What is Flowcode?

Flowcode software allows you to develop complex electronic and electromechanical systems with ease.

Flowcode software allows you to quickly and easily develop complex electronic and electromechanical systems. The graphical programming tool allows even those with little experience to develop complex electronic systems in minutes.

Flowcode is one of the world's most advanced environments for electronic and electromechanical system development. Engineers use Flowcode to develop systems for control and measurement based on microcontrollers, on rugged industrial interfaces or on Windows compatible personal computers.

A 2D and 3D graphical development interface allows students to construct a complete electronic system on-screen, develop a program based on standard flowcharts, simulate the system and then produce hex code for PICmicro® microcontrollers, dsPIC and PIC24 microcontrollers, AVR and Arduino microcontrollers and ARM microcontrollers.

Flowcode version 6 has a number of new developments which come together to create a software package which is amongst the best of its kind in the world. Flowcode is aimed at the 16 + market.

Flowcode SE has now also given the ability for those aged 12+ to learn about the development of complex electronic and electromechanical systems.

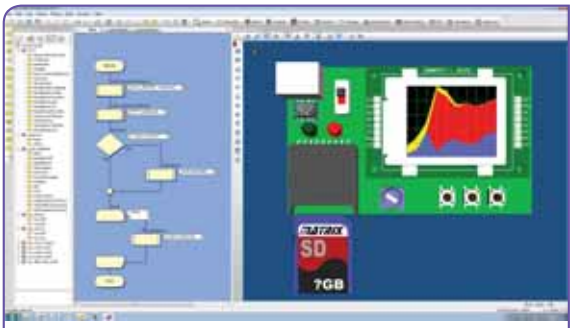
Flowcode is available in over 20 languages and is used by thousands of engineers and educators.

Based on flowcharts - minimal programming experience is required.

Open architecture - all aspects of Flowcode are fully customisable for your projects.

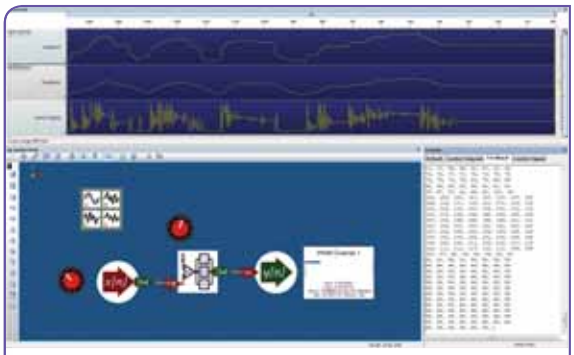
Fully Supported - with online tutorials, documentation and an active online community.

Transfer your design - easily between Windows, PICmicro, AVR, Arduino and ARM.

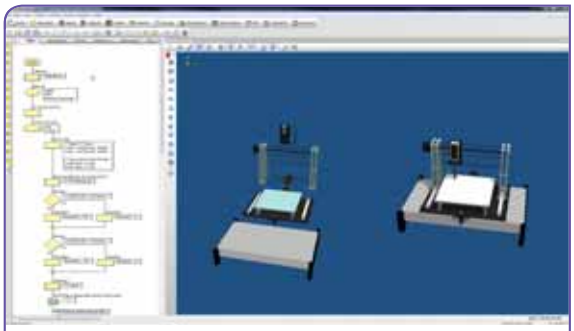


Improved Simulation:
Flowcode v6 has improved its simulation, making system design easier and faster.

3D Graphics Engine:
Extend your design to include electromechanical components and systems.



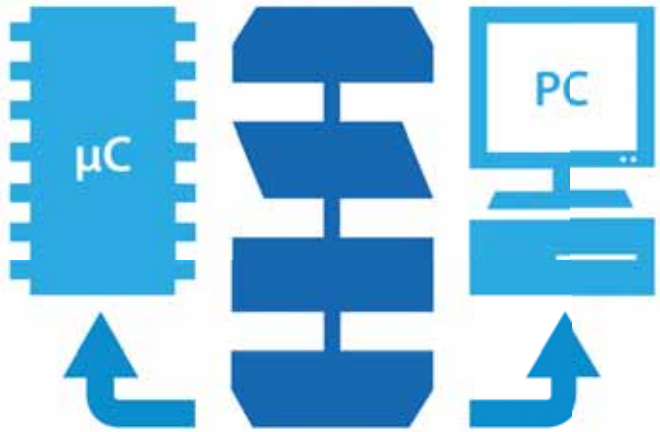
New Test Features:
The new test features in Flowcode v6 allow users to verify and record a system under test.



Component Creation:
Users can create their own components for more realistic system design and simulation.

Advantages of using Flowcode

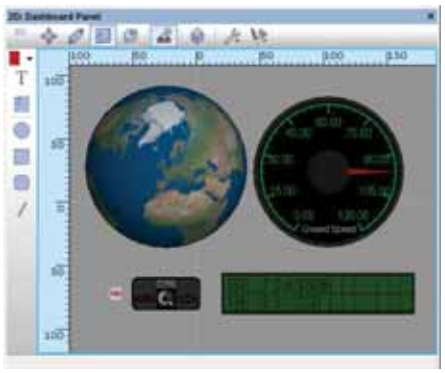
Microcontroller compiler and PC interpreter together make the design process easier.



Flowcode software is based on standard Flow chart symbols. Flow chart icons can be compiled to a microcontroller and can also be executed on a Windows PC. The PC-side software in Flowcode includes a full suite of Windows commands for mathematics, controlling graphics on the monitor, communications via Ethernet etc. In fact Flowcode 6 now includes a full Windows programming language as well as a microcontroller compiler.

This 'PC-side' and 'chip-side' functionality makes Flowcode really powerful:

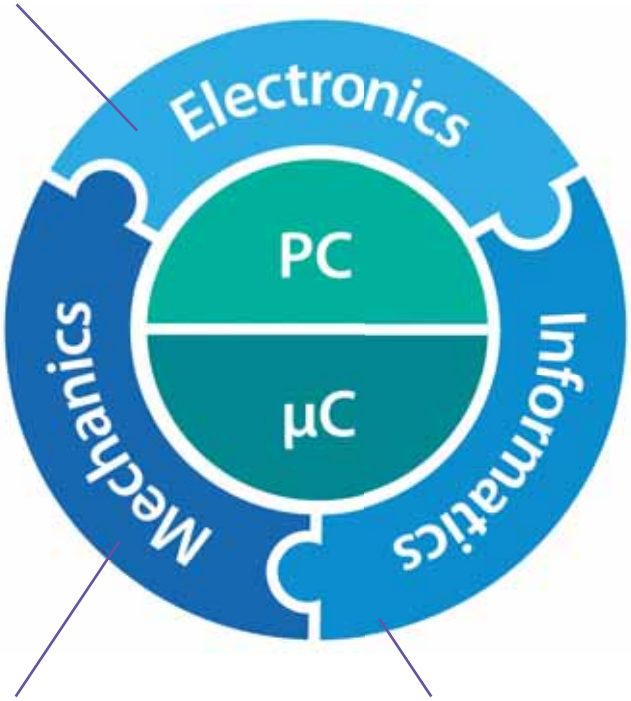
- Complex systems can be designed and simulated before chip-side compilation which saves design time
- In-Circuit-Test data can be linked to simulations to show system performance at run-time which proves designs function properly
- Programs can be deployed on a microcontroller or a Windows PC.



For example: GPS data from microcontroller In-Circuit-Test is processed by PC-side software into a human friendly format so that system design can be verified.

Focus on three technologies facilitates a systems level design which makes the design process easier.

- Sensors
- Signal processing
- Drive systems

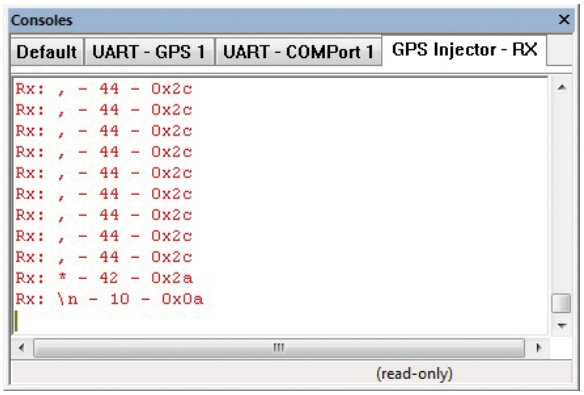


- Actuators
- Mechanisms
- Ergonomics

- Data manipulation
- Communications
- User interface

Flowcode's PC-side and chip-side features focus on Electronics, Informatics and Mechanics which gives Flowcode several advantages over other microcontroller compilers:

- Program design takes place at a systems level rather than at a chip level
- Program design time is shortened and made easier
- Programs for microcontrollers can be linked to PC side data files during design time
- Data decoding algorithms can be tested at the same time as control programs are developed



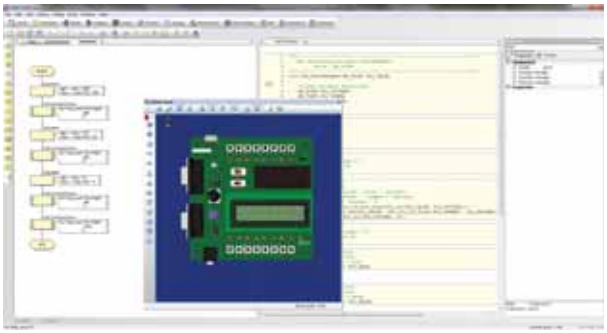
For example: During the design phase mock streams of serial digital data can be injected into a simulation so that decoding algorithms can be tested before compilation to chip.

Flowcode design flow

Design

Simulate

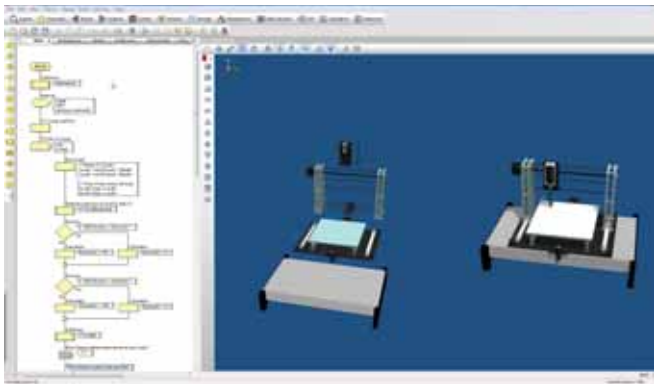
Circuit level



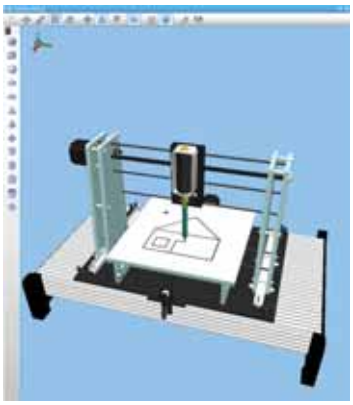
Design a virtual circuit board with PCB level components that connect to a virtual microcontroller and develop the program using flowcharts.

Simulate the program and circuit board components to check function using LEDs, displays to see function and interacting with virtual switches to control the system.

Electromechanical level

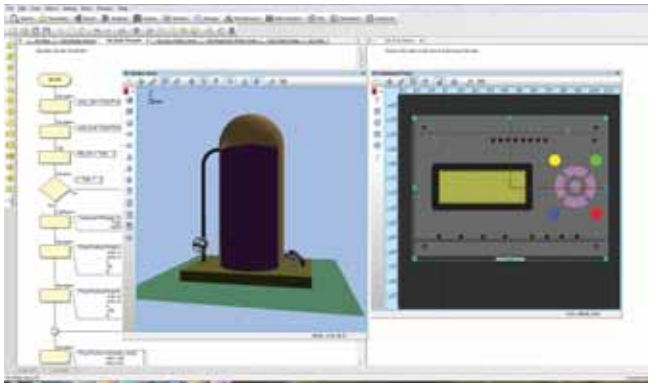


Develop a mechanical system in Solidworks and characterise it for Flowcode. Develop a flowchart program for control and operational data conditioning.

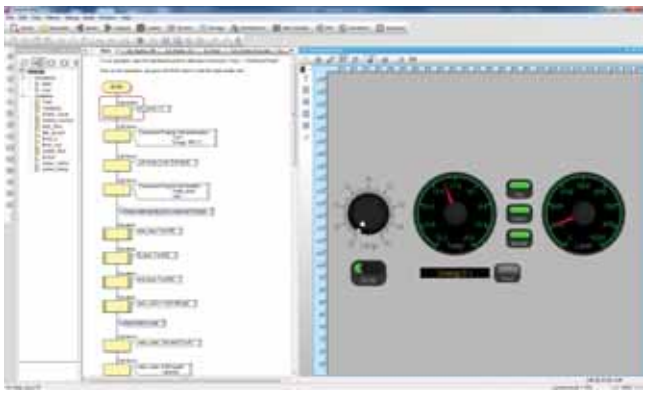


Simulate the mechanical system, the electronic system and the data decoding algorithms all in one package.

Systems level



Develop a mathematical and/or physical model of your system and develop a flowchart control program using Flowcode.



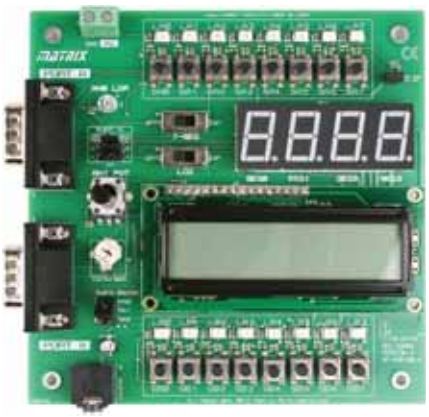
Use Flowcode Dashboard objects to simulate system performance in human friendly graphical format.

Flowcode design flow

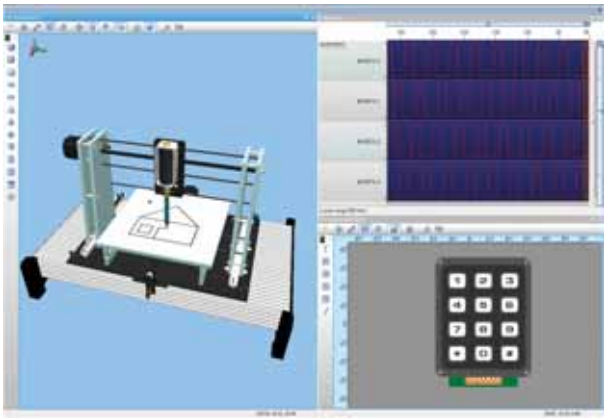
Test

Download to the microcontroller in the E-blocks development system and use In-Circuit-Test and Softscope feature to verify operation at pin level.

Deploy

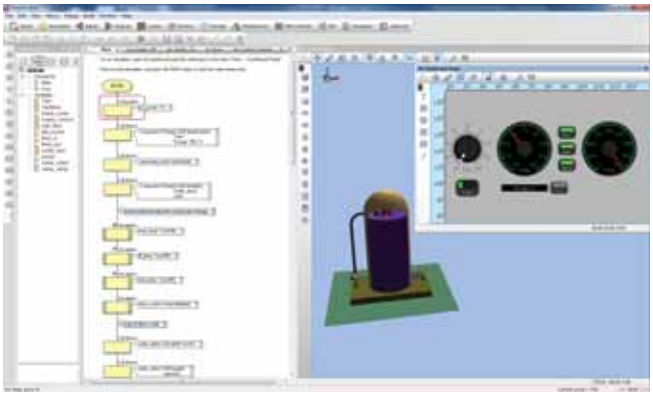


Develop the final circuit board and release to market.



Use In-Circuit-Test to test and debug at a pin level.

Develop the final product, verify operation and release to market.



Link Dashboard objects, Softscope and Console to third party instruments using DLLs in SCADA fashion to verify performance in real time.

Deploy your system in a control system based on microcontrollers, MIAC controller or Windows PC linked to third party controllers using DLLs.

Flowcode specification and ordering

Specification

OS/Processor cores
Windows XP, Vista, Windows 8, PIC10, 12, 16, 18, dsPIC/PIC24/PIC33, Atmel TINY, MEGA, Atmel AT91, SAM7, ARM, Arduino.

Inputs
Various switches, knobs and potentiometers both PCB and panel mounted. Keypads.

Outputs
Various LEDs and indicators, LED array, RGB LED, bar graph, single 7-seg display, quad 7-seg display, various monochrome LCDs, various colour graphic LCDs, multimedia modules. LED matrices, 4D Visi interface, PWM.

Mechatronics
Servo, stepper, DC motor, solenoid, Formula AllCode robot, Formula AllCode API

Media
Audio, video, MIDI, speech.

Wired communications
CAN, CAN2, I2C master, LIN master, LIN slave, RS232, RS485, SPI, TCP/IP, web server, MIDI, USB HID, USB serial, USB slave, Modbus, One wire.

Wireless communications
Bluetooth, GPS, GSM, RF ISM, RC5, IrDA, RFID, WLAN, Zigbee.

Storage
FAT16 and 32, internal EEPROM, lookup tables.

DSP
System, Kalman filter, output, inverse FFT, frequency generator, filter, FFT, control, level, scale, input, delay and sum.

Sensors
Accelerometer, gyro, compass, photo reflector, beam breaker, reed switch, thermistor, digital temperature, quadrature encoder, thermocouple, hall effect, cap touch on/off, cap touch slider, magnetometer, humidity, colour, ultrasonic, infrared.

Dashboard HMI controls
Text label, value reactor, switches and buttons, control knob, slider, bargraph meter, 'analogue' style meter, vertical scale, horizontal scale.

Injectors
CAN, GPS, Human interface, VNET, DS1307, AT.

3rd party instruments with DLL
ECIO, MIAC, FTDI UM232R, FTDI, UM245R, Velleman 8805 interface board, Picoscope 200 series, TTI Signal Generator (TG5011), TTI Power Supply (PL155-P).

Versions
The versions and features of Flowcode are shown in the table on the right. Academic versions are designed for vocational schools, universities, and schools with highly technical curriculum content. The schools edition (SE) is designed for schools delivering a Design and Technology curriculum.

Chip packs are reduced function versions for hobbyists and also characterise Flowcode for the various microcontroller cores supported. Order a second chip pack if you need a second microcontroller core.

MIAC is only supported in PIC versions.

For ordering Substitute 'XXX' for the appropriate core: PICmicro 16 and 18 series: 'PIC' AVR/Arduino: 'AVR', dsPIC/PIC24: 'DSP', Arm 7: ARM.

	Feature	Version					
		Free - first 30 days	Free - post 30 days	Chip pack only	Professional *	Academic	Flowcode SE
1	**General**						
	Commercial product rights	✗	✗	✗	✓	✗	✗
	Multi-seat license available	✗	✗	✗	✓	✓	✓
	Compile to Chip	✓	✗	✓	✓	✓	✓
	Unrestricted Chip selection	✓	✓	✓	✓	✓	✗
2	**System design**						
	Unrestricted programming icons	✓	✓	✓	✓	✓	✓
	Unrestricted programming size	✓	✓	✓	✓	✓	✓
	Control 3rd party hardware	✓	✓	✓	✓	✓	✓
	Code commenting	✓	✓	✓	✓	✓	✓
	Save and publish templates	✓	✓	✓	✓	✓	✓
	Access to plugins	✓	✓	✓	✓	✓	✓
	Access to simulation API	✓	✓	✓	✓	✓	✓
	Auto document	✓	✓	✓	✓	✓	✓
3	**Flowcode components** ***						
	Input / Output components	✓	✓	✓	✓	✓	✓
	Wired communications	✓	✗	✗	✓	✓	✗
	Wireless communications	✓	✗	✗	✓	✓	✗
	Wrapped wireless	✓	✗	✓	✓	✓	✓
	Mechatronics	✓	✗	✗	✓	✓	✓
	DSP	✓	✗	✗	✓	✓	✗
	Formula AllCode****	✓	✗	✓	✓	✓	✓
	MIAC**	✓	✗	✓	✓	✓	✓
4	**SCADA support**						
	In-Circuit-Test	✓	✗	✓	✓	✓	✓
	Third party instruments	✓	✓	✓	✓	✓	✓
	Consoles	✓	✗	✗	✓	✓	✓
	Softscope	✓	✗	✗	✓	✓	✓

* Professional requires at least one 'Chip Pack' to compile.
** PIC 'Chip Pack' required to compile.
*** This list is provided in much more detail in the Flowcode datasheet
**** dsPIC chip pack required to compile

Ordering information	
Flowcode Academic single	FC6AC01NEXXX
Flowcode Academic 10 user	FC6AC10NEXXX
Flowcode academic 50 user	FC6AC50NEXXX
Flowcode SE 50 user licence	FC6SE50

GHOST™

The Ghost chip on our new EB006 PICmicro Multiprogrammer enables advanced debug features.

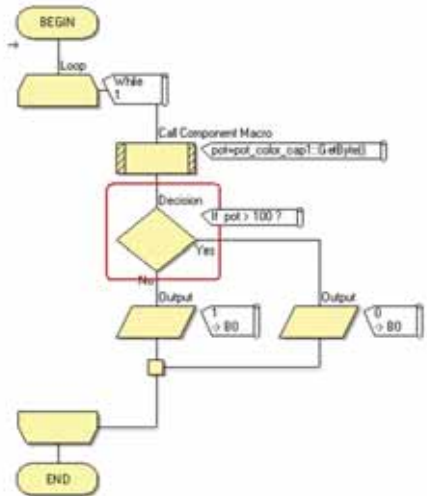
Ghost is a combination of PC-side and chip-side technologies which, when combined with Flowcode, provides a new way of debugging electronic systems.

Ghost technology provides a real time log of the status of all the pins on the microcontroller whilst a Flowcode program is running in real hardware. Ghost is designed to provide you with the best way of understanding what is happening in your electronic system.

There are two parts to Ghost technology: In-Circuit-Debug and In-Circuit-Test.

In-Circuit-Debug

When connected to Ghost compatible hardware the In-Circuit-Debug function allows you to run your program in hardware, to pause, to step through each command, and to run the program at different speeds.



When in ICD mode you can see the flow chart and icon under execution, you can view the status of variables, and alter their value.

ICD mode also allows you to set breakpoints at a number of places in your program so that you can see the status of the system at critical points.

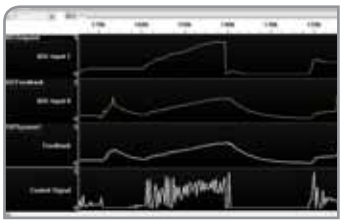
ICD is a really great tool for solving programming problems.

In-Circuit-Test

Ghost software within Flowcode takes the data gathered from the target chip and displays it in human friendly ways so that you can understand what is happening in your electronic system and debug it more easily. There are four instruments within Ghost:

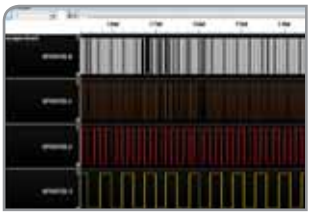
Multichannel analogue scope

The multichannel 'scope allows you to see the voltages on the analogue pins of the microcontroller.



Multichannel logic analyser

The logic analyser displays the digital status of the input output pins on your microcontroller. 32 pins are monitored and you can display as many as will fit on your screen.

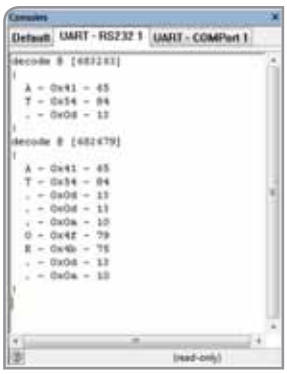


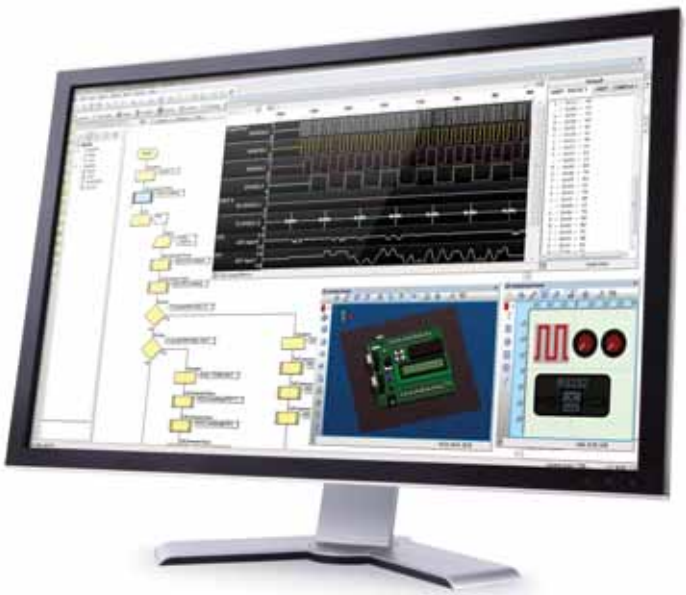
Packet decoder

The packet decoder allows you to convert the digital signals from the logic analyser into hexadecimal and see the traces as well as their numerical values. You can choose between different types of decoding such as I2C, RS232 etc.

Data console display

The data console displays a different view of the data captured by the packet decoder in Ghost. The console consists of a multi window scrolling text box displaying the sequentially decoded data. The different tabs in the console show different levels of decoding which makes the console a superb tool for developing projects involving digital communications.





Find out more about Ghost technology at: www.matrixtsl.com/ghost