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What is Flowcode?

Flowcode is an advanced integrated development environment (IDE) for electronic and electromechanical system development targeting microcontrollers such as Arduino, PIC and ARM, and rugged industrial interfaces using protocols such as Modbus and CAN.

Non-programmer friendly

Those with little or no programming experience can use Flowcode without barriers. In a matter of minutes, beginners can start to develop electronics systems using the graphical programming modes available. Flowcode is perfect for teaching and learning key microcontroller system principles.

Flowcode saves time

Being an intuitive, graphical programming IDE gives Flowcode users the ability to develop complex systems quickly. Engineers use Flowcode because it allows for fast development, speeding up learning processes for microcontroller systems development.
Fast & easy graphical programming

Choice of programming methods
Being able to use graphical icons to develop your system makes Flowcode easy-to-use. If you’re a first-time developer or have little experience of developing electronic systems, Flowcode will make it easy for you to pick up the fundamentals and run with your designs without getting bogged down in syntax. Users can choose between two graphical methods of programming - flowcharts or Blocks - and two scripted coding modes - Pseudocode or C - making for a very flexible IDE.

Fast system development
Programming can be a complex, drawn out process and can often result in errors. Ensuring your code is accurate and precise takes skill and time. With Flowcode, your job becomes easier. Programs that previously took hours to design and perfect can be brought together in minutes. The added advantage of simulation also allows you to check and test your designs prior to compilation to a microcontroller.

Learn and program using C code
If you’re a more advanced programmer or have pre-written code you want to embed into your design, Flowcode allows you to do just that. What’s more, if you’re using graphical icons, you can view and learn code side-by-side with your design, meaning academic users of Flowcode develop their learning over time. Convert your C code into graphical programs and your graphical programs into C to develop and grow your understanding. You can now even simulate your C code, too.
Test & Debugging

Ghost Technology

Ghost Technology is an advanced way of testing and debugging your electronic system. Using Matrix’s range of E-blocks and E-blocks2 hardware, you can monitor every pin and every variable on your microcontroller and interpret serial data inputs and outputs. Flowcode includes an in-software oscilloscope and data recorder which both display feedback and information live from the hardware you’re using.

Simulation debugger

For many engineers, a key requirement is to ensure the designs you have developed will work when you compile to your microcontroller. Flowcode allows you to do all you need in simulation using the simulation debugger. This becomes active during simulation and is used to monitor both the values of the variables in your program, and the macros which are being called. Flowcode 8 allows you to simulate your C code.

Code profiling

Code profiling shows the user when icons have been ‘hit’ when the program is executed, distinguishing between sections of code that may be redundant and other parts which are executed often. This helps you improve program efficiency.
In-Circuit-Test and In-Circuit-Debugging

In Circuit Debug (ICD) allows you to control the execution of your Flowcode program on E-blocks & E-blocks2 hardware. This allows you to Run, Step, Pause, use Breakpoints, and monitor and set variable values. In Circuit Test (ICT) allows you to monitor the signals on the pins of your microcontroller, providing you with a clear picture of what is happening on your hardware. ICT mode also allows you to decode communications signals including UART, SPI and I2C packets.
Simulation

Simulate your code
Prior to deploying your code to a microcontroller, you can simulate in Flowcode, to ensure your design is accurate and will run as you expect. This can be done not only for your flowchart, Blocks or Pseudocode projects, but even for your C code-based developments, too.

Create simple designs
Create simple actuators or valves or add simple shapes to your existing designs and use the built in API to control these creations during simulation. You can even use the Flowcode system panel tools to create your own simple 3D models.

Import your designs from CAD packages
Flowcode integration with third party drawing packages (such as Solidworks), through support for various file formats, means that you can easily import your 3D drawings and designs into Flowcode, then characterise and bring their electromechanical elements to life with the advanced simulation capabilities. Check out the how-to guide here.

Multi-view system panel
View your designs from different angles within the system panel. Split-screen capabilities means you can ensure you are happy with your electronic design. Furthermore, high-speed simulation means that your system works close to real-time - so you can verify your design 'live'.

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Component Library

Pre-developed components

A whole suite of electromechanical components exists in our large library of parts; from simple switches and LED’s to more complex communications modules. These components are developed and grown with every release of Flowcode we launch, ensuring you have what you need to develop your electronic systems. Academic licences gain access to all components, with professional and standard users gaining access through the purchase of feature packs.

Communications components

Communications developments form a large part of modern day electronic education and understanding. Communications protocols including CAN bus, Bluetooth, USB, Ethernet and Wi-Fi are widely studied across the globe. All of these components are available within the Flowcode environment and come as standard with all academic licences.

New components added

Flowcode 8 contains hundreds components that can be used to create a wide range of electrical and electromechanical systems. These components can also be used as a basis for creating your own components or simulations. Version 8 includes a number of new components for system development and more are constantly being added via the dynamic update system. You can find a full list of components in the Flowcode datasheet.
What's new in Flowcode 8

New programming modes
Flowcode is the perfect flowcharting language for platforms including Arduino; however, users can now program in “Blocks” mode, “Pseudocode” as well as C code. Programming using Blocks can be likened to the way the Blockly library is used to create block programming languages such as Scratch or App Inventor, whilst Pseudocode gives users a new way to construct commands and build programs without the complexities of C.

C-code Conversion and Simulation
You can now convert your most C code programs to other programming modes including flowcharts. Moreover, you can simulate C code with ease.

Code folding & Icon grouping
Users can improve the readability of their programs by using the new in-built facilities to collapse sections of their programs and group together specific icons.
C-code simulation and conversion

You can now convert most C code to flowcharts and simulate C code with ease. Flowcode has always allowed users to turn flowcharts into C code, but the opposite has not been possible. Flowcode 8 changes this, and also allows users to not only switch between the four main programming modes, but to simulate C code for the first time.

To convert to C code, simply click on and highlight the C-code icon you wish to convert into Flowcharts and press the new C conversion icon on the toolbar. The C code will then be parsed by Flowcode and transformed into the relevant flowchart icons.

Hover over the picture on the left to see the C-code being transformed.

Raspberry Pi as a Flowcode target

For the first time, Flowcode 8 enables users to target the hugely popular Raspberry Pi board. Whether you are working with a Raspberry Pi model 2B(v1.2), 3B or 3B+, it’s an intuitive way to program for you, either at home or in the classroom. Alongside this, our E-blocks hardware platform also supports the Raspberry Pi and the Raspberry Pi Shield is perfect for those who wish to integrate their Pi into the E-blocks system.
Code folding & Icon grouping

Code Folding
Code Folding is a new feature in Flowcode 8 which will improve the readability of your projects. By clicking on the [+] or [-] icon within the flowchart, this will collapse the preceding icons, reducing the amount of clutter on the screen.

Icon Grouping
Icon Grouping will allow you to create custom groups of icons which you can then copy and paste to easily manage commonly used code within your projects.

These two new features give you the ability to create compact, easy to follow projects for yourself, your students or colleagues.

Auto ID your hardware

Flowcode can be used by users of any hardware platform supported by the software. For example, Arduino or Raspberry Pi users can use their own boards as a direct target for the projects they develop in Flowcode. Users of E-blocks2 hardware can now benefit from a very impressive new feature in Flowcode 8, which is the ability to automatically identify the hardware boards they have connected to their laptop or PC via USB. This ensures that users can be clear about which boards they are using and not worry about the configuration of their hardware before compilation of their projects.
Flowcode SCADA

Flowcode SCADA (Supervisory Control And Data Acquisition) allows users to quickly and easily create PC based control and data acquisition programs with graphical Human Machine Interfaces (HMI) based on flow charts.

How does it work?
Users write programs using flowcharts, pseudocode, or blocks. Simply drag flowchart icons onto the screen and set their parameters to create the program. A number of premade visual components including meters, 7-segment displays, dials, switches, and indicators can be dragged onto the system panel to show relevant information and allow user control of the local or remote interface. The resulting program can be deployed as a stand-alone application that runs independently of Flowcode and can be distributed to other users. The software is supplied with a large number of pre-written macros for control, data processing, communications, visual data representation and interfaces well to other analysis tools.

Flowcode SCADA is a low cost and simple way of allowing visually rich and feature rich PC control and data acquisition for electronic and electromechanical systems.
Arduino and Flowchart programming

The Arduino prototyping hardware platform has a large following of educators and enthusiasts around the world. Flowcode can target and program Arduino hardware directly. E-blocks hardware is also available to provide access to modular plug and play circuitry as well as debugging support.

Flowcode includes support for many of the AVR based Arduino boards available including the Deumilanove, Leonardo, LilyPad, Mega, Micro, Mini, Nano, Uno and more. Graphical Arduino programming in the form of flowcharts or blocks is possible using Flowcode’s powerful development environment. This presents users with multiple benefits including:

- Syntax-free coding; users do not get bogged down with missing semi-colons any longer
- Drag and drop of coding icons and programming libraries
- Simulation of Arduino projects (including graphical and most C code programs)
- Inbuilt test-and-debug capabilities
- Multiple programming modes (visual and textual) and effortless conversion between them
- C code editing and conversion to graphical icons
- Simple porting between devices, including non-Arduino targets

Arduino and Education

Matrix offers support to Arduino users via our hardware platform, E-blocks2 (see our Arduino microcontroller system development kit, right). We also offer both on-site training to your centre, and remote training through our curriculum provision. You can see our microcontroller systems course for free, or read more about how we support education with Arduino programming on our Education page.
Flowcode in Education

Flowcode academic licences are available to schools, colleges, universities and training providers at a discounted rate in comparison to standard and professional licences. We offer “single user”, “ten user” and “site” licence versions. Prices can be obtained by contacting us directly, or by contacting one of our worldwide distributors.

FREE Student licences

For the first time, those academic institutions and training centres who are using Flowcode can license their students for home use of Flowcode completely free of charge, as long as you remain on the latest released version.

BTEC Level 3, unit 6

The Edexcel BTEC NQF qualification at National level (3) unit 6; Microcontroller systems for engineers, states that specific hardware and software must be used by centres in their delivery. Amongst the software that can be used is Flowcode. Users can take advantage of the graphical capabilities of Flowcode when it comes to using the Arduino or PIC hardware. In addition to Flowcode, we have two hardware kits, perfect for delivery of this unit on either Arduino or PIC, plus a FREE BTEC approved course on Microcontrollers

- PIC Microcontroller System Development Kit
- Arduino Microcontroller System Development Kit
- FREE Microcontroller Introduction course for BTEC
- BTEC Unit 6 forum support area

Support & Training

One of the huge benefits of academic and training institutions opting to work with us is the extensive support we can offer. You’ll find more in the support pages of Flowcode, but if you want to know more about how you and your colleagues can benefit from using Flowcode and accessing our training courses, do not hesitate to get in touch. We are able to offer Flowcode users on-site Flowcode training, which can be delivered at your place of work/study at a competitive per day rate. Alternatively, we love having people to visit our HQ in Halifax, West Yorkshire for training.
Testimonials

“Teaching the BTEC L3 and L4 Microcontroller units to students with a mechanical engineering background using the Arduino IDE was a struggle for both the students and myself. Then I discovered Flowcode and life became so much easier. No worries about missing semicolons, round brackets where curly brackets should have been used etc. Flowcode is more than just an entry level tool to programming with the more able students tackling some really complex problems using timer interrupts, I2C peripherals and simple multi-tasking schemes.”

Eastleigh College, United Kingdom

“We have been using Flowcode since 2010 in our microcontroller laboratories. Flowcode is the ideal perfect system to teach the students a systematic and organized, but simple way of programming microcontrollers. Since Flowcode covers multiple microcontroller platforms, the students are not limited to one type of microcontroller. About three years ago, we updated our control laboratory, and we started using Flowcode for digital control on dsPIC microcontrollers. Flowcode is a great educational tool, updated frequently to keep up with the newest and most advanced technologies. Many of our students use Flowcode in the design and programming of their senior embedded system design projects. They love the advanced simulation and In Circuit Testing capability of Flowcode too (Ghost Technology). I cannot explain enough my appreciation and my students’ enjoyment and satisfaction of learning using Flowcode. I must also mention the prompt help and support provided by Matrix at all times. Finally, after using Flowcode for several years, flowcode proved to be the best tool for programming several microcontroller platforms from entry level student projects to very advanced and sophisticated projects.”

George Breidy, ECCE Laboratory Supervisor, Notre Dame University, Lebanon

“In 2015, the department of electronic engineering began using a range of E-blocks hardware solutions for specific telecommunications programs to be taught at the University. I used Flowcode for the students in a module called “Embedded Systems Engineering” (MSc and MEng module). Some students have never used microcontrollers before and they were able to use Flowcode easily for basic microcontroller based embedded system design on a ping pong game. The students moved on to use Flowcode for a project on ZigBee based wireless network system for environment monitoring. The project was very successful.”

Hongying Meng, Brunel University, United Kingdom
Supported Devices

Arduino programming

One of the major benefits of using Flowcode, is that it simplifies the programming of Arduino platforms through its use of graphical programming. Arduino support means you can do more with your Arduino than you ever dreamed, and you can even integrate it into our E-blocks modules with our E-blocks2 Arduino Shield.

E-blocks & E-blocks2

Use Flowcode to program Matrix’s E-blocks, the perfect platform for learners, engineers and electronic system developers to quickly prototype your designs on a rugged set of hardware. Programming boards and peripheral downstream boards, ranging from input and output, to communications and prototyping makes this the ultimate development platform. Our new E-blocks2 range is out now, and features development boards and kits for Arduino, PIC MCUs, Raspberry Pi, ARM and more.

MIAC

The MIAC range from Matrix gives electronic engineers a rugged industrial platform on which to develop their designs. The MIAC range of hardware is fully supported by Flowcode and is available with a choice of Microcontroller brain: 8bit PIC, 16bit PIC or Arduino. Users have a PLC which is easy to program, reliable and perfect for harsh, industrial environments.
8Bit PIC
Flowcode provides support for a range of 8-bit microcontrollers from Microchip, with an easy-to-use development environment, technical documentation and our hardware platform.

16Bit & 32bit PIC
Flowcode also supports Microchip’s 16-bit (also known as dsPIC or PIC24 devices) and 32-bit (PIC32) families of MCU’s. The PIC32 family delivers 32-bit performance and more memory, to solve increasing complex embedded system design challenges.

Raspberry Pi
New in Flowcode 8, is the ability to control Raspberry Pi devices. For those wanting to integrate the Raspberry Pi into our new E-blocks2 range, we have also developed a hardware platform, the Raspberry Pi Shield, through which your Raspberry Pi becomes compatible with the whole new range of Eblocks2 boards. Perfect for those studying Computer Science or those who wish to develop using the Pi.

Microchip templates
Another new feature of Flowcode 7 is the inclusion of templates for a number of popular Microchip development boards including the Curiosity and Xpress boards.

AVR & ARM
Atmel’s AVR devices and ARM MCUs including the popular STM32 ARM family are also supported in Flowcode.
Datasheet

32MZ1024EFH100,
32MZ1024EFH124,
32MZ1024EFH144,
32MZ1024EFK064,
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32MZ1024EFK124,
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Raspberry Pi
BL0036, RPI1, RPI1A, RPI1B, RPI2, RPI3

SCADA
Default
## Version control

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