change the #define DEBUG_MODE to 1 for the initial checkout. Once things are working OK, set this back to 0 to disable all diagnostic output.

0. 23) Click Run (F9)

0. 24) Watch the STDIO window for any errors. Within several seconds, the DS2 LED on the demo board should begin to blink at about a 1-second rate to indicate RWS is running. The green WiFi Link LED should turn on after several seconds to indicate that the Rabbit has connected to your WiFi network. If not, verify your network ID and IP Address in steps 20 through 22.

0. 25) Wait approximately 1 minute for RWS to read the sensors. Then open your web browser and enter the Rabbit's IP address, such as http://192.168.1.111/ . If all went well, you should see a simple web page with the weather displayed.

0. 26) To customize the web page, open the file Formatted Weather.html in the pages directory. Using your favorite web page or text editor (or open it in the Dynamic C editor), change the title and weather underground URL. Feel free to make other customizations.

0. 27) Save the file. To minimize the file size (since it will be stored on the Rabbit), remove all leading spaces or tabs. This is easy using the Dynamic C editor, just select all text and press shift-Tab repeatedly until all indention is removed. Now save the file as weather.shmtl, replacing the existing one.

0. 28) Have Fun!! All source code and files have been included, so you can customize this software to fit your needs.

Debugging Notes: Most likely you'll find some bugs in this software. Dynamic C 10.11 supports logging errors to the battery-backed RAM. When running without the programming cable connected, if RWS crashes an error will be logged and RWS rebooted. You can use the supplied Rabbit code DisplayErrorLog.c to view the stored errors. Refer to the Dynamic C user's manual for more info.