Flowcode allows those with little programming experience to develop electronic systems quickly and easily.
Flowcode is one of the World’s most advanced graphical programming languages for microcontrollers.

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

**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 an electronic system without writing traditional code line by line.
- **Fast and flexible** Flowcode has a host of high level component subroutines which means rapid system development. The flowchart programming method allows user 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 though 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** Microchip PIC 10, 12, 16, 18, dsPIC, PIC24, Atmel AVR, Atmel ARM.
- **Supported communication systems** Bluetooth, CAN, FAT, GPS, GSM, I2C, IrDA, LIN, MIDI, One wire, RC5, RF, RFID, RS232, RS485, SPI, TCP/IP, USB, Wireless LAN, Zigbee.
- **Supported components** ADC, LEDs, switches, keypads, LCDs, Graphical colour LCD, Graphical mono LCDs, Sensors, 7-segment displays, Internal EEPROM, comms systems, Touchscreen LCD, Webserver.
- **Supported mechatronics** Accelerometer, PWM, Servo, Stepper, Speech.
- **Supported subsystems** MIAC, MIAC expansion modules, Formula Flowcode.
- **Panel designer** Design a panel of your choice on-screen and simulate it.
- **In-Circuit Debug (ICD)** When used with EB006 PIC Multiprogrammer, EB064 dsPIC/PIC24 Multiprogrammer or FlowKit.
- **Tight integration with E-Blocks** Each comms system is supported by E-blocks hardware.
- **Virtual networks** Co-simulation of many instances of Flowcode for multi-chip systems. Co-simulation of MIAC based systems with MIACbus.
supported components

**Inputs**
- ADC
- Keypad
- Switch
- Switchbank

**Outputs**
- LED7seg4
- gLCD / touchscreen
- LCD display
- LED
- LED array
- LED RGB

**Comms**
- CAN
- CAN2
- i²C_master
- LIN master
- LIN slave
- One wire
- RS232 / RS485
- SPI

**Wireless**
- Bluetooth
- IrDA
- RF
- RFID
- Zigbee

**Peripheral**
- FAT
- MIDI
- USB HID
- USB Serial
- USB Slave
- Web server
- WLAN

**Mechatronics**
- Accelerometer
- PWM
- RC5
- Servo
- Speech
- Stepper

**MIAC expansion**
- MIAC system
- Advanced
- Basic
- Bluetooth
- Comms
- GSM
- Industrial
- Sensors
- Serial
- Slave
- Co-ordinator
- Router

**Misc.**
- Formula Flowcode
- MIAC
- Custom
- EEPROM
- GPS
- GSM
The features in Flowcode 5 are designed to improve the developing environment for professional users. There are many new features but the major ones are:

**C code views and customisation**
Improvements to the C code viewing and editing. View the flowchart or its generated C code, or even show and edit the flowchart and the C code side-by-side. Insert new icons into the C code in the same way as you can with the flowchart. Customise the C code behind individual components and use Flowcode as a C code management tool.

**Simulation improvements**
Improved the simulation and mathematics parsing. Simulation is faster and truer to “real-life”.

**New components and E-Blocks support**
Touchscreen systems, RC5, accelerometer, WLAN, rotary encoder and more.

**Search and replace**
Search the whole program for icon and variable use, and replace where needed.

**Improved support**
Access help, support, videos, updates and more from within Flowcode.

**Project auto-documentation**
Creates a HTML document for the whole program to allow the program to be easier understood by others.

**Interrupts overhaul**
Improved range and handling of chip interrupt features in terms of simulation and code generation.
**Improved annotations**
The annotation feature has been improved to allow flowchart icon functionality to be better commented and understood.

**Disable icons feature**
Icons can be temporarily disabled within Flowcode to assist in debugging.

**Compilation errors and warning**
Better linkage between errors in the compiler and location in Flowcode program makes programs easier to debug.

**Improved annotations**
The annotation feature has been improved to allow flowchart icon functionality to be better commented and understood.

**Project explorer**
New project explorer tree-view for components, variables, etc. makes for easier editing and improves project transparency.

**MIAC expansion**
New support for additional MIACs in an electrical system and for the new range of MIAC expansion modules.

**New variable types +**
New data types include bool, long, uint. Constants now implemented. Possible to set initial values for variables in simulation. Port and pin values are directly supported. Syntax highlighting implemented for Flowcode icons.

**Bookmarks**
Bookmark icons within your flowchart to help navigation through larger programs.
1 design
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. View the C code created, customise the C code each icon and component represents. Incorporate C code from other sources.

2 simulate
Drag and drop the components you need onto your simulation panel. Adjust graphical properties of components, design your own graphics, embed photographs and images, assign pin connections to the microcontroller. Simulate the program icon by icon, or at full speed. See the effects on the components, the microcontroller, watch variables change and then flow through the program. Test the system’s functionality by clicking on switches or altering sensor values, and see the effects on-screen.
3. **test**
Compile and download to your system with one button click. Use the In Circuit Test feature to see your program working on-screen and on Matrix development hardware or your own hardware.

4. **deliver**
Download your code into a microcontroller in your own circuit board and control a wide variety of systems - from mobile home habitation systems to wind turbines. Transfer your code to a fully functioning electrical datalogging and control system using rugged MIAC technology. Transfer your program to a new microcontroller with ease.
Flowcode is internationally recognised as a market leader in microcontroller development for education. Flowcode is used in more than 1,200 schools, colleges and universities worldwide. Flowcode is used in a variety of subject areas including technology, science, electronics and automotive.

Flowcode can be used with many microcontroller development hardware solutions including those from Matrix that you can see here:

- 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

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

E-Blocks and Flowcode are used to train British army technicians.

Flowcode is used by many technical institutes in Finland.

**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 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 DCDC 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.
FlowKit In Circuit Test system

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.
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.

**Flowcode community**
Our extensive online forums are the first point of call for any technical questions you have: on getting your equipment and software working, and on coding techniques and methods for your project.

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

**Books**
There are several books on developing electronic systems with Flowcode. Microcontroller Systems Engineering, by Bert Van Dam, and Pic Projects for Non-Programmers by John Iovine, are both available from the Matrix website.
licensing, versions and upgrades

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

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

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 of 10 user versions.

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

Version 4 to version 5 upgrade
Upgrades from version 4 to version 5 will be charged at 50% of the version 5 price.

Version 3 to version 5 upgrade
Upgrades from version 3 to version 5 will be charged at 70% of the version 5 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
Upgrade rights do not apply to all versions of Flowcode. If your version of Flowcode has been included free of charge with MIAC or other hardware systems then upgrade rights might not apply.

Annual student rental
Max number of students is 200.
**PICmicro supported devices**

**dsPIC/PIC24**

**AVR**

**ARM**

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