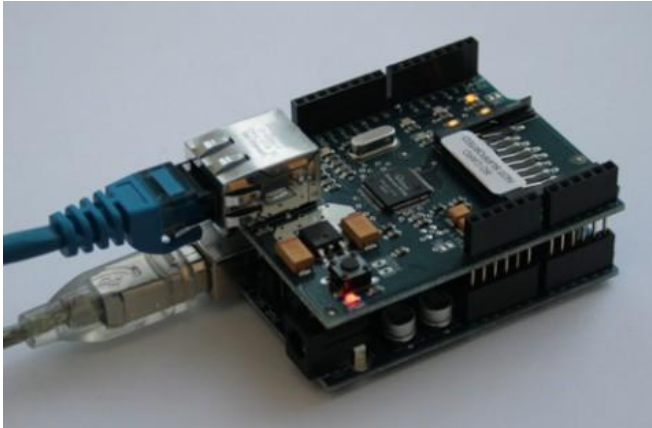


Building an Arduino based 'OpenToriLink' for Current Cost and makeHistori

1) Purchase Arduino boards



1 x Ethernet Shield

1 x Arduino Duemilanove (Updated 328 Version) *(Note you will also need a USB printer style cable for programming the board from your computer)*

The boards can be purchased in the United States:

<http://www.robotshop.us/arduino-ethernet-shield-2.html>

and <http://www.robotshop.us/arduino-usb-microcontroller-board-1-2.html>

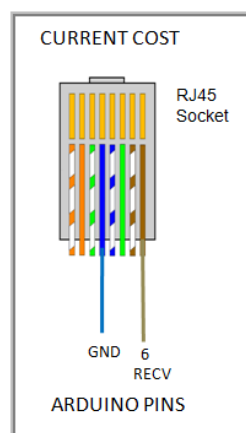
\$45 + \$30 = \$75

In the United Kingdom

<https://www.coolcomponents.co.uk/>

£29 + £20.58 = £49.58

2) Buy an Ethernet Socket and wire it to the Arduino so that you can connect it to your Current Cost



3) Download the Arduino ide programmer from here

<http://arduino.cc/en/Main/Software> Extract it from the zip/archive and install it.

4) Download the NewSoftSerial driver library for Arduino from here

<http://arduiniana.org/libraries/NewSoftSerial/> (search the page for 'download')

Copy the extracted files to your arduino-??\hardware\libraries folder

5) Download our Arduino OpenToriLink code from here

http://www.makehistori.net/ccOpenToriLinkv1_2.zip

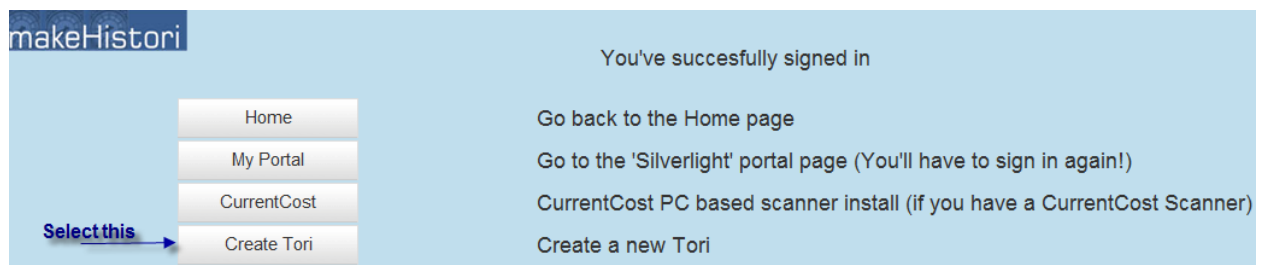
Place the downloaded file CCOpenToriLinkV1_0 .pde file into a new folder with the same name CCOpenToriLinkV1_0 This is where the Arduino ide programmer likes to find it.

6) Sign Up for a makeHistori account and then Sign In to your account

<http://www.makehistori.net/mhilogin.htm> Also use this url after you have accepted your account signup



7) After you Sign In from the page in step 6, then select Create Tori, (a tori is a data store for you values)



8) Fill in the Create Tori form

makeHistori
create a new tori here!

See the forum or help PDFs for details

Tori Name This is the tori name

Description A short note about this tori

Tori Type Text Numeric Power What type of data will it store

Visibility Can everyone see this tori?

UOM Units of measure

Range Low Low range (Charts)

Range High High Range (Charts)

Currency Currency symbol

Rate Charge rate per KWattHour

If successfully created you will see the Tori's ID. Note it down you will need it for the Arduino code

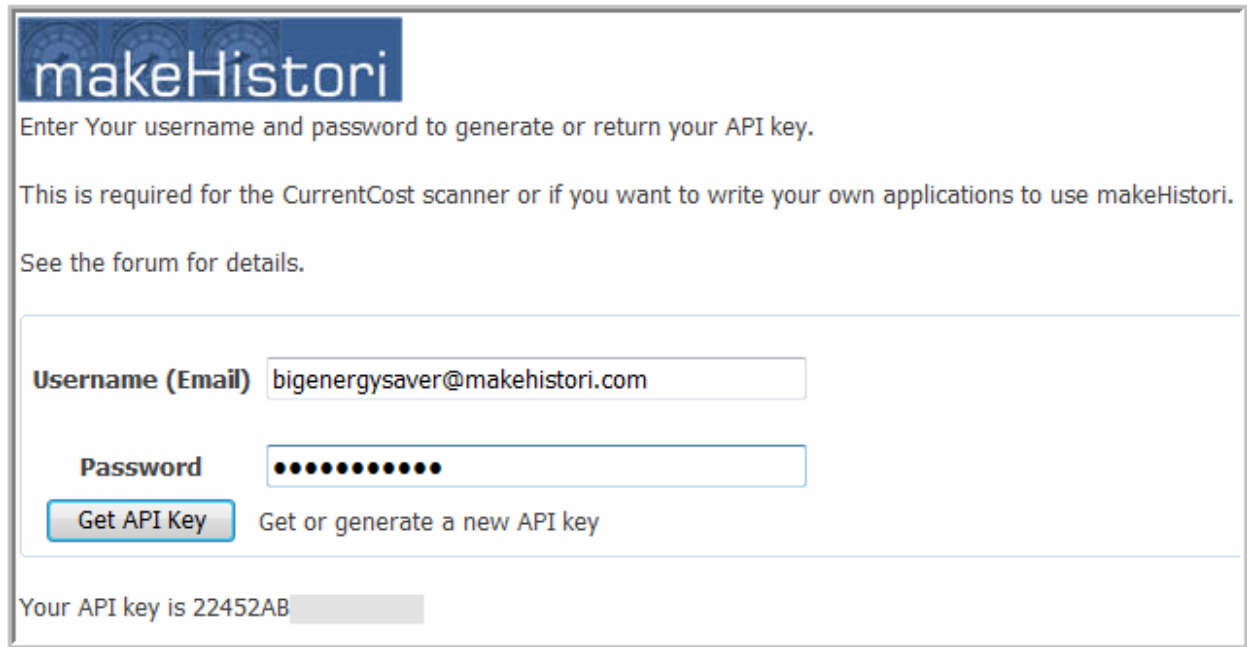
New tori has an id of 2613 ← **Note this ID for later**

Tori Name This is the tori name

Description A short note about this tori

Note although we are showing the creation of a special Power type Tori here, you could create a Numeric Tori for storing any type of signal that your Arduino project is generating. A Power Tori is unique in that it automatically calculates statistics such as kwatt-hours and the cost of your energy usage.

9) Go back to the makeHistori Home page and then select Get API Key to return your security key



The screenshot shows the 'makeHistori' website interface. At the top left is the 'makeHistori' logo. Below it, the text reads: 'Enter Your username and password to generate or return your API key.' This is followed by: 'This is required for the CurrentCost scanner or if you want to write your own applications to use makeHistori. See the forum for details.' The main form area contains two input fields: 'Username (Email)' with the value 'bigenergysaver@makehistori.com' and 'Password' with masked characters. A 'Get API Key' button is positioned below the password field. To the right of the button, the text says 'Get or generate a new API key'. At the bottom of the form, it displays 'Your API key is 22452AB' followed by a greyed-out box.

Make a note of your API Key as you will need it for the Arduino code.

10) Run the Arduino ide programmer and open the CCOpenToriLinkV1_0 code you downloaded and modify settings

Add your:

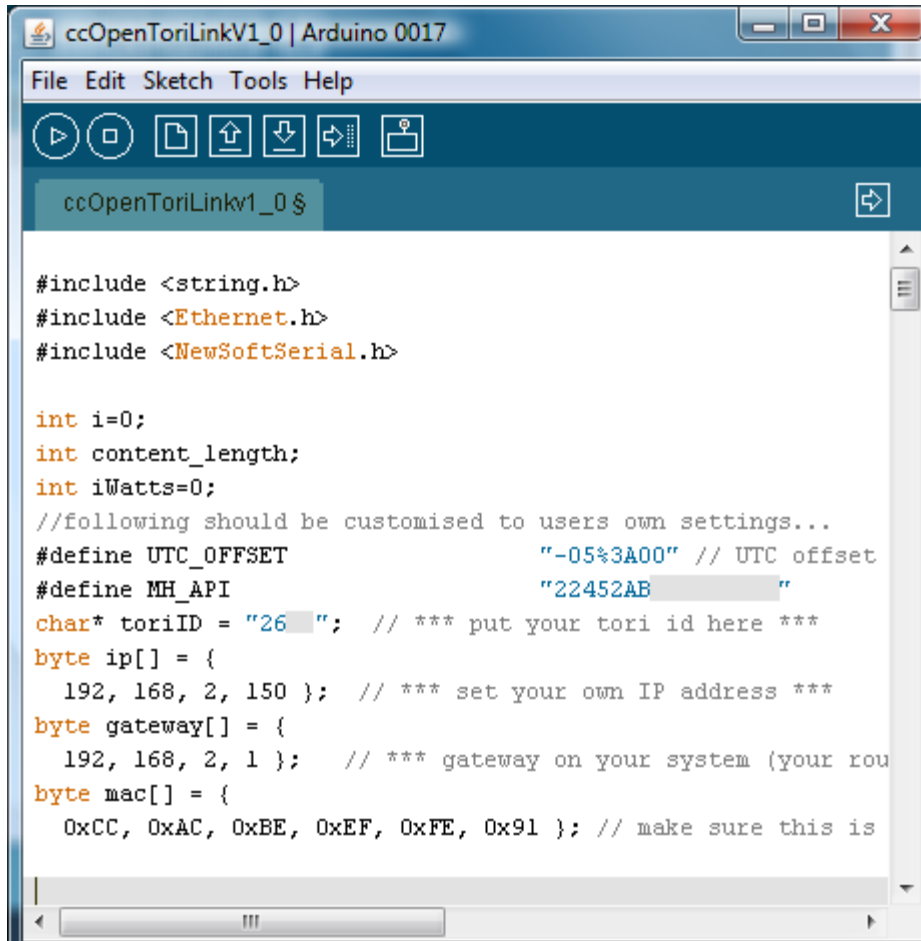
Api Key

Tori ID

Give your ToriLink an **IP address** valid on your local network

Put in your **Gateway's IP Address**

Modify the **UTC_OFFSET** for your local offset from GMT time



```
ccOpenToriLinkV1_0 | Arduino 0017
File Edit Sketch Tools Help
ccOpenToriLinkV1_0 $
#include <string.h>
#include <Ethernet.h>
#include <NewSoftSerial.h>

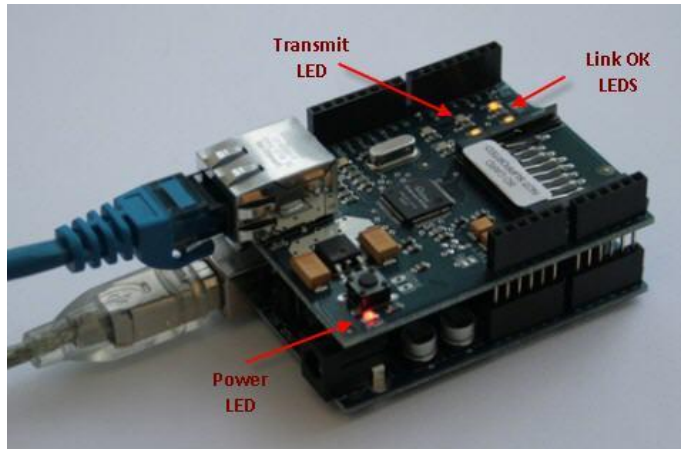
int i=0;
int content_length;
int iWatts=0;
//following should be customised to users own settings...
#define UTC_OFFSET          "-05%3A00" // UTC offset
#define MH_API              "22452AB"
char* toriID = "26"; // *** put your tori id here ***
byte ip[] = {
  192, 168, 2, 150 }; // *** set your own IP address ***
byte gateway[] = {
  192, 168, 2, 1 }; // *** gateway on your system (your rou
byte mac[] = {
  0xCC, 0xAC, 0xBE, 0xEF, 0xFE, 0x91 }; // make sure this is
```

11) Compile, then upload to the Arduino boards via the usb port and cable

12) Connect the board to your Current Cost and your router and start collecting data!

Note on some Arduino boards we have found that you may have to press the manual reset button on the board to get everything working once everything is connected.

Note to check that the board is functioning correctly then examine the LEDs on the board. The yellow Power LED will be lit and there should be a group of 3 other yellow LEDs which are always on to show successful communications. Occasionally the Transmit LED flickers to green as data is sent to the Web.



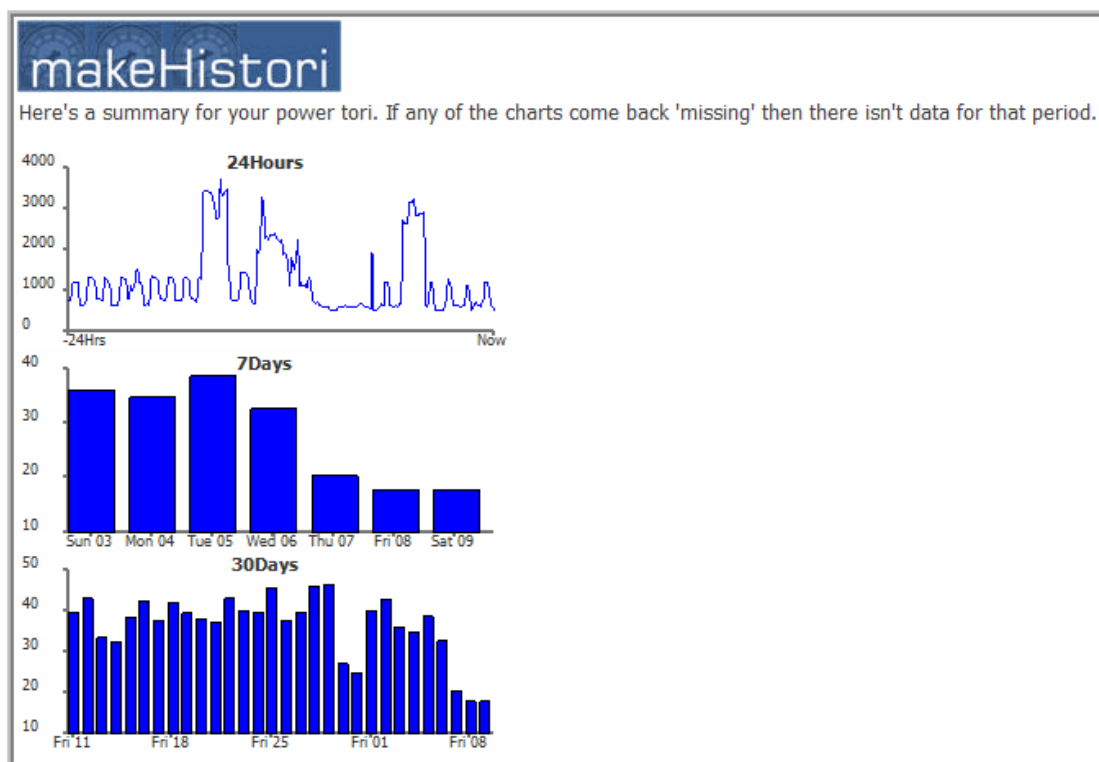
13) Check that the data is being stored into makeHistori

For non Silverlight users you can simply use the following url to display a page of your data

<http://www.makehistori.net/mhitoripower.aspx?tori=>

For instance:

<http://www.makehistori.net/mhitoripower.aspx?tori=2383> Use page refresh to update the data



You can also use the makehistori API commands to return data programmatically or through simple urls:

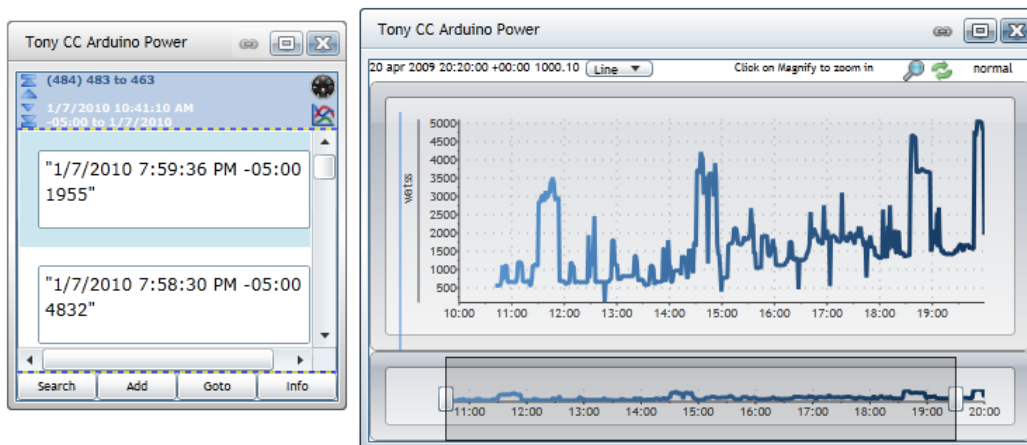
www.makehistori.net/tori/2383?count=-1000

Replace 2383 with your tori id

```
<?xml version="1.0" encoding="utf-8" ?>
- <Tori>
  - <Entries>
    <Entries Start="2010-01-11T11:16:21-05:00" Text="525" />
    <Entries Start="2010-01-11T11:15:34-05:00" Text="534" />
    <Entries Start="2010-01-11T11:14:46-05:00" Text="615" />
    <Entries Start="2010-01-11T11:13:58-05:00" Text="616" />
    <Entries Start="2010-01-11T11:13:10-05:00" Text="620" />
    <Entries Start="2010-01-11T11:12:22-05:00" Text="617" />
    <Entries Start="2010-01-11T11:10:46-05:00" Text="1078" />
    <Entries Start="2010-01-11T11:09:58-05:00" Text="1074" />
    <Entries Start="2010-01-11T11:09:09-05:00" Text="1199" />
    <Entries Start="2010-01-11T11:07:27-05:00" Text="1199" />
    <Entries Start="2010-01-11T11:06:39-05:00" Text="1213" />
    <Entries Start="2010-01-11T11:05:51-05:00" Text="1215" />
    <Entries Start="2010-01-11T11:05:02-05:00" Text="719" />
    <Entries Start="2010-01-11T11:04:14-05:00" Text="768" />
    <Entries Start="2010-01-11T11:03:26-05:00" Text="620" />
    <Entries Start="2010-01-11T11:02:38-05:00" Text="617" />
```

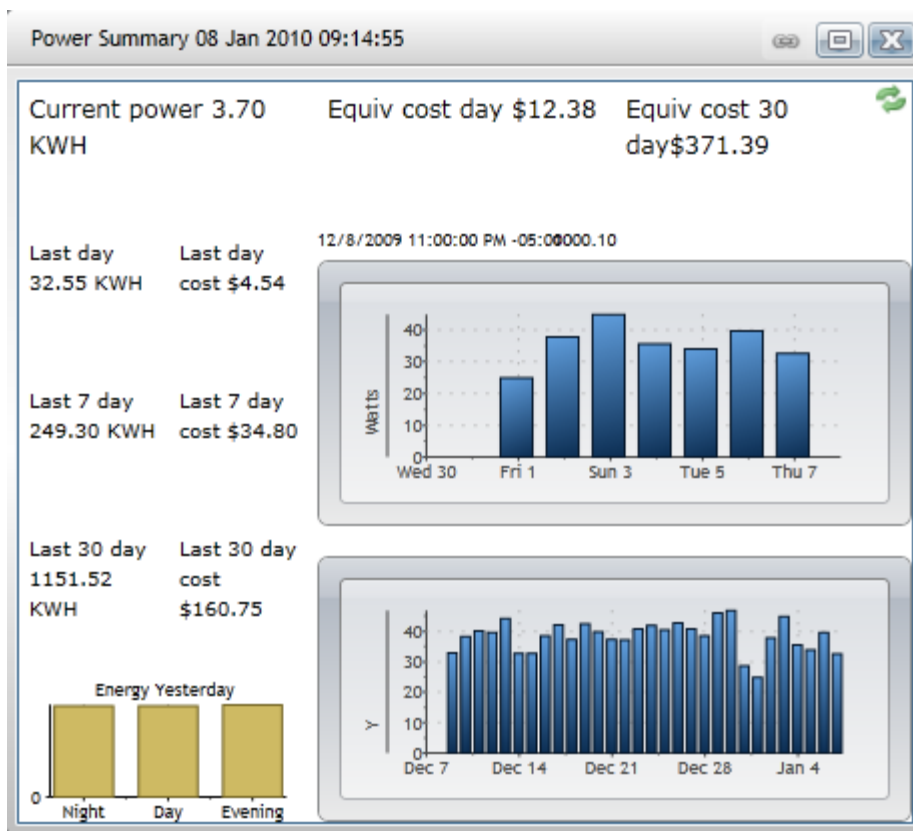
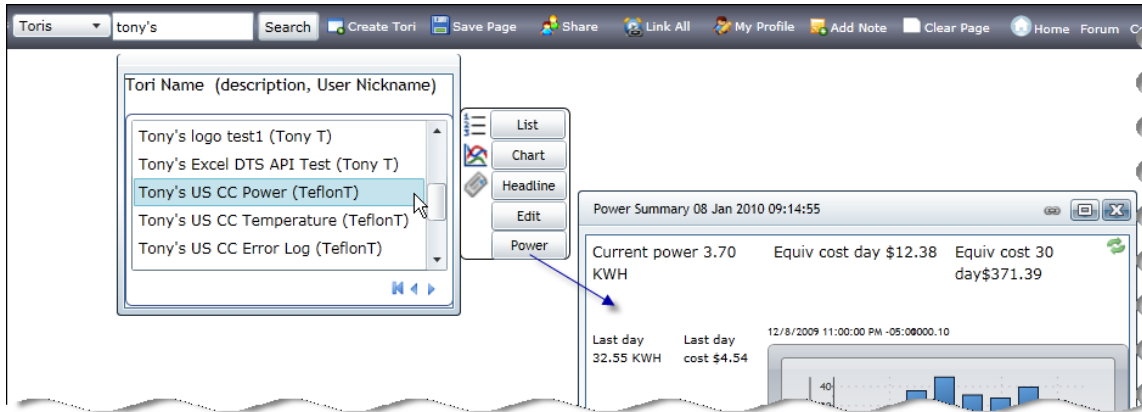
14) You may be done, but to check out the full Silverlight features of makeHistori, then Launch the Portal from the Home page

15) Build a makeHistori page and turn Auto Refresh On to monitor the data in Real Time





Add the Power Tori to your page so you can start tracking your energy usage and savings



Share your page address with others so that they can connect remotely.

Have fun and makeHistori !