ZIG

Easy Internet for Objects

Rob Faludi
www.faludi.com

Rob Faludi

- ITP
- SVA
- Network Objects
- Sociable Objects
- Things that talk to other things

What’s ZIG?

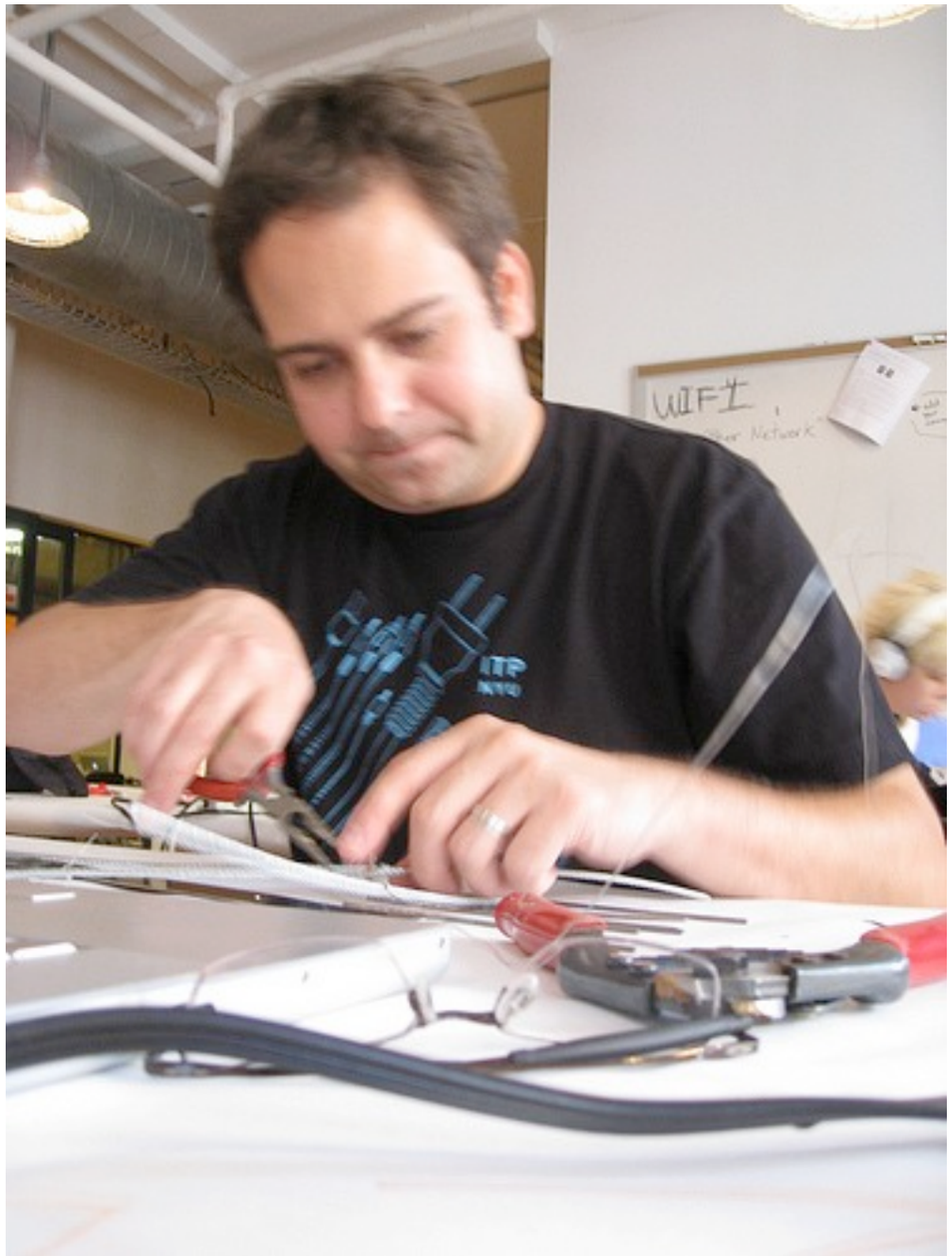
ZigBee Internet Gateway


Maxstream
XBee
Series 2
www.maxstream.net

ZIG Collaborators

ZIG Collaborators: T3dbot

ZIG Collaborators: Corey Menscher



ZIG Collaborators: Jordan Husney

ZIG Collaborators: Liz Arum

Before ZIG

- Wired Ethernet
- WiFi with SSID, WEP, WPA, keys and passwords
- MAC addresses
- Ports
- HTTP protocol with GET
- Computer with screen savers, sleep mode, software updates

With ZIG

- One radio
- Zero hexadecimals
- No security keys
- Vanilla URLs

Before ZIG

Send:

```
GET /path/file.html HTTP/1.1
Host: www.host1.com:80
User-Agent: HTTPTool/1.0
<CR><LF>
```

Receive:

```
HTTP/1.0 200 OK
Date: Tue, 8 Jun 2010 12:01:35 GMT
Content-Type: text/html
Content-Length: 1354

<html>
<body>
<h1>Happy Birthday Tim!</h1>
<p>Thanks for inventing all this stuff...
</body>
</html>
```

After ZIG

- Send:
  http://twansform.appspot.com/usweekly/text/1

- Receive:
  “Lindsay Lohan cried as she arrived to jail, but the inmates cheered her on”

Reasons for ZIG

- simple
- wireless
- shared
- single radio: inexpensive
- low power
- endlessly flexible

ZIG Demo

http://faludi.com/zig/twitter_reader/Twitter_Reader.html

http://faludi.com/zig/twitter_reader/Twitter_Reader.html

How To ZIG

The Setup


POWER
ASSOC
Digi
ConnectPort X2
ETHERNET


ConnectPort WAN
Digi


CATEGORY 6 UTP PATCH CABLE

xig

XBee Internet Gateway for the Digi ConnectPort

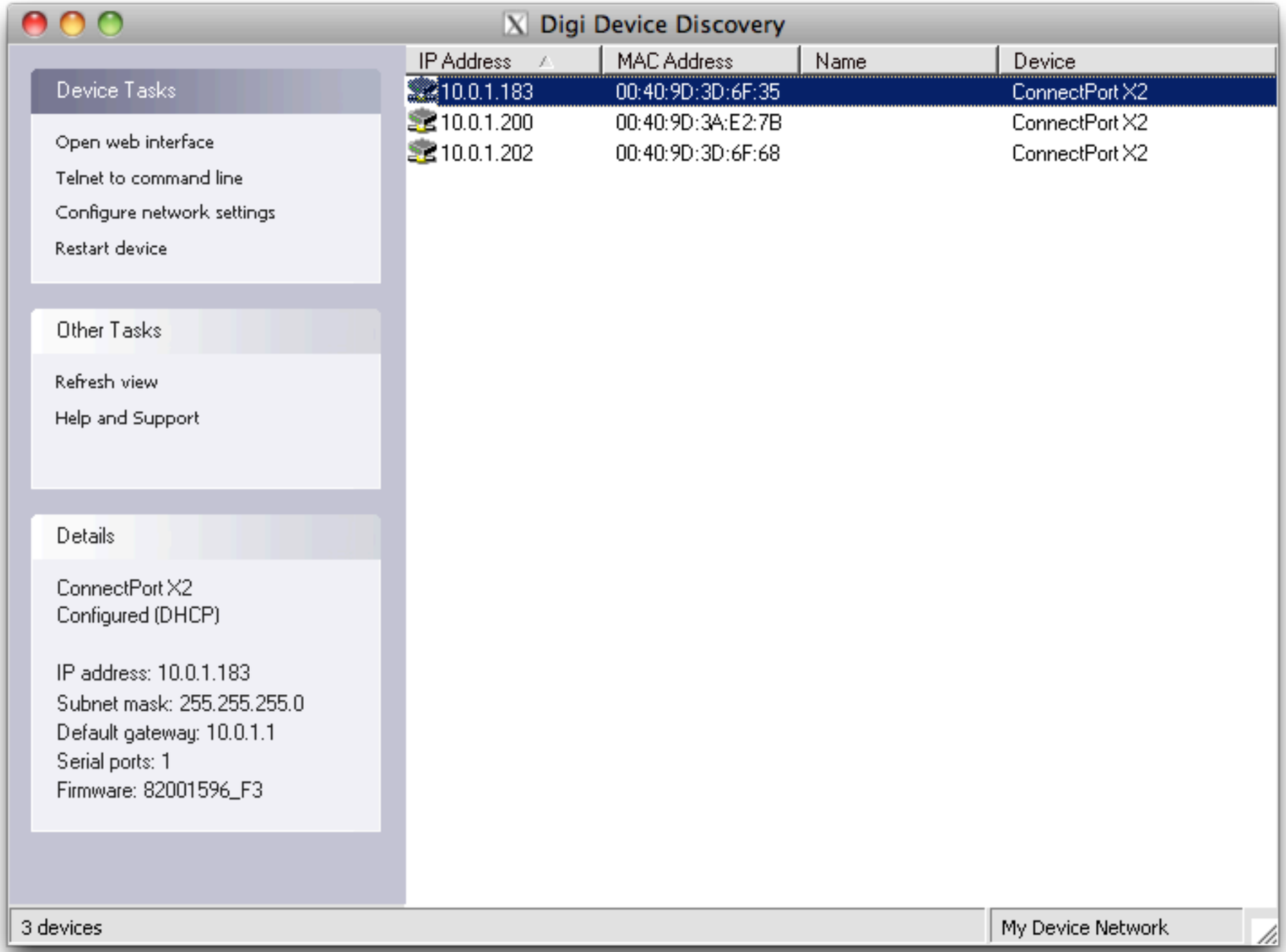
Project Home | Downloads | Wiki | Issues | Source | Administer

Checkout | **Browse** | Changes | Search Trunk | Request code review

Source path: svn/ trunk/ zig.py

```
1  NAME = 'ZigBee Internet Gateway (zig)'
2  VERSION = '1.00a35'
3  TIMEOUT = 0                          # default length of time (s) before main loop automat
4  SLEEP_DUR = 0.00                     # sleep delay
5  TERMINATOR = "\r"                    # command terminator byte
6  QUIT_CODE = "^"
7  CLEAR_CODE = "`"                     # manually clear your request buffer
8
9  print NAME + ' v' + VERSION
10 print 'Unzipping and loading modules...'
11
12 import sys, time, os
13 from socket import *
14 from select import *
15
16 APP_ARCHIVE = "WEB/python/zig_library.zip"
17 sys.path.insert(0, APP_ARCHIVE)
18 sys.path.insert(0, os.path.join(APP_ARCHIVE, "lib"))
19
20 import urllib, digicli
21 print '  ...done.'
22
23 stopTime = 0
24
```

http://code.google.com/p/xig/


Digi Device Discovery
Device Tasks
Open web interface
Telnet to command line
Configure network settings
Restart device
Other Tasks
Refresh view
Help and Support
Details
ConnectPort X2
Configured (DHCP)
IP address: 10.0.1.183
Subnet mask: 255.255.255.0
Default gateway: 10.0.1.1
Serial ports: 1
Firmware: 82001596_F3
IP Address
MAC Address
Name
Device
10.0.1.183
00:40:9D:3D:6F:35
ConnectPort X2
10.0.1.200
00:40:9D:3A:E2:7B
ConnectPort X2
10.0.1.202
00:40:9D:3D:6F:68
ConnectPort X2
3 devices
My Device Network

ConnectPort X2 Configuration and Management

http://10.0.1.183/home.htm

Google

ConnectPort X2 Configuration and Management

Help

- Home

Configuration
- Network
- XBee Network
- System
- Remote Management
- Security

Applications
- Python

Management
- Connections
- Event Logging

Administration
- File Management
- Backup/Restore
- Update Firmware
- Factory Default Settings
- System Information
- Reboot

Logout

Home

Getting Started

Tutorial Not sure what to do next? This Tutorial can help.

System Summary

Model:	ConnectPort X2
Ethernet MAC Address:	00:40:9D:3D:6F:35
Ethernet IP Address:	10.0.1.183
Description:	None
Contact:	None
Location:	None
Device ID:	00000000-00000000-00409DFF-FF3D6F35

ConnectPort X2 Configuration and Management

http://10.0.1.183/config/applications/python_files.htm

Google

ConnectPort X2 Configuration and Management

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Python Configuration

Python Files

Upload Files

Upload Python programs

Upload File: Choose File no file selected

Upload

Manage Files

Action	File Name	Size
☐	zigbee.py	1147 bytes
☐	python.zip	144321 bytes
☐	zig_library.zip	239511 bytes
☐	zig.py	7657 bytes

Delete

Auto-start Settings

ConnectPort X2 Configuration and Management

http://10.0.1.183/config/applications/python_autostart_config.htm

Google

ConnectPort X2 Configuration and Management

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Python Configuration

▸ Python Files

▾ **Auto-start Settings**

Specify python programs to be run when the device boots.

Enable	Auto-start command line *(specify program filename to execute and any arguments)*
☑	zig.py
☐	
☐	
☐	

Apply Cancel

Friday, July 23, 2010

ConnectPort X2 Configuration and Management

http://10.0.1.183/config/mesh/mesh_zigbee_config_table.htm

Google

ConnectPort X2 Configuration and Management

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XBee Configuration

Network View of the XBee Devices

Node ID	Network Address	Extended Address	Node Type	Product Type
	[0000]!	00:13:a2:00:40:5c:82:56!	coordinator	X2 Gateway

☑ Clear list before performing refresh

Refresh

▸ Firmware Update Setup

▸ Firmware Update Status

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ConnectPort X2 Configuration and Management

http://10.0.1.183/config/mesh/mesh_zigbee_config.htm?1

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ConnectPort X2 Configuration and Management

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XBee Configuration

Return to Network View ← Previous Next →

Extended Address: 00:13:a2:00:40:5c:82:56!
Product Type: X2 Gateway
Firmware Version: 0x2164

Basic Settings

Basic Radio Settings

Extended PAN ID (ID):	x000000000000AAAA	8 hex bytes
	Setting to 0 allows a random extended PAN ID to be used.	
Node Identifier (NI):		
Discover Timeout (NT):	60	tenths of second (1-255)
Scan Channels (SC):	0x1ffe	hex (0xffff=all channels)
Scan Duration (SD):	3	(0-7)

Advanced Radio Settings

Allows Join Time (NJ):	255	seconds (0-255. 255=always)
Broadcast Hops (BH):	0	(0-30, 0=maximum)

Apply Cancel

Advanced Settings

Device Operations

ConnectPort X2 Configuration and Management

http://10.0.1.183/admin/reboot.htm

Google

ConnectPort X2 Configuration and Management

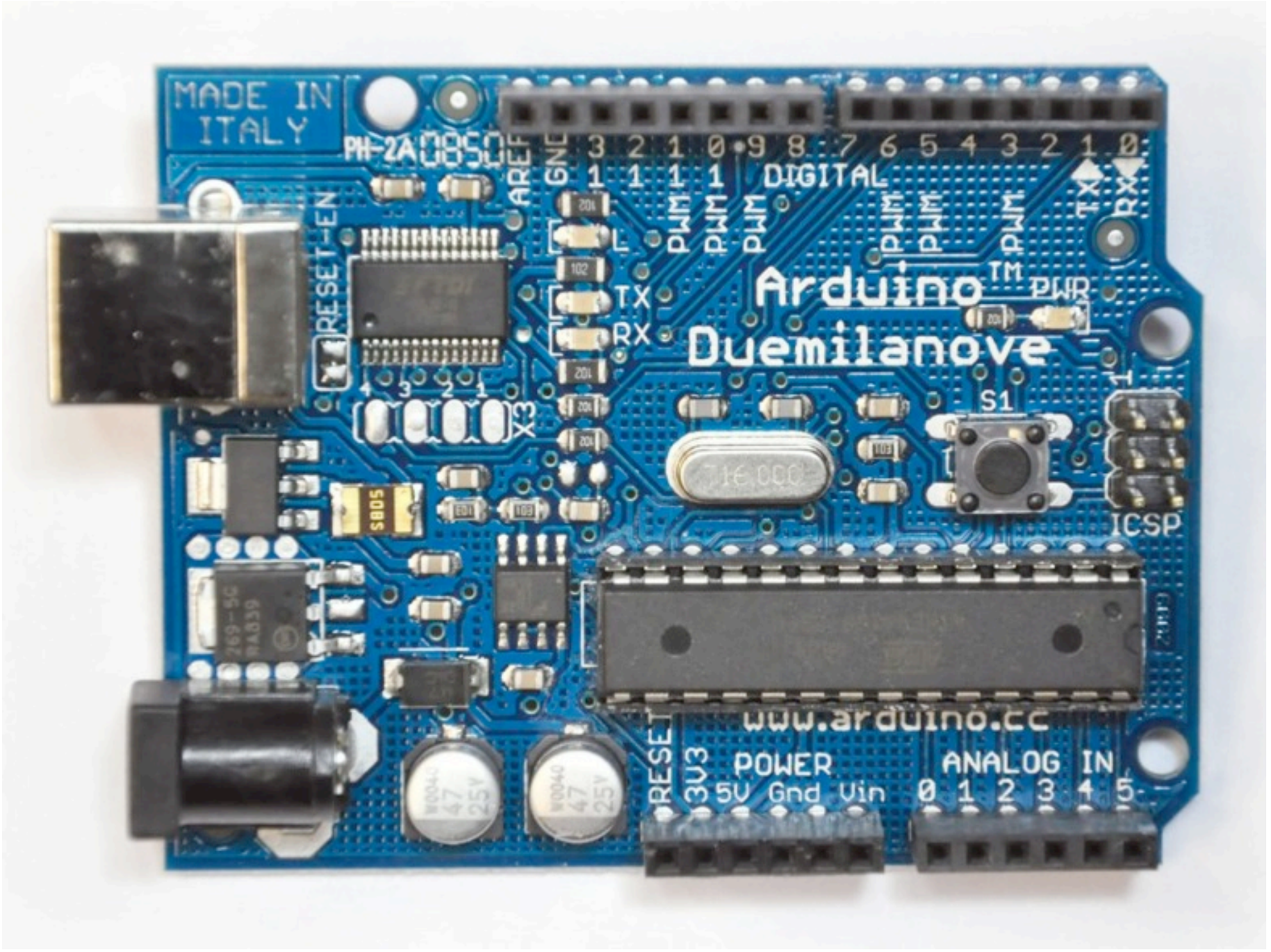
Help

Reboot

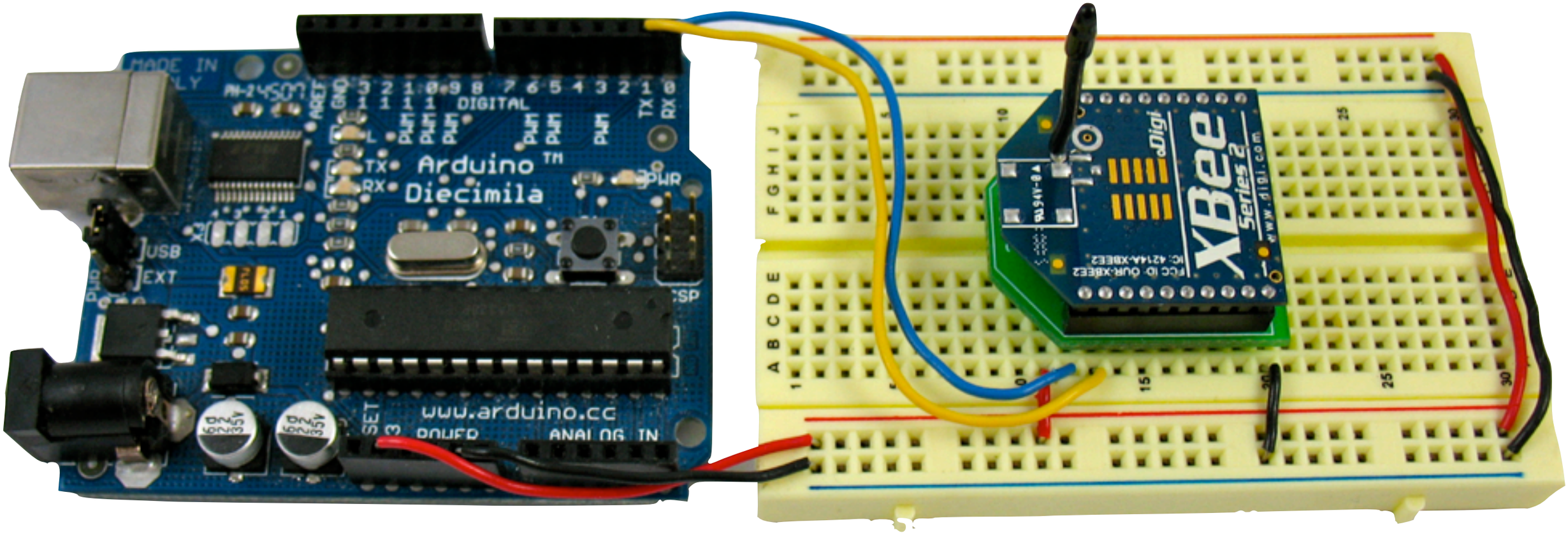
The reboot process will take approximately 1 minute to complete. Click Reboot now to reboot the ConnectPort X2.

Reboot

Use


MADE IN ITALY
PH-2A08050
RESET-EN
AREF GND 13 12 11 10 9 8 7 6 5 4 3 2 1 0
DIGITAL (PWM~)
TX
RX
L
Arduino
Duemilanove
PWR
S1
ICSP
16 000
SB05
www.arduino.cc
POWER
RESET
3V3 5V Gnd Vin
ANALOG IN
0 1 2 3 4 5


Maxstream
XBee
Series 2
www.maxstream.net


Arduino ™
Diecimila
www.arduino.cc
XBee
Series 2
www.digi.com

Preparing for the Gateway

- Switch the PAN to AAAA: ATID AAAA
- Set radio to 115200 baud: ATBD 7
- Set the destination address to zero: ATDH 0 and ATDL 0

Send a request

```
Serial.println(“http://faludi.com/test.html”);
```

Read a response

- ```
  if (Serial.available()) {
    char inChar = Serial.read();
    debug.print ( inChar );
  }
  ```
  ```

Using the Gateway

- currently supported URL formats (items in [] are optional):

```
http://host/path[:port]
https://host/path[:port]
ftp://[username:password@]host/path[:port]
```

- sending help will get the current help file from the gateway

- baud rates lower than 115200 will work if the results you're getting are brief

- error messages are displayed raw for now. You can ignore the specifics which are solely for development debugging

Seek a character

```
if (Serial.available() > 0) {
   if (Serial.read() == ‘p’) {

    //do something

   }
}
```

Send a value

```
Serial.println(“http://faludi.com/testpage.php?value=137”);
```

Read an ASCII decimal value

```
if (Serial.available() >= 3) {

   position1 = Serial.read() - 48;

   position2 = Serial.read() - 48;

   postion3 = Serial.read() - 48;

   value = position1 *100 + position2 * 10 + position3

}

// using a buffer would be more sophisticated
```

Read a phrase

```
char buffer[128], result[128];
int count = 0;


if (Serial.available() > 0) {


   buffer[count] = Serial.read();
   count++;
   if (buffer[count] == ‘\r’) {
         strcopy(result, buffer);
         count = 0;


}
```

// additional code would be added to make this into something interesting

Easy PHP

zig_download_example.php

- Simple file that produces a numeric value for download
  http://faludi.com/zig/zig_download_example.php

```
<?php
   $value = "8";
   echo $value;
?>
```

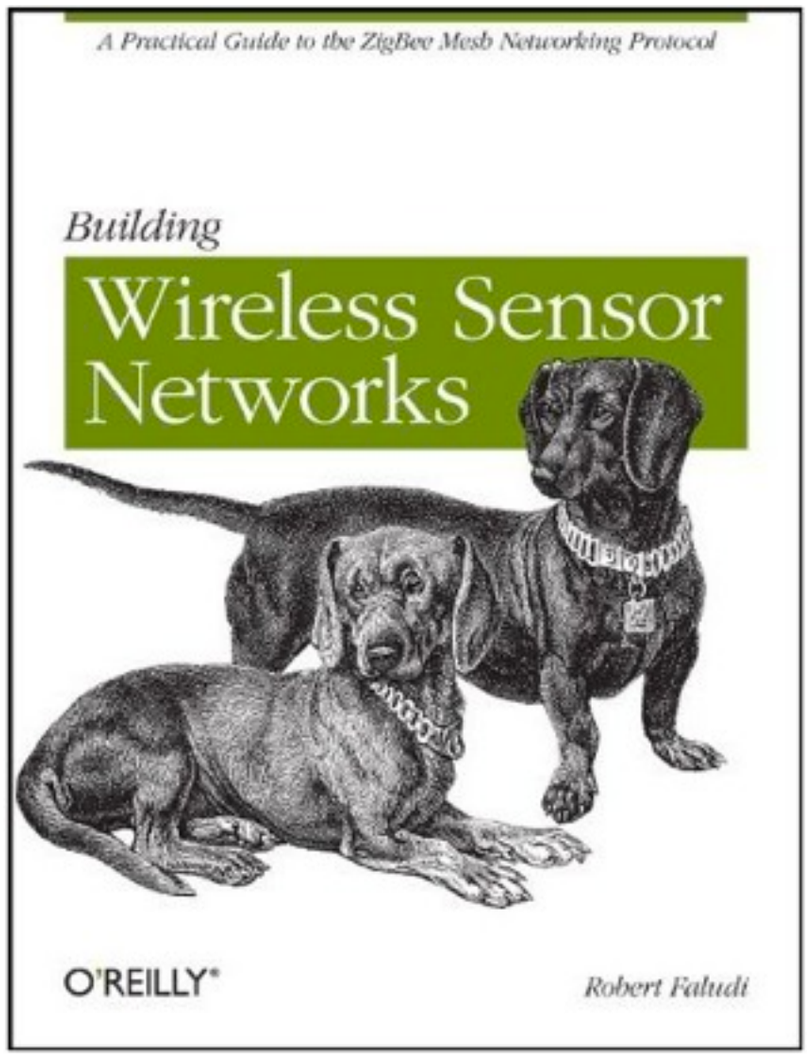
zig_upload_example.php

- Simple file that records a data upload
  http://faludi.com/zig/zig_upload_example.php?value=43

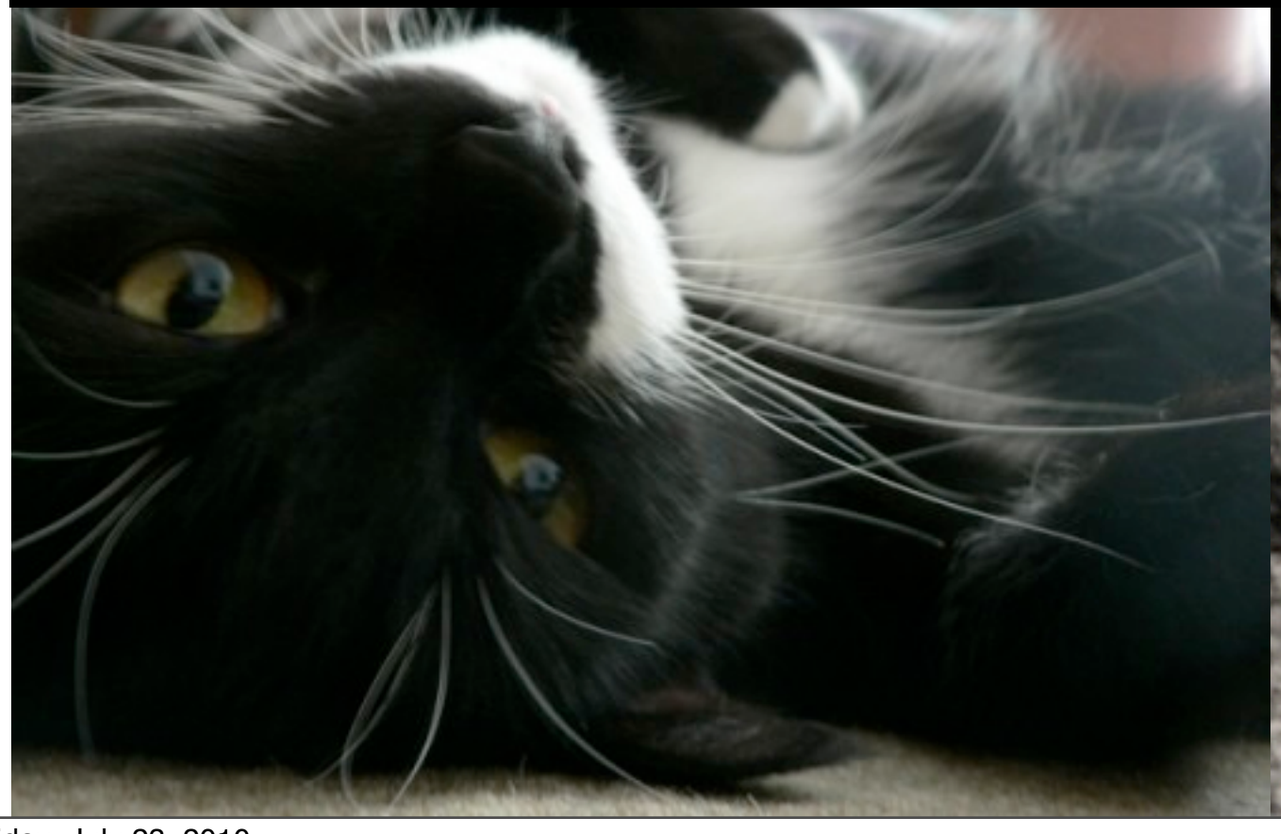
```
<?php
  $value = $_GET['value'];
  $myFile = "dataFile.txt";
  $fh = fopen($myFile, 'a') or die("can't open file");
  fwrite($fh, $value);
  fwrite($fh, "\n");
  fclose($fh);
?>
```

ZIG Future

- software development
- documentation development
- book example



Thanks



ZigBee Internet Gateway

Rob Faludi
www.faludi.com