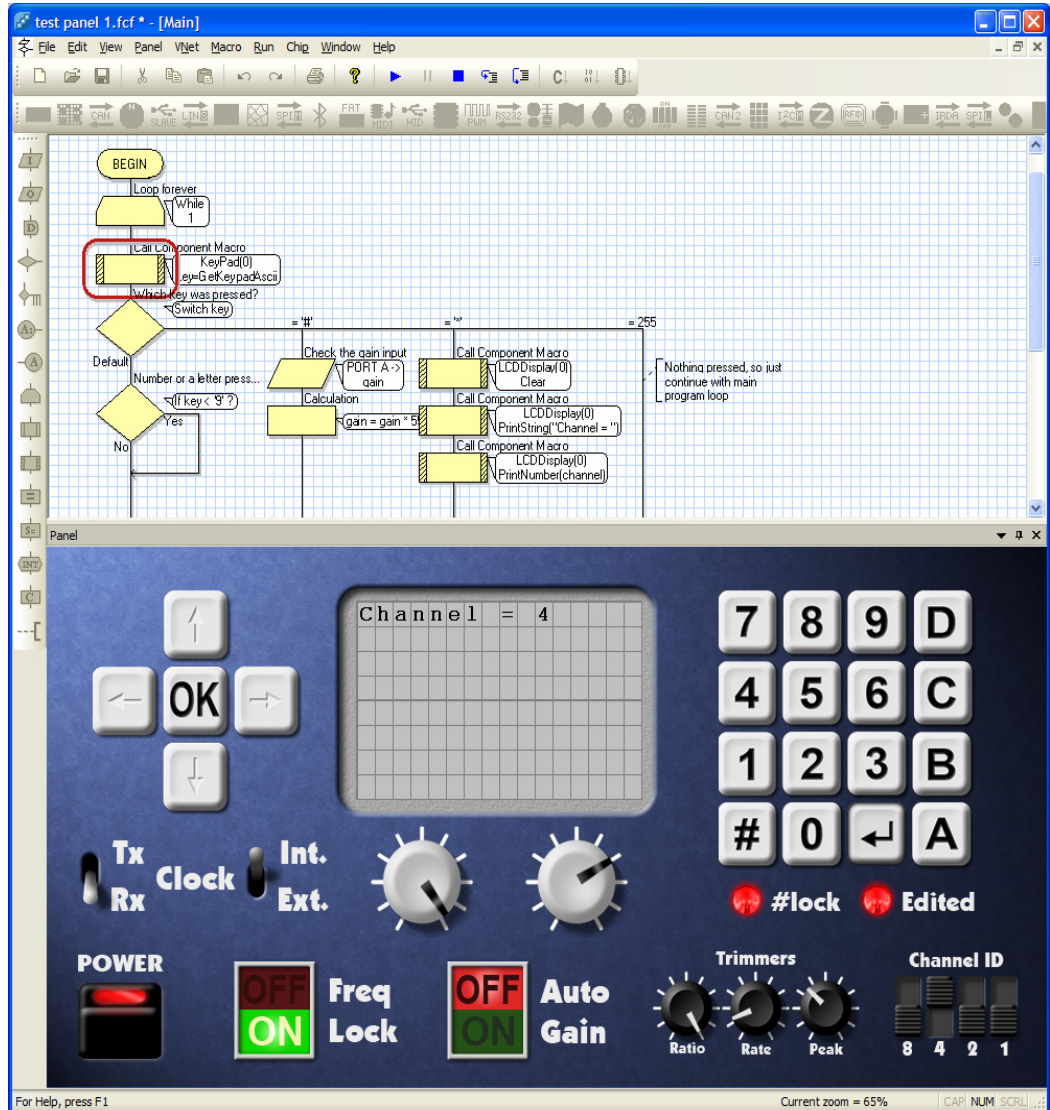




FLOWCODE 4

NO CODING, NO LIMITS...

- **Microcontroller development software**
- **Easy to use graphical interface**
- **Fast and flexible**
- **PICmicro, ARM, and AVR devices**



The screenshot displays the FlowCode 4 development environment. The top window shows a flowchart for a program named 'test panel 1.fcf'. The flowchart starts with a 'BEGIN' block, followed by a 'Loop forever' block containing a 'While 1' loop. Inside the loop, there is a 'Call Component Macro' block for 'KeyPad(0)' with parameters 'key=GetKey(ypadAscii)' and 'Switch key'. This is followed by a decision diamond 'Number of a letter press... (if key < '9'?'. If 'Yes', it goes to a 'Calculation' block 'gain = gain * 5', then a 'Call Component Macro' block 'LCDDisplay(0) PrintString("Channel = ")', and another 'Call Component Macro' block 'LCDDisplay(0) PrintNumber(channel)'. If 'No', it goes to a 'Default' block 'Check the gain input (PORT A -> gain)'. From the 'Default' block, there are three paths: one to 'Call Component Macro LCDDisplay(0) Clear', one to 'Call Component Macro LCDDisplay(0) PrintString("Channel = ")', and one to 'Call Component Macro LCDDisplay(0) PrintNumber(channel)'. A note on the right says 'Nothing pressed, so just continue with main program loop'. The bottom window shows a virtual control panel with a keypad, a display showing 'Channel = 4', and various control elements like 'Tx Rx', 'Clock', 'Int. Ext.', 'POWER', 'Freq Lock', 'Auto Gain', 'Trimmers', and 'Channel ID'.



English



Spanish



Greek



Thai



Dutch



French



Romanian



Finish



Italian



Vietnamese



German



Slovenian



Danish



Hungarian



Japanese



Slovak



Mandarin



Turkish



Portuguese



Swedish

New in version 4:

- **Panel Creator**
- **In Circuit Debug**
- **Virtual networks**
- **C Code customization**
- **Switch Icon**
- **Floating point**
- **Additional string functions**
- **Watchdog timer support**
- **New GUI**
- **New components**
- **New targets**
- **Fast USB development**



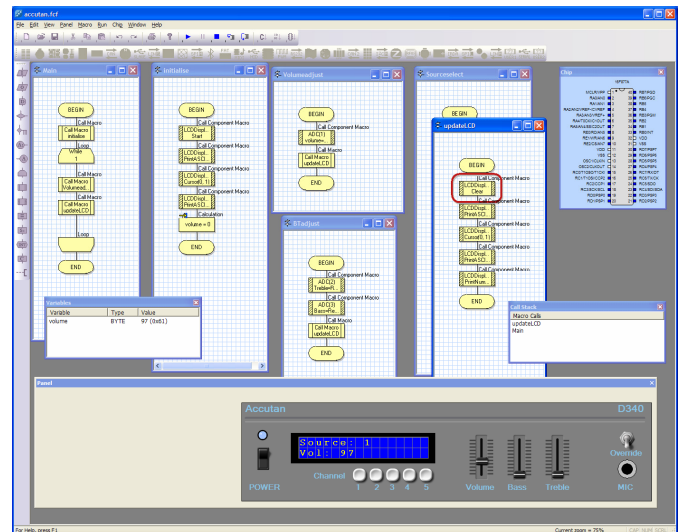
Introducing Flowcode

Flowcode 4 is one of the World's most advanced graphical programming languages for microcontrollers.

The great advantage of Flowcode is that it allows those with little experience to create complex electronic systems in minutes.



In 2008 Flowcode and E-blocks were awarded the World Didac prize for outstanding contribution to the education market



Benefits

- **Save time and money** Flowcode facilitates the rapid design of electronic systems based on microcontrollers.
- **Easy to use interface** Simply drag and drop icons on-screen to create a electronic system without writing traditional code line by line.
- **Fast & flexible** Flowcode has a host of high level component subroutines which means rapid system development. The flowchart programming method allows users of all abilities to develop microcontroller programs.
- **Error free results** Flowcode works. What you design and simulate on screen is the result you get when you download to your microcontroller.
- **Open architecture** Flowcode allows you to view C and ASM code for all programs created and customise them. Access circuit diagram equivalents to the system you design through our datasheets and support material.
- **Fully supported** Flowcode is supported by a wide range of materials and books for learning about, and developing, electronic systems.

Features

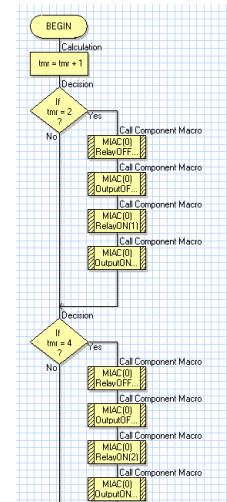
- **Supported microcontrollers**
PIC, AVR, Atmel ARM
- **Supported communication systems**
I²C, SPI, RS232, Bluetooth, Zigbee, IrDA, CAN, LIN, TCP/IP, Webserver, USB, RFID, GPS
- **Supported components**
LEDs, switches, keypads, LCDs, Graphical colour LCD, Graphical mono LCDs, Sensors, 7-segment displays, Internal EEPROM, comms systems
- **Panel designer**
Design a panel of your choice on-screen and simulate it.
- **In-circuit debug**
When used with EB006 PICmicro multiprogrammer, or FlowKit.
- **Tight integration with E-blocks**
Each comms system is supported by E-blocks hardware
- **Virtual networks**
From version 4.1 simulation of many instances of Flowcode can co-simulate to form virtual chip networks.

The design process

Design your program

Drag and drop the flow chart icons to create a program. Click on each icon and component to set the actions and properties you want. The range of components is large: from simple switches and LEDs, I²C and SPI, through to more advanced components like Bluetooth, TCP/IP and Zigbee.

- Allows complex systems to be developed and managed quickly
- Large component library speeds up design process



Design your system

Drag and drop the components you need onto your system panel. Adjust graphical properties of components, design your own graphics, embed photographs and images, assign pin connections to the microcontroller and you are ready to simulate.

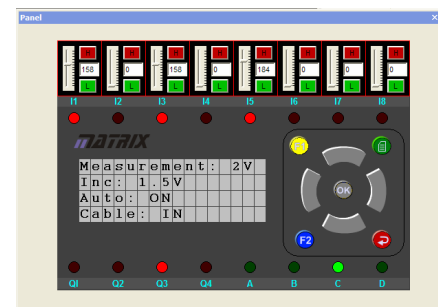
- Closely mimic your electronic system
- Reduce design cycles with superb visual design representation, and on-screen functionality



Simulate your program and system

Simulate the program icon by icon, see the effects on the components, the microcontroller, watch variables change, or run the program in near-real time. Test the system's functionality by clicking on switches or altering sensor values, and see the effects on-screen. Link to other instances of Flowcode to simulate entire systems (V4.1 only)

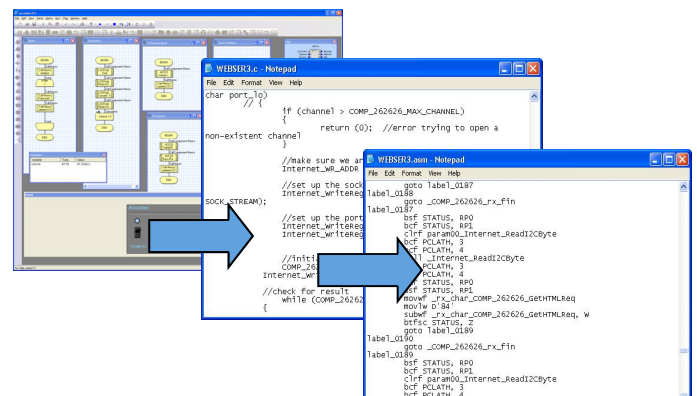
- Simulation aids understanding
- Debug before download
- Shorten the design cycle



Download and debug

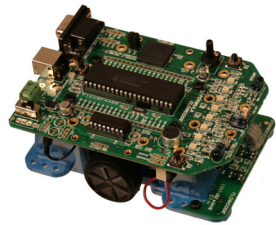
Compile and download to your microcontroller with one button click. Use the In Circuit Debug feature to verify the program's operation on the hardware whilst viewing the simulation on-screen. Link in your own C code or assembly code libraries. Tightly integrate Matrix targets with Flowcode for rapid code development and optimal project satisfaction.

- Compiles to C then ASM then Hex
- Link in your own C or ASM files
- Immediately download to your programmer

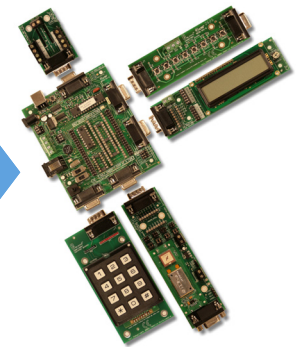
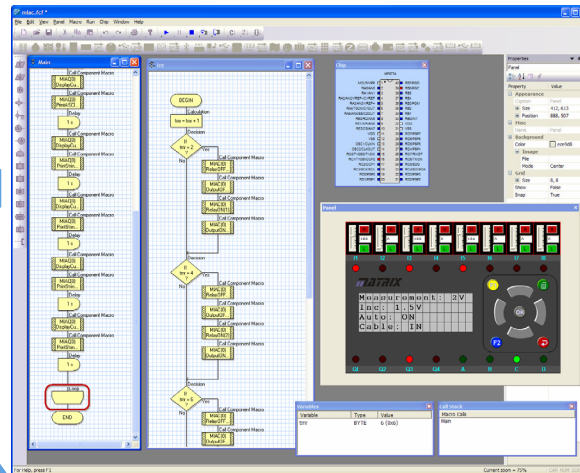


Flowcode in education

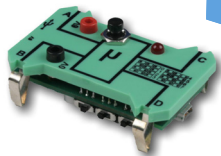
Flowcode is internationally recognised as a market leader in microcontroller development for education. Flowcode is used in more than 700 schools, colleges and universities world-wide. Flowcode is used in a variety of subject areas including technology, science, electronics and automotive.



Use with Formula Flowcode for studies in robotics at age 11 onwards



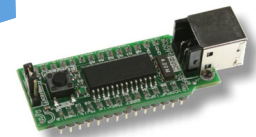
Use with E-blocks for a wide variety of subjects in technology, computer science, and engineering education



Use with the Locktronics microcontroller for experiments in Science



Use with the rugged MIAC for experiments in automotive technology



Use with ECIO to add functionality to student projects

Case study - Flowcode's role in the Belgian technology and electronics schools system

In the last few years Matrix has worked closely with teachers in the Flemish educational system to develop resources for teaching technology and electronics.

In a technology course pupils from the age of 12 are taught robotics using Flowcode in the Flemish language, and the Formula Flowcode robot. Having received a good grounding this knowledge is then built on by using E-blocks with Flowcode at 16+ to understand how electronic systems are developed. Students then build further on this by undertaking a course in C programming using the same hardware.

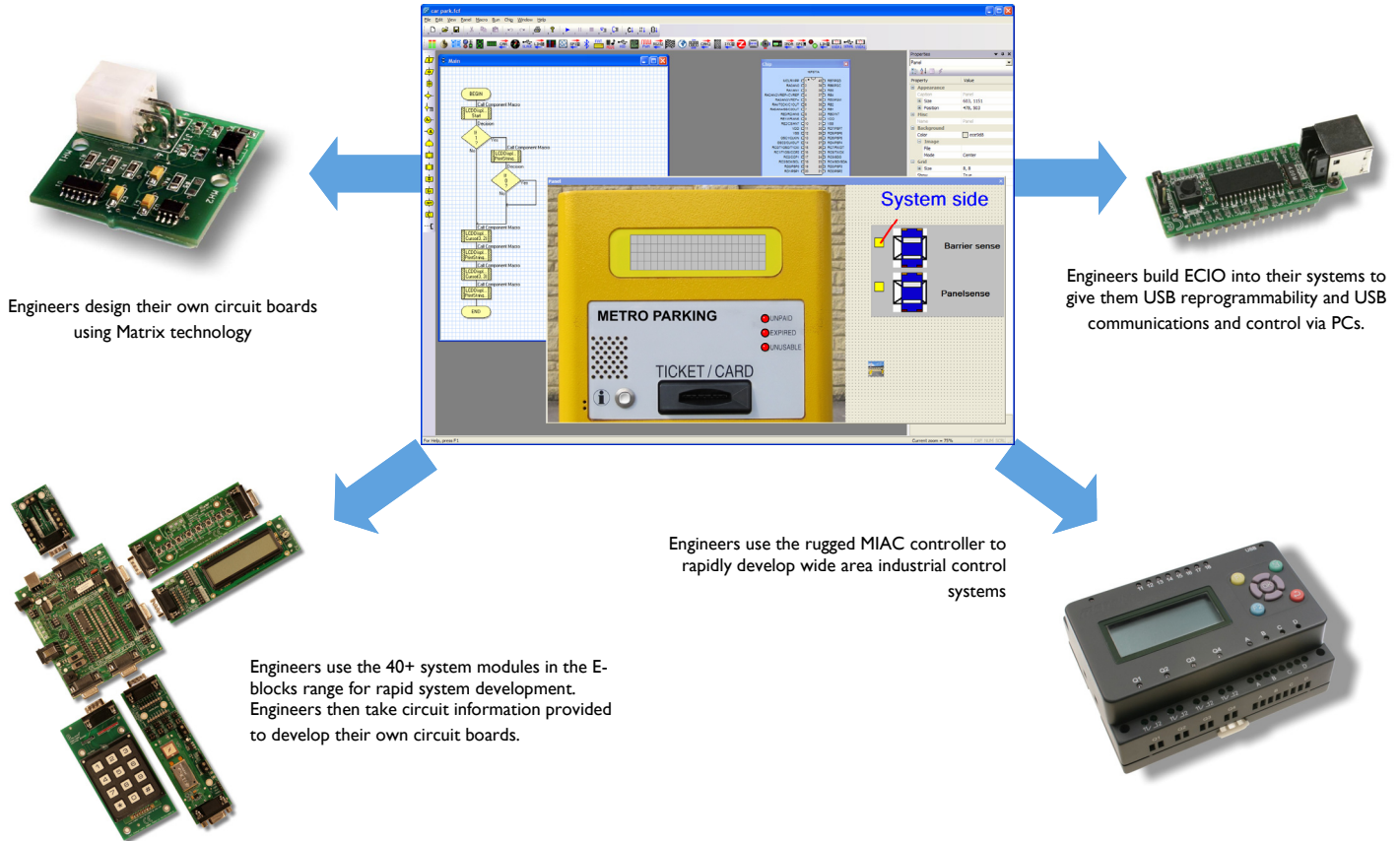
So far this program of study has been rolled out to more than 50 schools in Belgium.



This photograph shows the electronics teaching lab at St Joseph's Academy near Brecht where Flowcode is used extensively.

Flowcode in industry

Flowcode is used in conjunction with E-blocks in industry to shorten the design cycle for developers of electronic systems. Engineers use circuit blocks in E-blocks with Flowcode macros for rapid design of electronics systems and control systems based on MIAC technology.



Case study - Toyota Prius achieves more than 99mpg using Flowcode and E-blocks

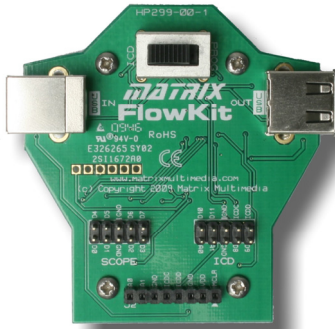
In this project a standard Toyota Prius hybrid car was modified to include an additional battery to achieve a fuel economy in excess of 99mpg.

Having added a large Lithium ion battery and DC-DC converter to his Prius, Jim Fell used Flowcode hardware and E-blocks software to hack into the Toyota management system trapping the 'state of charge' (SOC) messages sent from the battery ECU to the power train control. By monitoring SOC messages Jim was able to recharge the Prius' NiMH battery with the reserve Li-ion battery (charged each night from the domestic supply). This enabled him to achieve such an economy that the Prius on-board display 'maxed out' - more than 99mpg.

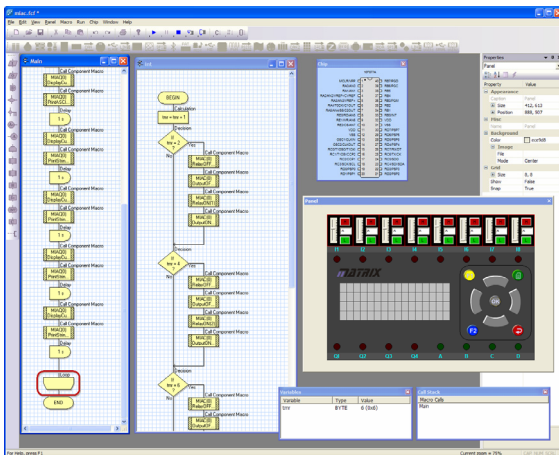


Before and after pictures of the Prius with the additional battery, and the in-car management system showing the bar graph of fuel economy of 99mpg (the top of the scale) of 100mpg.

FlowKit



The FlowKit main board



The system is controlled within Flowcode

Ordering information

FlowKit pack

HP299

What does it do?

The FlowKit can be connected to hardware systems to provide a real time debug facility where it is possible to step through the Flowcode program on the PC and step through the program in the hardware at the same time. This function is available with Flowcode 4.2 or later.

Benefits

- A fast way to solve programming problems
- Seamless program and debug

Features

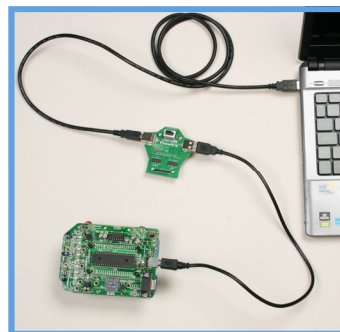
- Compatible with a variety of hardware systems including E-blocks
- Compatible with ECIO, MIAC and Formula Flowcode systems via the USB lead
- Allows start, step, and play of programs
- Allows users to see and alter variable values

Description

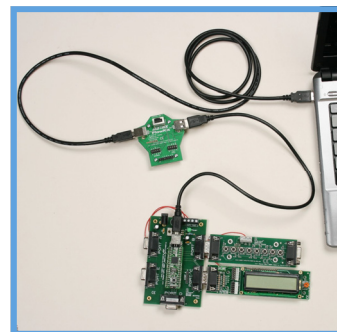
Whilst Flowcode simulation allows debug of a system to a first pass, FlowKit takes debug to a new level by running the program in the hardware and on the screen at the same time. The system is controlled from within the Flowcode environment where controls allow users to start, stop, pause and step through their program one icon at a time. Under user control the Flowcode software shows the location of the program in the flow chart, the value of all variables in the program, and allows users to alter the variable values when the program is paused.



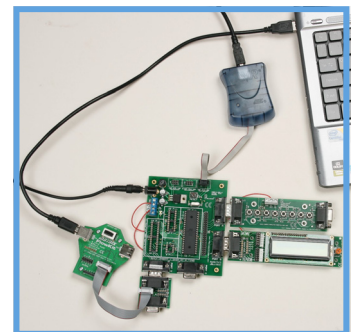
Using Flowkit with MIAC



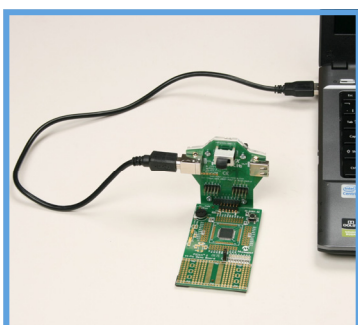
Using Flowkit with Formula Flowcode



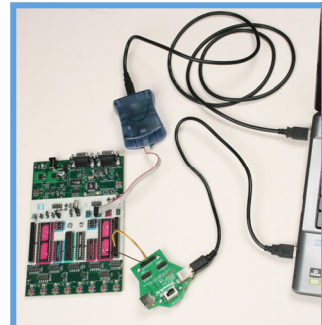
Using Flowkit with ECIO



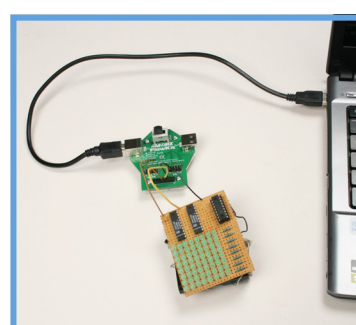
Using Flowkit with AVR E-blocks



Using Flowkit with PICkit 2



Using Flowkit with Atmel STK500



Using Flowkit with a project



The complete FlowKit package

Support

Whether you are in education or industry you will find that there are a wide range of resources available to help gain knowledge on how Flowcode is used, programming concepts, microcontroller techniques and circuits.

In-package support:

Flowcode is shipped with a comprehensive help file covering all Flowcode functions. Over 30 example files are included with full descriptions.

Free web based courseware:

On our web site you will find a number of free web based courseware applications which cover not only how Flowcode is used but also cover the basics of microcontrollers, and how they are used in electronic systems,

Forums:

Online forums are used as a mechanism for building a knowledge base on Flowcode, and for general technical support. Our engineers answer all questions on the forums on a daily basis. Forums include lots of example code that is posted with user's questions.

Tutorial manuals:

For more advanced topics, such as Bluetooth, CAN, and TCP/IP, are available.

Technical support:

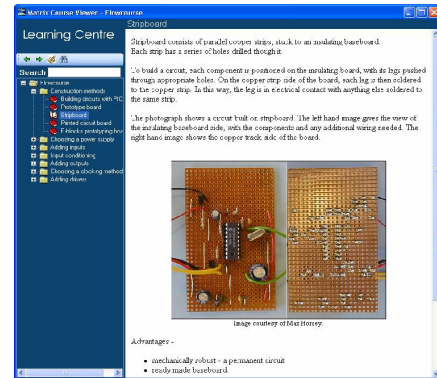
Our active forum provides fast technical support and links to consultants who can help you further. Additional examples and applications are also available on our web site.

Training:

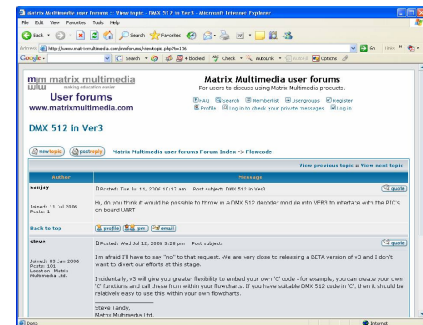
Training courses on Flowcode programming and design of systems based on Flowcode technology are available in the UK and across Europe via our partners.

Books:

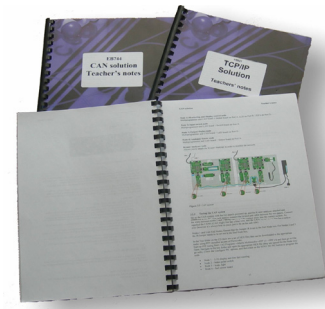
A book on Microcontroller Systems Engineering, by Bert Van Dam, is available from Matrix direct or



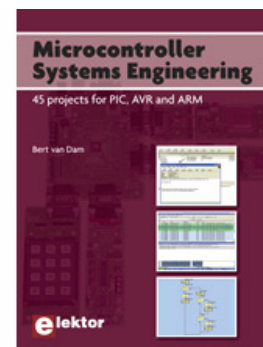
The Flowcode / E-blocks Learning Centre includes several web based tutorials and videos supporting Flowcode users



Web based forums, covering a variety of topics, are monitored by our technical support team on a daily basis



Tutorial manuals cover more advanced topics like using Flowcode to teach and learn TCP/IP, Bluetooth and CAN bus.....



Microcontroller System design with Flowcode from Bert Van Dam

Licensing, versions and upgrades

	Free version	Home Version	Flowcode Pro	Flowcode 10 concurrent users	Flowcode 50 concurrent users	Annual student rental for site licence holders
Unlimited icons	N	Y	Y	Y	Y	Y
Code size limit*	2K	4K	-	-	-	-
All devices	N	Y	Y	Y	Y	Y
All components	N	N	Y	Y	Y	Y
In Circuit Debug	N	N	Y	Y	Y	Y
Virtual networks	N	N	Y	Y	Y	Y
Code customisation	N	N	Y	Y	Y	Y
Licence for commercial use	N	N	Y	N	N	N
Multi-user licence for education	N	N	N	Y	Y	N
Each microcontroller version:						
Retail price each**	£0	£39	£149	£399	£799	£199
Additional price / copy: 2 - 4 copies			£125			
Additional price / copy: 5+ copies			£99			
Ultimate version each						
Retail price each**			£299	£799	£1,599	£399
Additional price / copy: 2 - 4 copies			£249			
Additional price / copy: 5+ copies			£199			

*Code size limit only applies to PICmicro versions. Other versions use limited icon numbers to limit functionality.

**These target prices are exclusive of tax and any applicable postage charges, and may vary slightly from one region to another.

Code size limits

For the AVR version of Flowcode there are no code size limits for any version. For the Free PICmicro version the code will limit to 2KB of compiled and assembled code (18 series PICmicro limit is 4K). For the PICmicro Student version the code will limit to 4KB of compiled and assembled code (18 series PICmicro limit is 8K).

Limited components

Free and home versions do not have all components. Limited component versions all have LED, LED array, Switch, Switchbank, ADC, LCD, 7-segment display, Keypad, Quad 7-segment display, and PWM. The PICmicro version additionally has MIAC and Formula Flowcode. These versions cannot have more components added to them as free downloads. Other versions include all components.

Free version

This well featured version allows you to verify that Flowcode will provide the functions you need and is also suitable for use with hardware devices like the Formula Flowcode robot and ECIO. This is a fully working version of Flowcode that has some limitations. For Flowcode for PICmicro MCUs the demo version will produce hex code for only the following: 16F628A, 16F690, 16F88, 16F84A, 16F877, 18F2220, 18F4431, Formula Flowcode, and ECIO. Free versions are limited to around 50 usable icons and also have code size limitations for PICmicro microcontrollers.

Home version

The Home version is limited in the compiled code size it can produce and in the number of Flowcode components provided: communications functions are not supported. The AVR home version is limited in Flowcode components but has no code size limit. Home versions are not licensed for use in institutions.

Pro version

The Pro version includes all functions, components, full code compilation size and is licensed for commercial use. Industrial users who need more than one licence will need to purchase each licence separately.

Multiuser education

Multiuser versions are fully functional like the Pro version, but these are for educational (non-commercial) use only. Only 10 and 50 user versions are available. Those requiring between 10 and 20 users will need to purchase 2 off 10 user versions.

Upgrading licences

Upgrades from one type of licence (e.g. Student to Pro) to another are simply the price difference.

Versions 3 to Version 4 upgrade

Upgrades from version 3 to version 4 will be charged at 50% of the version 4 price.

Version 2 to version 4 upgrade

Upgrades from version 2 to version 4 will be charged at 70% of the version 4 price.

Crossgrade

Customers who have a version of Flowcode for one microcontroller will be charged at 50% of the price of Flowcode for each subsequent microcontroller family.

Upgrade procedure

Please contact Matrix Multimedia or one of our dealers with your old serial number which is found on the inside of your CD ROM case.

Buying online

The only downloadable version available is the free version. Copies of Flowcode for purchase are only available in CD ROM form from Matrix or an authorised dealer.

Activation

Each product will need activation with a code issued by Matrix. An internet connection is recommended for this.

Upgrade rights

A version of Flowcode 3 is bundled with MIAC and various other packages. This version has no upgrade rights and customers will need to pay the full price for version 4.

Technical specification



Flow chart icons

Input, Output, Delay, If, Switch case, Connection point, Goto connection point, While, Macro, Component macro, Calculation, String calculation, Interrupt, C/ASM icon, Comment.

Virtual systems

Formula Flowcode, MIAC

Standard components

LED, LED array, Switch, Switch bank, LCD display, ADC/sensor, 7-segment display, Quad 7-segment display, Keypad, PWM.

Advanced components

SPI master, I²C master, SPI(legacy), Internet TCP/IP, Webserver, CAN bus, Advanced CAN bus, LIN master, LIN slave, EEPROM, IrDA, Bluetooth, GPS, RS232, Graphical colour LCD display, FAT16, MIDI, USB HID, USB slave, USB serial bus, Zigbee, RFID, Stepper motor, Servo motor, Speech, One wire bus.

Technical requirements

Windows XP, Vista, and later.

Output

Produces C code, ASM code and hex/bin code compatible with the target microcontroller.

Version timelines

May 2009 - V4 - initial release: PICmicro MCU version in English only.

August 2009 - V4.I release: PICmicro versions in Chinese(simplified), Danish, Dutch, French, German, Greek, Hungarian, Italian, Japanese, Portugese, Romanian, Slovakian, Spanish, Turkish.

Late 2009: AVR and ARM versions with target language support for Chinese (Taiwanese), Finnish, Slovenian, and Swedish.



Target microcontrollers - PICmicro

10F200, 10F202, 10F204, 10F206, 10F220, 10F222, 12C508, 12C508A, 12C509, 12C509A, 12C671, 12C672, 12CE518, 12CE519, 12CE673, 12CE674, 12F609, 12F615, 12F629, 12F635, 12F675, 12F683, 12HV609, 12HV615, 16C716, 16C717, 16C72, 16C72A, 16C73, 16C73A, 16C73B, 16C74, 16C74A, 16C74B, 16C76, 16C77, 16C770, 16C771, 16C84, 16C87, 16C872, 16C883, 16C884, 16F1933, 16F1934, 16F1936, 16F1937, 16F1938, 16F1939, 16F616, 16F627, 16F627A, 16F628, 16F628A, 16F630, 16F631, 16F636, 16F639, 16F648A, 16F676, 16F677, 16F684, 16F685, 16F687, 16F688, 16F689, 16F690, 16F716, 16F72, 16F722, 16F723, 16F724, 16F726, 16F727, 16F73, 16F737, 16F74, 16F747, 16F76, 16F767, 16F77, 16F777, 16F785, 16F818, 16F819, 16F83, 16F84, 16F84A, 16F87, 16F870, 16F871, 16F872, 16F873, 16F873A, 16F874, 16F874A, 16F876, 16F876A, 16F877, 16F877A, 16F88, 16F883, 16F884, 16F886, 16F887, 16F913, 16F914, 16F916, 16F917, 16F946, 16LF1933, 16LF1934, 16LF1936, 16LF1937, 16LF1938, 16LF1939, 18F1220, 18F1230, 18F1320, 18F1330, 18F13K50, 18F14K50, 18F2220, 18F2221, 18F2320, 18F2321, 18F2331, 18F23K20, 18F2410, 18F242, 18F2420, 18F2423, 18F2431, 18F2439, 18F2450, 18F2455, 18F2458, 18F248, 18F2480, 18F24J10, 18F24J11, 18F24J50, 18F24K20, 18F2510, 18F2515, 18F252, 18F2520, 18F2523, 18F2525, 18F2539, 18F2550, 18F2553, 18F258, 18F2580, 18F2585, 18F25J10, 18F25J11, 18F25J50, 18F25K20, 18F2610, 18F2620, 18F2680, 18F2682, 18F2685, 18F26J11, 18F26J50, 18F26K20, 18F4220, 18F4221, 18F4320, 18F4321, 18F4331, 18F43K20, 18F4410, 18F442, 18F4420, 18F4423, 18F4431, 18F4439, 18F4450, 18F4455, 18F4458, 18F448, 18F4480, 18F44J10, 18F44J11, 18F44J50, 18F44K20, 18F4510, 18F4515, 18F452, 18F4520, 18F4523, 18F4525, 18F4539, 18F4550, 18F4553, 18F458, 18F4580, 18F4585, 18F45J10, 18F45J11, 18F45J50, 18F45K20, 18F4610, 18F4620, 18F4680, 18F4682, 18F4685, 18F46J11, 18F46J50, 18F46K20, 18F6310, 18F6390, 18F6410, 18F6490, 18F6520, 18F6527, 18F6585, 18F65J10, 18F65J15, 18F6620, 18F6622, 18F6627, 18F6680, 18F66J10, 18F66J15, 18F66J60, 18F66J65, 18F6720, 18F6722, 18F67J10, 18F67J60, 18F8310, 18F8390, 18F8410, 18F8490, 18F8520, 18F8527, 18F8585, 18F85J10, 18F85J15, 18F8620, 18F8622, 18F8627, 18F8680, 18F86J10, 18F86J15, 18F86J60, 18F86J65, 18F8720, 18F8722, 18F87J10, 18F87J60, 18F96J60, 18F96J65, 18F97J60, 18LF13K50, 18LF14K50, ECIO-28, ECIO-40, Formula Flowcode Buggy, Locktronics PIC, MCHP_FUSUB, MIAC, RF12F675F, RF12F675H, RF12F675K

Target microcontrollers - AVR

T90CAN128, AT90CAN32, AT90CAN64, AT90PWMI, AT90PWM2B, AT90PWM3B, AT90S2313, AT90S2323, AT90S4433, AT90S815, AT90S8535, AT90USB1286, AT90USB1287, AT90USB162, AT90USB646, AT90USB647, AT90USB82, ATMEGA103, ATMEGA128, ATMEGA1280, ATMEGA1281, ATMEGA1284P, ATMEGA16, ATMEGA161, ATMEGA162, ATMEGA163, ATMEGA164, ATMEGA164P, ATMEGA168, ATMEGA168P, ATMEGA169, ATMEGA169P, ATMEGA16M1, ATMEGA16U4, ATMEGA2560, ATMEGA2561, ATMEGA32, ATMEGA323, ATMEGA324, ATMEGA324P, ATMEGA325, ATMEGA3250, ATMEGA3250P, ATMEGA325P, ATMEGA328, ATMEGA328P, ATMEGA329, ATMEGA3290, ATMEGA3290P, ATMEGA329P, ATMEGA32C1, ATMEGA32M1, ATMEGA32U4, ATMEGA32U6, ATMEGA48, ATMEGA48P, ATMEGA64, ATMEGA640, ATMEGA644, ATMEGA644P, ATMEGA645, ATMEGA6450, ATMEGA6450P, ATMEGA645P, ATMEGA649, ATMEGA6490, ATMEGA6490P, ATMEGA649P, ATMEGA64C1, ATMEGA64M1, ATMEGA8, ATMEGA8515, ATMEGA8535, ATMEGA88, ATMEGA88P, ATTINY13, ATTINY167, ATTINY2313, ATTINY24, ATTINY25, ATTINY26, ATTINY261, ATTINY44, ATTINY45, ATTINY461, ATTINY84, ATTINY85, ATTINY861, ATTINY87

Target microcontrollers - ARM

AT91SAM7S512, AT91SAM7S256, AT91SAM7S128, AT91SAM7S64, AT91SAM7S321, AT91SAM7S32, AT91SAM7S16, AT91SAM7S161, AT91SAM7S32, AT91SAM7SE256, AT91SAM7SE512

Note that microcontroller compatibility changes on a frequent basis. If you have specific microcontroller requirements then please contact your dealer.

Order codes

Flowcode for PICmicro MCUs

Student version:	TEFLCHM4
Pro version:	TEFLCSI4
10 user education version:	TEFLCI04
Site licence education version:	TEFLCSL4
Student rental version	TEFLCSR4

Flowcode for AVR MCUs

Student version:	TEVRHM4
Pro version:	TEVRSI4
10 user education version:	TEVRI04
Site licence education version:	TEVRLS4
Student rental version	TEVRSR4

Flowcode for ARM

Pro version:	TERMSI4
10 user education version:	TERMI04
Site licence education version:	TERMSL4

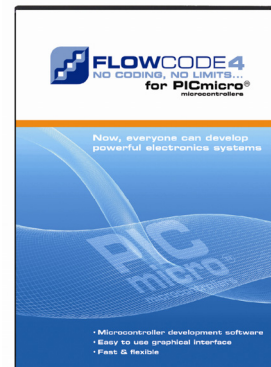
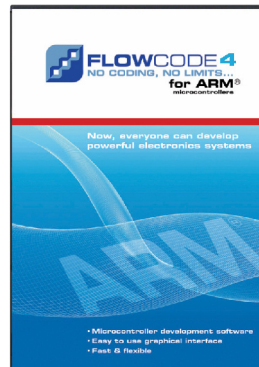
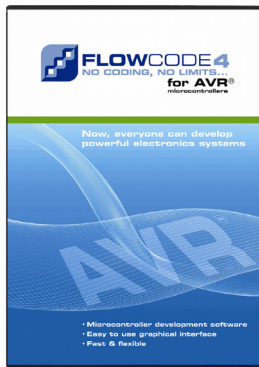
Flowcode Ultimate - for ARM, AVR and PICmicro

Pro version:	TEULSI4
10 user education version:	TEULI04
Site licence education version:	TEULSL4



FLOWCODE 4

NO CODING, NO LIMITS...



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