

getting started guide

E-Blocks Wireless LAN Bundle







EB800-80-1 E-Blocks Wireless LAN Bundle

Installing Flowcode

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

EB800-80-1 E-Blocks Wireless LAN Bundle

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

	or RC KTAL ntemal	-Watch C	ndog timer On Off	
Swite	h To Expert Config	Screen	Ab	iout
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OK	. Can	cel	Option	s ?
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mgaration (expert	1-3101 2			1
				Select chip: PIC16F877A
Oscillator	LIC		-	Construction of the second sec
Oscillator:	HS OF			Autodetect PICmicro
Oscillator: Watchdog Timer:			-	Autodetect PICmicro Program Memory Start = 0x00 End = 0
Oscillator: Watchdog Timer: Power Up Timer:	HS Off Off		-	Autodetect PICmicro Program Memory Start = 0x00 End = 0 TOTAL = 8192 wor
Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect:	HS Off Off On District		• • •	Autodetect PICmicro Program Memory Start = 0x00 End = 0 TOTAL = 8192 wor EEPROM Memory
Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect: Low Voltage Program:	HS Off Off On Disabled		• • •	Autodetect PICmicro Program Memory Start = 0x00 End = 0 TOTAL = 8192 wor EEPROM Memory Start = 0x0 End = 0
Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect: Low Voltage Program: Flash Program Write: Bashersond Dct	HS Off Off On Disabled Write Protection Off			Autodetect PICmicro Program Memory Start = 0x00 End = 0 TOTAL = 8192 wor Start = 0x0 End = 0 TOTAL = 256 bytes
Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect: Low Voltage Program: Flash Program Write: Background Device:	HS Off On Disabled Write Protection Off Disabled			Autodetect PICmicro Program Memory Stat = 0x00 End = 0 TOTAL = 8192 wor EEPRIOM Memory Stat = 0x0 End = 0 TOTAL = 256 bytes Misselaneous ID Location = 0/2000
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Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect: Low Voltage Program: Flash Program Write: Background Debug: Data EE Read Protect: Code Protect:	HS Off On Disabled Write Protection Off Disabled Off Off			Autodetect PICmicro Program Memory Stat = 0x00 End = 0 TOTAL = 8192 won EEPRIM Memory Stat = 0x0 End = 0 TOTAL = 256 bytes Miscellaneous ID Location = 0x2006 ID Mask = 0x3FF0 Chip ID = 0x0E20
Oscillator: Watchdog Timer: Power Up Timer: Brown Out Detect: Low Voltage Program: Flash Program Write: Background Debug; Data EE Read Protect: Code Protect:	HS Off Off Disabled Write Protection Off Disabled Off Off			Autodetect PICmicro Program Memory Start = 0x00 End = 0 TOTAL = 8192 wor EEPROM Memory Start = 0x0 End = 0 TOTAL = 256 byte: Miscellaneous ID Location = 0x2006 ID Mask = 0x3FF0 Chip ID = 0x6E20 Programming Scripts erase = SCRIPT3 prog = SCRIPT4 data = ProgData1

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.



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.

Edit Component Properties		
Internet Properties Web Page 1 Web Page 1 v4.1.0 Gateway Address: 110 [192] 168 0 10	Mode Access point End device Web Page 4 DHCP On C End device	UART Channel:
Subnet Mask : 255 255 0 IP Address: 1192 168 0 2	Server Port: Security 5000	C 2 C 3 Data rate (Mbps)
IP Address Pool Start: 192 168 0 10 IP Address Pool End: 10 10 192 168 0 10	SSID: (32 Characters max.) Flowcode Broadcast SSID	WebPage Timeout 2 Maximum number of Web pages: 4 pages
	OK Cancel	Apply Help

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.



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EB800-80-1 E-Blocks Wireless LAN Bundle

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.

		webrag	je i j web				
4.1.0 Gatewa 192 Subnet 255	y Address 168 Mask : 255	: 0 255	0	Mode Access point End device	DHCP © On © Off	UART	Channel: Auto Tx Power: 14
IP Addr 192	ess: 168 ess Pool 9	0 Start:	2	5000 ·	None Current settings		Data rate (M 48Mbps
192	168	0	10	SSID: (32 Characters m Flowcode	ax.)	Ì	WebPage Timeo 2
IP Addr 192	ess Pool E 168	End:	20	Broadcast SSID		Maximum nu 4 pages	mber of Web pag

The WLAN SSID for the example is set to Flowcode

Edit Component Properties		
Internet Properties Web Page 1 Web Page 2 Web Page	e 3 Web Page 4	
Page name (max 12 chars.): (Usually index.htm for main page)	ndex .htm	
Enter the html code in the text box below:		
<html>Test Page Sensor Reading: %0</html>		Call Component Macro ADC(0) Light=Re Call Component Macro Call Component Macro WLAN(0) WLAN(0) WLAN(0)
Note: Use Ctrl+Enter to go to the next line.	OK Cancel	

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.





EB800-80-1 E-Blocks Wireless LAN Bundle

Not connected	47	-
Connections are available		
Wireless Network Connection	^	-
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Flowcode	311	H
BTHomeHub2-Q6H9		
SKY36409		
SKY65937		
Katie	lite.	
TalkTalkj5cce	.all	
BTFON	201	-
Open Network and Sharing C	Center	
	10	:0'
- + + 🙀 🛱 🕻), 10 19/07	:01 7/2

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.

Flowcode	3 41
Information sent ov might be visible to o	er this network others.
Connect automatical	ly <u>Connect</u>
Wireless Network Conne	ction 🔺
Flowcode	Connected 🐫

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

?	A user name and password are being requested by http://192.168.0.2. The site says: "WLANAP (username: admin)"
User Name:	admin
Password:	•••••

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.





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EB800-80-1 E-Blocks Wireless LAN Bundle

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.

	WLAN Gateway Modul	e Wireless LAN Access Point
Status Network Setting	System Data	
Nireless Setting	System	
Security	Uptime:	2 min, 22 secs
Management	Firmware Version:	WLANAP_v1.1.29
	Firmware Date:	2010/10/29 13:44:54
	LAN Configuration	
	MAC Address:	00:08:DC:16:53:8F
	IP Address:	192.168.0.2
	Network Mask:	255.255.255.0
	Default Gateway:	192.168.0.10
	DHCP Server:	ON
	DHCP Start IP Address:	192.168.0.10
	DHCP Finish IP Address:	192.168.0.20

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. http://192.168.0.2:5000/

Test Page Sensor Reading: 32

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 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></html>	
<head></head>	
<title>Flowcode Webpage</title>	
<script type="text/javascript"></td><td></td></tr><tr><td>function reFresh()</td><td></td></tr><tr><td>(</td><td>Automatically refresh the</td></tr><tr><td>location.reload(true)</td><td>nage every 5 seconds</td></tr><tr><td>}</td><td>page every 5 seconds</td></tr><tr><td><pre>window.setInterval("reFresh()",5000);</pre></td><td></td></tr><tr><td>function SetColour()</td><td></td></tr><tr><td>{</td><td></td></tr><tr><td><pre>var temp = %0;</pre></td><td></td></tr><tr><td>if(temp > 50)</td><td></td></tr><tr><td></td><td>Read the contents of</td></tr><tr><td>document.write(' %0 '</td><td>swap variable 0 and</td></tr><tr><td>}</td><td>the switch the colour</td></tr><tr><td>else</td><td>style appropriately</td></tr><tr><td>(</td><td>before printing out</td></tr><tr><td>document.write(' %0 '</td><td>the variable</td></tr><tr><td>}</td><td></td></tr><tr><td>}</td><td></td></tr><tr><td></script>	
<style type="text/css"></td><td></td></tr><tr><td>.style1 (color: #00FF00)</td><td></td></tr><tr><td>.style2 (color: #FF0000)</td><td>HTML Text Styles</td></tr><tr><td></style>	
<body></body>	
Test Page > Sensor Reading: <script> SetColour() </script>	
	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 » `

Plowcode Webpage - Mozilla Firefox	🕑 Flowcode Webpage - Mozilla Firefox
<u>File Edit View History Bookmarks Tools H</u> elp	<u>File Edit View History Bookmarks Iools H</u> elp
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Flowcode Webpage	Flowcode Webpage
Test Page Sensor Reading: 30	Test Page Sensor Reading, 102
Done	Done





EB800-80-1 E-Blocks Wireless LAN Bundle

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.

Main Page

LED D0 On

LED D0 Off

LED D1 Off

LED D1 Off

All LEDs On

All LEDs Off

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

Link Text



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.

🥹 Flowcode Webpage - Mozilla Firefox	x
<u>File Edit V</u> iew History <u>B</u> ookmarks <u>T</u> ools <u>H</u> elp	
C × ☆ Ψ · C http://192.168.0.2:5000/ ☆ · Google P	
Flowcode Webpage	-
Test Page	
Sensor Reading: 30	
LED Control	
Done	

Index Page

🕘 Mozilla Firefox	x
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http://192.168.0.2:5000/page2.htm +	-
Main Page	
LED D0 On	
LED D0 Off	
LED D1 On	
LED D1 Off	
<u>All LEDs On</u>	
<u>All LEDs Off</u>	
http://192.168.0.2:5000/page2.htm?0=5	



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 incoming 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

EB800-80-1 E-Blocks Wireless LAN Bundle

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

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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 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







