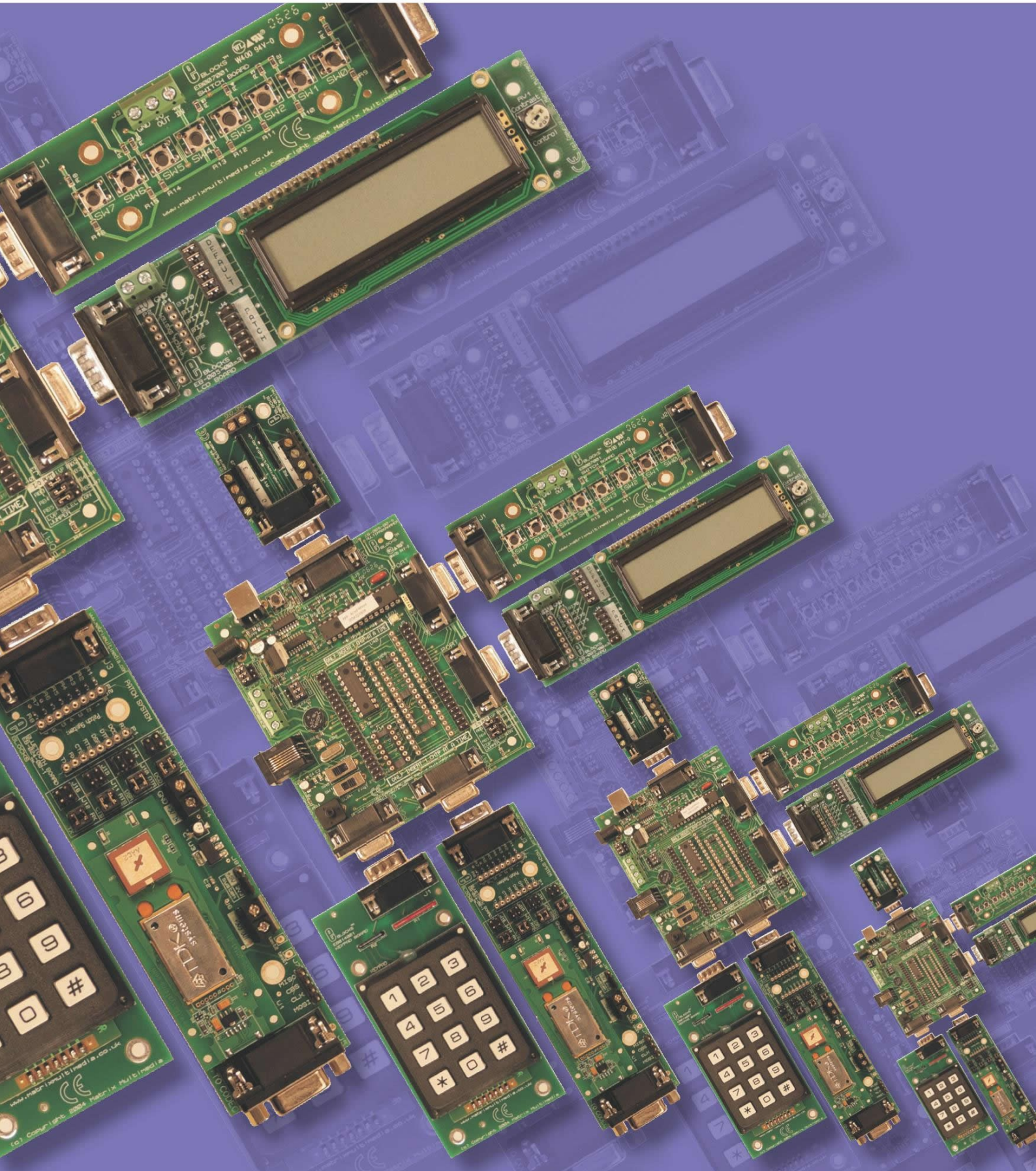
MATRIX

getting started guide

E-Blocks Wireless LAN Bundle



Flowcode

EB800-80-1
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Installing Flowcode

Instruction for installing Flowcode can be found inside the installation booklet located inside the Flowcode DVD case.

Before starting with the course it is recommended to update your version of Flowcode to the latest released version. This allows for the latest bug fixes and components to run on your machine. The latest version of Flowcode can be found by visiting the Matrix TSL website and clicking on the Flowcode page.

When installing Flowcode be sure to select E-blocks as your choice of programmer.

Getting Started with Flowcode

There is a free online course available for helping with getting started with learning Flowcode. This course covers basic principals through to designing your own programs and programming the devices. It is recommended that you take time to go through this course before proceeding with the bundle exercises to give you a better grasp of what the Flowcode program is doing.

The online course is available from the learning centre on our website or by visiting the following address:

http://www.matrixtsl.com/lc_microcontroller.php

Flowcode Examples

A number of pre-made example files are available for download from the main Flowcode page on the Matrix TSL website. These files are also located on the Flowcode CD. Before the example files can be used you must first copy them into a folder on your hard drive.

The example programs referenced in this bundle can be found at the following web address:
http://www.matrixtsl.com/lc_bundle_manuals.php

Or by clicking the bundle manuals link from the Learning Centre area of our website.

Flowcode Help

There is a help file available that covers all the main features of Flowcode. This help file can be accessed by clicking the question mark icon in the main Flowcode toolbar or alternatively clicking the help menu and selecting contents.

There are also help files available for each and every component in Flowcode which explain the functionality of the component and the component macros. The component help files can be found by selecting the component on the panel and the clicking the Help button in the properties toolbar.

General Support

Support for frequently encountered problems can be found online on our FAQ's site.
Our online forums can also be used as a general discussion area or for help or advice.

Wiring & Testing

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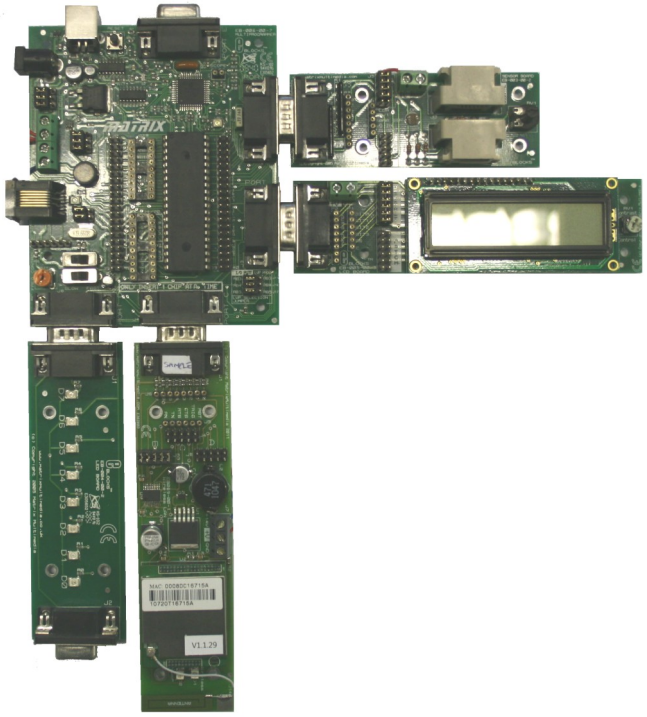
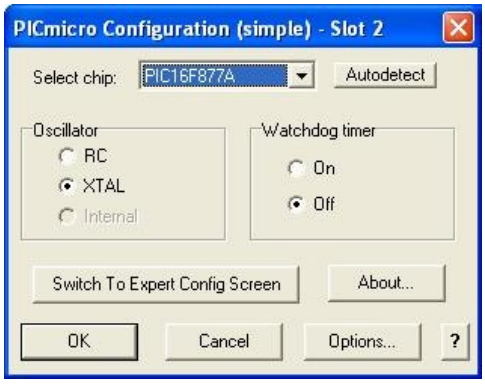
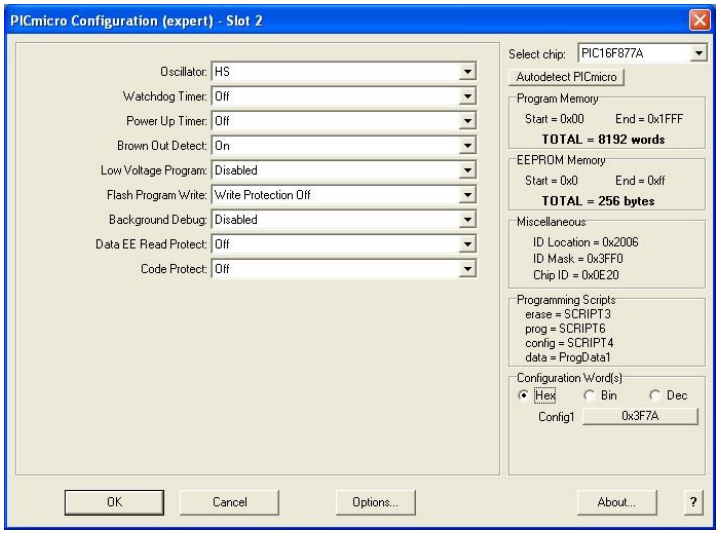


To setup your E-Blocks for use with the example programs you must perform the following actions:

- Remove the 16F88 Device from the EB006;
- Insert the 16F877A into the EB006;
- Connect up the E-blocks as shown on the right.
- The WLAN, LCD and Sensor E-blocks all need to be connected to the +V on the EB006 via single core wire.
- The WLAN also needs to be connected to the +14V on the EB006 via single core wire.

Before you can begin you must install the driver for the EB006 using the ELSAM CD or by visiting the Matrix TSL website: http://www.matrixtsl.com





The system can be tested by compiling and sending one of the example programs to the hardware. This is done by opening one of the example files in Flowcode and then clicking the compile to chip button.

The example Flowcode files contain a correct configuration so you will not have to modify the configuration to allow them to run on the hardware.

Any program you create from scratch will have to be configured as shown on the left. The configuration is specified by clicking the Chip -> Configure menu icon Flowcode and then if you need more options click the switch to expert config screen button.

Example file 1 is a good test file as it is probably the easiest way to confirm that all of your hardware is working correctly.

Flowcode WLAN Component

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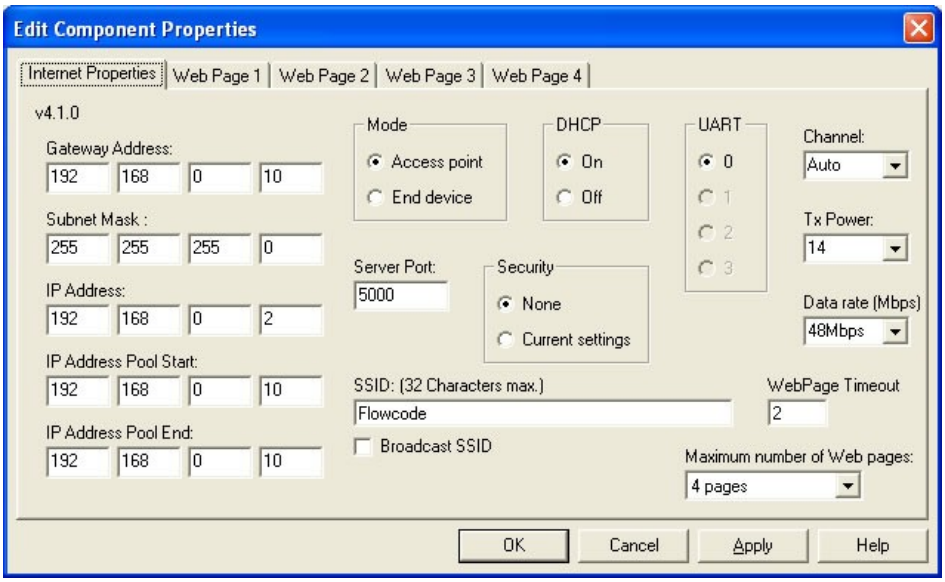
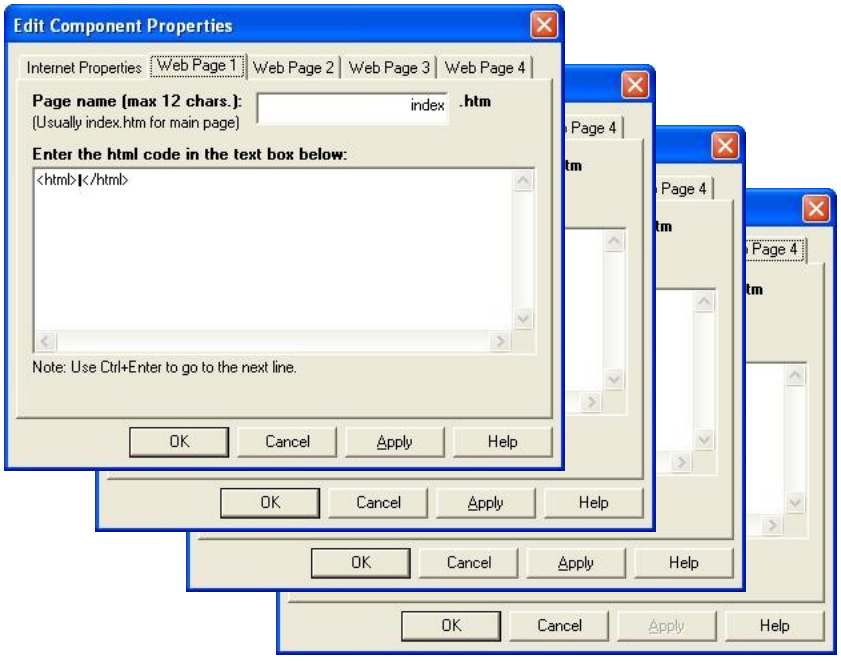
The Flowcode WLAN component can be added to your program by finding the component in the Wireless section of the Flowcode component toolbar.

WLAN Component Icon

Once the component has been added to your program you will find that the component icon has been added to your panel.



Here is an example of the Flowcode WLAN component main property page. This sets up key features of the Wireless LAN E-block such as the IP address, the subnet mask and the module operation mode. The properties also include which UART is used for the serial data connection which is UART 0 by default.



The WLAN component also has a further four property pages to define the contents of the internet pages. The component is capable of hosting up to four internet html pages so you should put your html into these property pages. The URL name of the page is also defined on the respective property page. Javascript code is also allowed in these HTML pages.

Example 1

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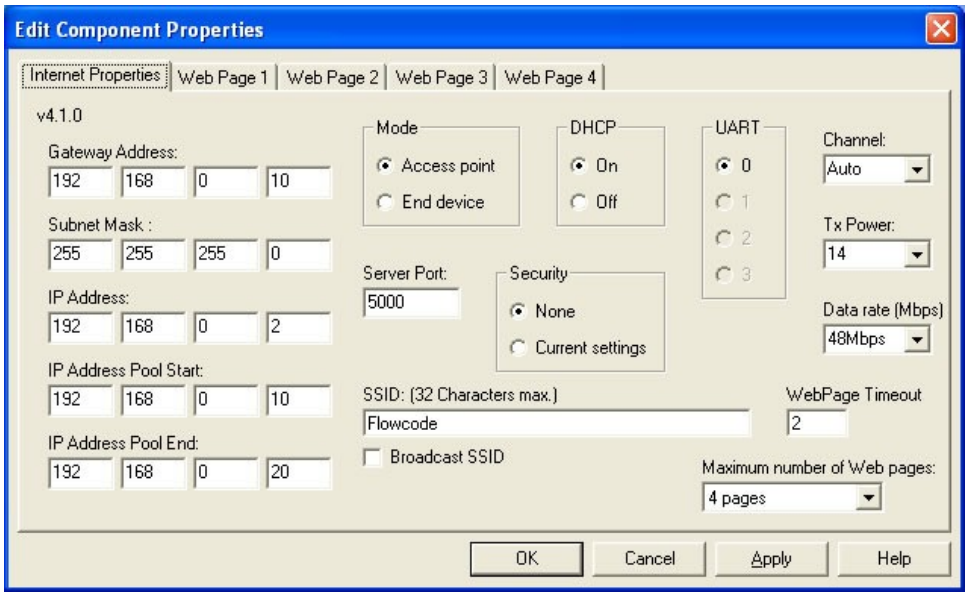
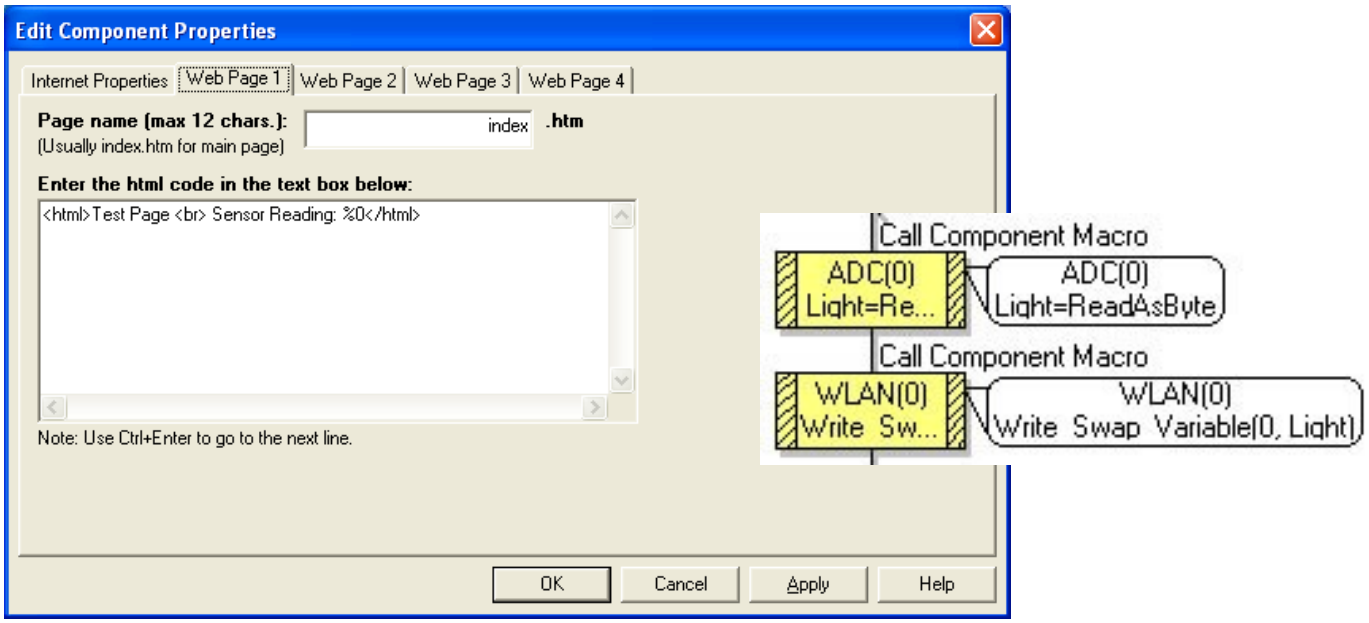
Example 1 demonstrates the usage of the WLAN component. The server is initialised and then the program enters a infinite loop where the value of the LDR on the Sensor E-block is read into variable Light. The Check_For_Page_Requests macro function must be called as part of the main program loop as this allows remote page requests to be detected and serviced.



The WLAN SSID for the example is set to Flowcode



The HTML code for the index page.

Swap variables can be referenced from the HTML code by using percentage character before the index of the variable as shown above. A percentage character can be inserted into the HTML by using a double percentage string i.e. 99%% = 99% on the page.

Example 1

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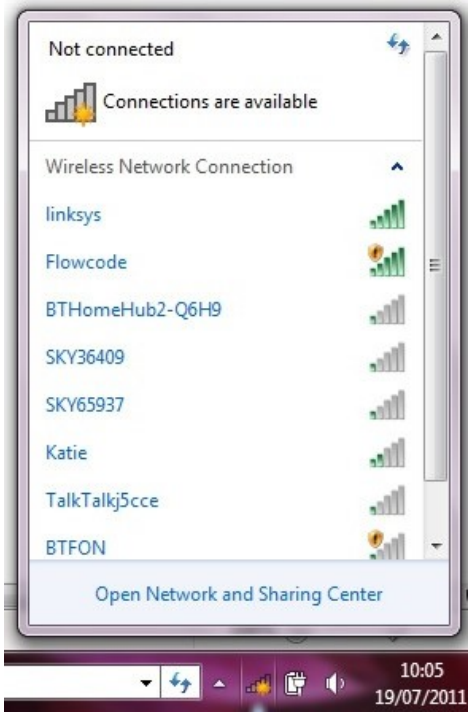
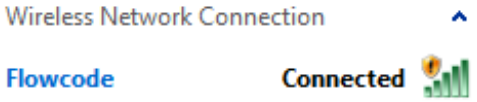


Use the compile to chip button in Flowcode to send the program to the device on the EB006 board. The initialisation will take approximately 30 seconds before the message “WLAN Started” appears on the LCD.

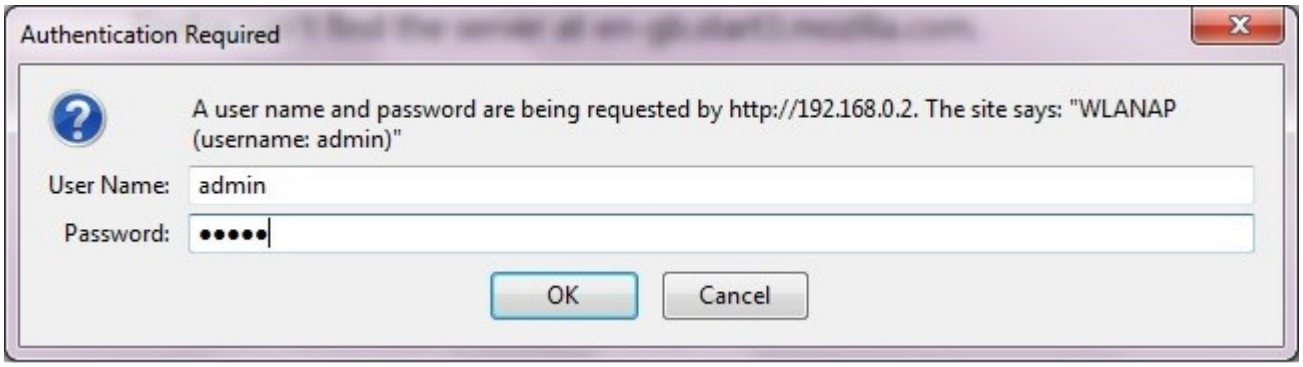
Once this has happened you can connect your laptop or wireless enabled computer to the module. You do this by clicking the wireless icon on the taskbar and you should then be presented with a list of wireless devices including one named Flowcode. Click the Flowcode wireless device to continue.

Clicking the Flowcode network opens up a warning saying the network is unsecured. This is ok so next click the connect button.



The computer will then try to connect to the device. If this is successful then the wireless device list will look like this.

Once you have successfully connected your computer to the wireless network you can then access the configuration utility. To do this type in the IP address of the module into your web browser’s address bar. Here the address should be 192.168.0.2



If the computer is connected to the network correctly and the program has initialised the module correctly then you will be presented with a login screen as shown above. Use the word admin for the username and password and click ok.

Example 1

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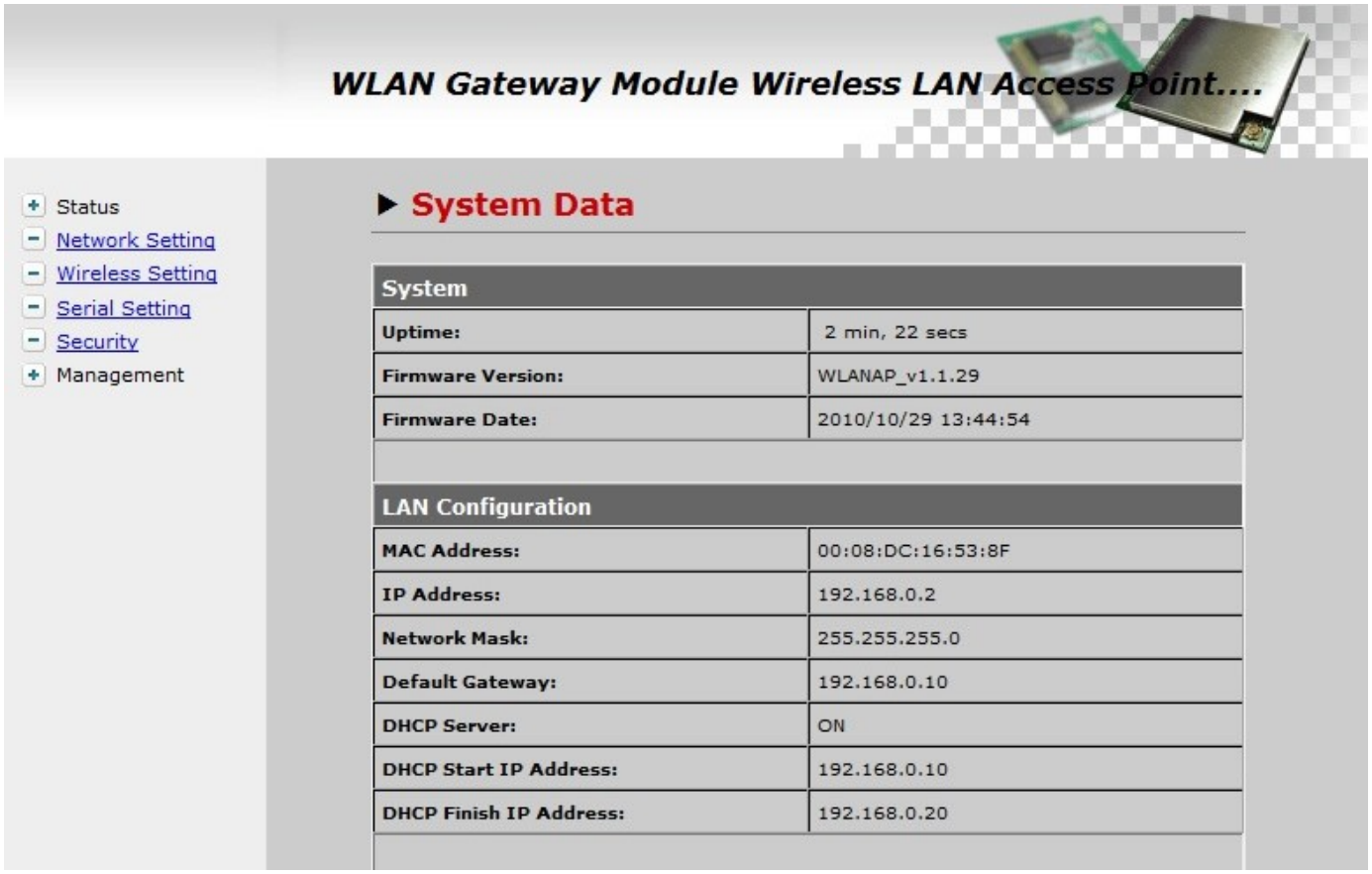
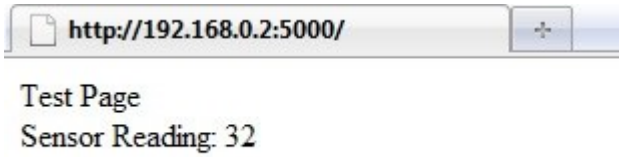
Once you have logged into the configuration utility you can then view the settings for the wireless device and do things like enable security settings to encrypt the wireless network.



To view the pages served from the embedded system you need to use the same IP address but this time you need to specify the server port that was detailed in the Flowcode WLAN component properties. The example port is 5000 so the IP address to connect to the system would look like this. 192.168.0.2:5000



Each time you access a page served from the embedded system the LCD will be updated with the page number of the requested page.

In this example you must manually refresh the page to allow the sensor value from the LDR on the sensor E-block to be re-sampled and updated.

Example 2

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Example 2 is very similar to Example 1 but this time we use javascript code to automatically refresh the page allowing us to see the sensor reading from the LDR. As well as the page refreshing automatically we will use javascript to colour code the sensor reading to provide a more user friendly interface and to demonstrate how javascript variables work.

```
<html>
<head>
<title>Flowcode Webpage</title>
<script type="text/javascript">
    function reFresh()
    {
        location.reload(true)
    }
    window.setInterval("reFresh()",5000);
    function SetColour()
    {
        var temp = %0;
        if(temp > 50)
        {
            document.write('<span class=\\"style1\\"> %0 </span>'
        }
        else
        {
            document.write('<span class=\\"style2\\"> %0 </span>'
        }
    }
</script>
<style type="text/css">
    .style1 {color: #00FF00}
    .style2 {color: #FF0000}
</style>
</head>
<body>
Test Page <br> Sensor Reading: <script> SetColour() </script>
</body>
</html>
```

Automatically refresh the page every 5 seconds

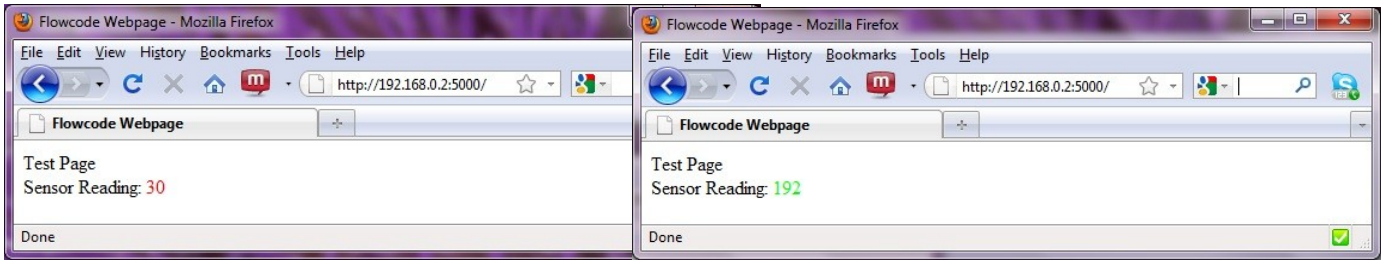
Read the contents of swap variable 0 and the switch the colour style appropriately before printing out the variable

HTML Text Styles

HTML Page Contents

Here we used Dreamweaver to perform syntax highlighting on the HTML code before passing it into the Flowcode WLAN property page. You could instead use TextPad to which will also perform the syntax highlighting, allowing you to spot any mistakes in the code. Do not use Microsoft Word or similar product to edit your HTML text as it will corrupt your code by replacing standard ASCII characters with Unicode characters that will not execute.

```
Executable characters          " '
Non-Executable characters      " '
```



Example 3

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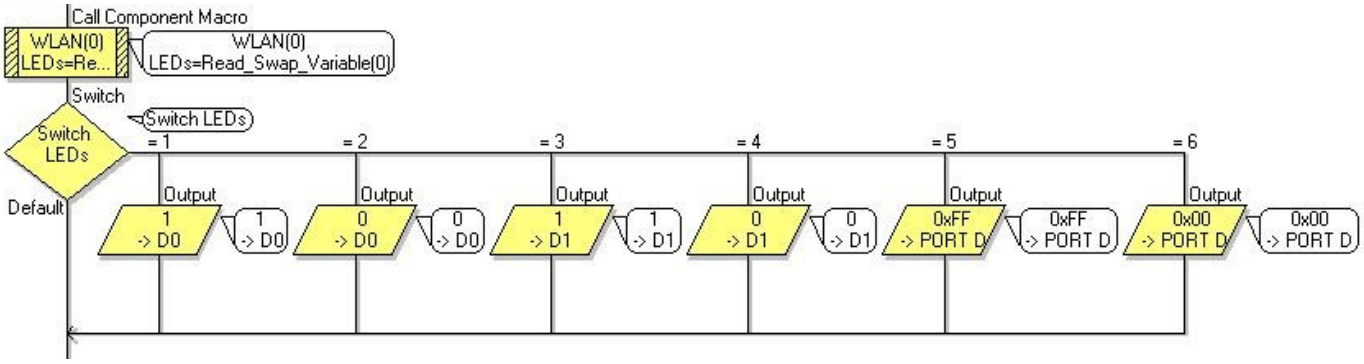
Example 3 uses the program from example 2 but adds more HTML pages and links to navigate between the pages. As well as this the variable callback mechanism is demonstrated by allowing values to be passed from the webpage through to the LEDs on the E-block. Replacing the LEDs with relays or transistors would allow you to control other electronic equipment such as lighting or heating etc.

For the Wireless LAN component there are always 8 default swap variables for incoming data and a further 8 swap variables for outgoing data. The swap variables are used to pass data between the embedded system and the web browser. We have already seen the outgoing swap variable in action as it was used to pass the value of the analogue sensor. The incoming swap variables are used in a similar way where there is a Flowcode component macro to read back the value. The only difference is that we have to pass the variable into the system by using the browser's URL address bar.

This section of code reads the value of the incoming swap variable and allows the LED outputs to be controlled.



The data is fed to the swap variable by entering it into the address URL. This can be done via a link or by manually entering values into the address bar.

Here is an example of creating links using a single swap variable.

```
<a href="index.htm">Main Page</a><br>
<a href="page2.htm?0=1">LED D0 On</a><br>
<a href="page2.htm?0=2">LED D0 Off</a><br>
<a href="page2.htm?0=3">LED D1 On</a><br>
<a href="page2.htm?0=4">LED D1 Off</a><br>
<a href="page2.htm?0=5">All LEDs On</a><br>
<a href="page2.htm?0=6">All LEDs Off</a><br>
```

Multiple swap variables can be controlled by inserting an ampersand between the variable allocations.

```
<a href="page2.htm?0=1&1=255&2=30&3=45">Link Text</a><br>
```

Example 3

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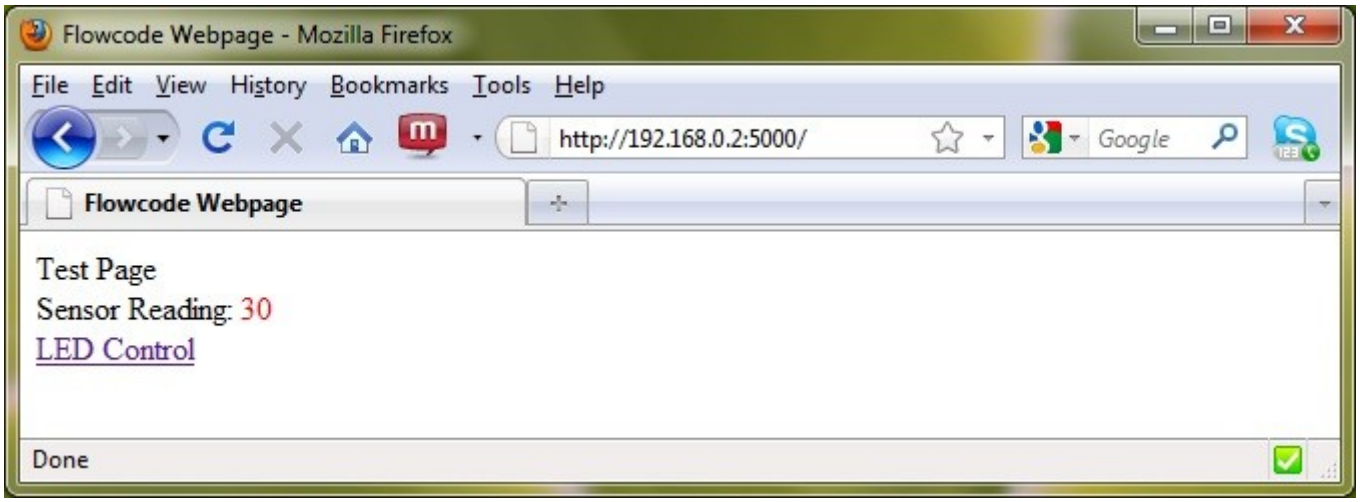
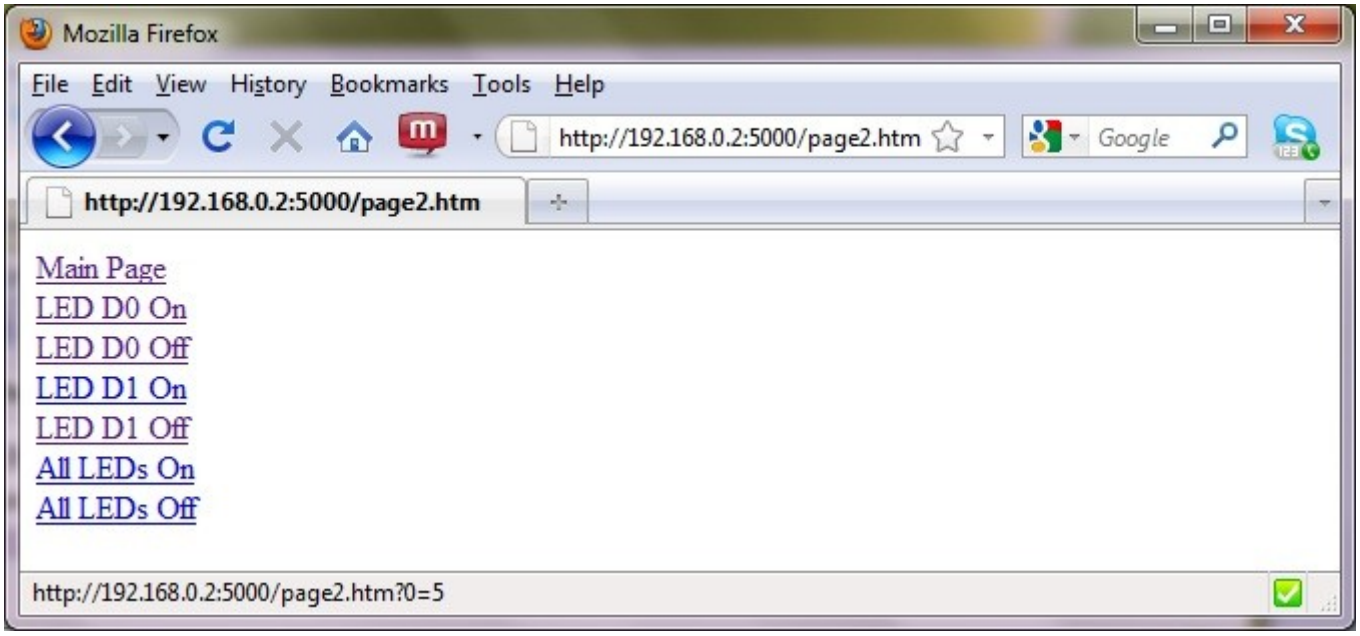
Here are the output HTML pages generated from Example 3. You can see that each there are links to navigate between the pages and also links on page2 to allow the LEDs to be controlled.



Index Page



Page2

To communicate with the wireless embedded system via the internet you will need to connect the wireless LAN module to your wireless router and then setup port forwarding so that any in-coming requests on port 80 are translated to the IP and port of the WLAN module. There is a website called portforward.com that will show you specific settings to use with your router.

Troubleshooting

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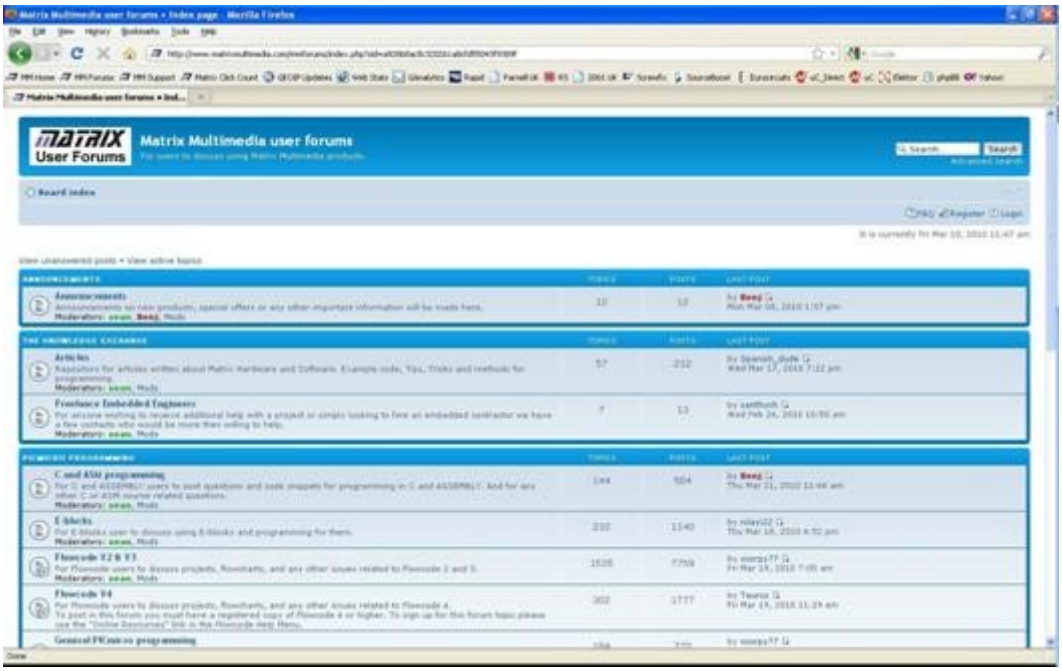
If you are having any problems getting up and running with any of the examples or any of the Flowcode components then the first port of call is to ensure you have your boards plugged together and wired correctly. As a rule of thumb any board with a screw terminal and a +V marking should be connected via a single core wire to the +V screw terminal on the corresponding Multiprogrammer.

If you do run into any problems then there is help and advice available from our online user forums located here:

http://www.matrixtsl.com/mmforums/

The Articles section contains quite a few examples, as well as hints and tips to aid in your applications



There is also an online video demonstrating Flowcode, available from the videos section of our website: http://www.matrixtsl.com/lc_videos.php

Other Products

EB800-80-1

E-Blocks Wireless LAN Bundle

Matrix TSL is a leading global technology company. Over the years we have developed a portfolio of award-winning products which have applications in Education, Industry and in the home.

Learning is at the heart of much of what our company does, and the philosophy of all Matrix learning products is based on 'learning by doing'. Each year Matrix spends around 25% of turnover on research and development to ensure that our learning and development resources are world class.

MIAC PLC

MIAC (Matrix Industrial Automotive Controller) is an industrial grade control unit which can be used to control a wide range of different electronic systems including sensing, monitoring and automotive. It has a number of applications in industry and learning.

Formula Flowcode

Formula Flowcode is a robot vehicle which is used to teach robotics, and to provide a platform for competing in robotics events.

ECIO

ECIO devices are powerful USB programmable microcontrollers with either 28 or 40 pin standard DIL (0.6") footprints. They are perfect for student use at home, project work and building fully integrated embedded systems.

FlowKit

The FlowKit allows for in circuit debugging directly from within Flowcode. This is the same ICD debugging feature that is included with our version 7 EB006 Multiprogrammer boards.

Flowcode + E-Block Technology bundles

Matrix TSL technology bundles are based on a combination of two of our most popular products, E-Blocks and Flowcode.

Other bundles in the range

- Easy GSM Pack
- Easy Zigbee Pack
- Easy RFID
- Easy Internet
- Easy CAN Bus
- Easy Bluetooth
- Easy GPS
- Easy USB
- Build your own PC Interface
- Build your own PLC
- Build your own Data-logger