



FLOW
CODE

Components and feature packs

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Free

RGB Xmas Tree	
7Segment (Quad)	14mm seven segment display. LED colour can be set from properties.
Combo Board (EB083)	A simulated version of the EB083 Combo board including LEDs, Switches, LCD, 7-Segs and analogue inputs.
GLCD (EB057 / EB058)	Graphical display component designed to work with the EB057 modules and EB058 E-blocks.
Keypad (EB014)	Preset keypad based around the 3 * 4 unit, as used by the Matrix EB014 E-block
LCD (EB005)	LCD based on the unit used in the Matrix EB005 E-block
LED (EB004)	An LED matrix made up of standard PCB mount 5mm LEDs.
Switch (EB007)	An array of up to eight momentary push switches, each connected to a single pin of the specified port.
Combo (BL0114)	A component to drive the BL0114 Combo board including LEDs, Switches, LCD, 7-Segs and analogue inputs.
LCD (BL0169)	LCD component to drive the E-blocks 2 BL0169 LCD board.Provides a 4 x 20 character alphanumeric display.
LED (BL0167)	LED component to drive the E-blocks 2 BL0167 LED board.Provides eight individually addressable LEDs.
IO Expander (BL0155)	Provides 16 digital input/output pins arranged into two 8-bit E-block 2 ports using a SPI bus connection.
GLCD (BL0139)	Graphical display component designed to work with the ST7567 type monochrome displays.Transfers data using a 4-wire SPI interface. Compatible with the EB2 BL0139 Downstream E-block.
GLCD EBM001	Graphical display component designed to work with the EBM001 colour display module.
Network Communications	A component designed to simplify the process of TCP/IP communications.Compatible with most of the Flowcode supported TCP/IP and WIFI components.A useful building block for creating components such as IoT and Modbus TCP.
TCP Template	Base TCP/IP component with simulation only interface to allow TCP/IP style network communications in simulation.Suitable for inheriting
Lookup tables	A lookup-table component allowing an easy way to place arrays of static data into ROM memory.The LUT data is accessed directly allowing very low overhead when collecting the data.
AllCode Robot Arm	Matrix 5-axis Robot Arm with Gripper.Compatible with the Matrix Robot ARM Training Curriculum and Hardware.Features gripper pressure sensor, light sensor, colour sensor, Potentiometer, Magnetic sensor.
Formula AllCode (RB4420)	A component to allow all the features of the Formula AllCode robot to be investigated.Fully simulated component which can interact with simulated objects on the panel as well as control the real hardware.
Formula AllCode API	A simulation only component to allow the Formula AllCode robot to be controlled via it's API interface and Bluetooth data connection without having to compile or re-program the robot.
Formula Flowcode	A component to allow all the features of the Formula Flowcode robot to be investigated.Fully simulated component which can interact with simulated objects on the panel as well as control the real hardware.
MIAC (Arduino_Compatible) (MIAC (Arduino-Compatible))	MIAC - Matrix Industrial Automotive Controller (Arduino-Compatible)
MIAC (PIC)	MIAC - Matrix Industrial Automotive ControllerPLC type module based on a PIC18F4455 device, produced by MatrixComponent includes functions to drive the functionality of the MIAC and MIAC system.
MIAC (dsPIC) (MIAC (dsPIC))	MIAC - Matrix Industrial Automotive Controller (dsPIC)
MIAC (PIC) CAN Slave	MIAC Slave for MIAC System. Requires Slave firmware program downloaded to a MIAC (PIC) to act as a CAN connected Slave device.
MIAC Advanced	Advanced Addon for MIAC System
MIAC Basic	Basic Addon expansion module for MIAC System
MIAC Bluetooth	Bluetooth Addon for MIAC System
MIAC GPS	GPS Addon expansion module for MIAC System
MIAC GSM	GSM Addon for MIAC System.
MIAC Industrial	MIAC Industrial Addon component for MIAC System.Add (WIZ810MJ) TCP/IP or Webserver component to the panel to add functionality.
MIAC Serial	Serial Addon expansion module for MIAC System

MIAC Zigbee Coordinator	MIAC Zigbee Coordinator Addon component for MIAC System.Add the Zigbee component to the panel to add functionality.
MIAC Zigbee Router	MIAC Zigbee Router Addon component for MIAC System.Add the Zigbee component to the panel to add functionality.
MIAC (PIC) USB Slave	Allows Matrix's MIAC PLC to be used as a PC peripheral controlled by Flowcode via a USBconnection. Requires that the MIAC (PIC) has the USB Slave firmware downloaded to it.
MIAC AllCode	MIAC AllCode.dsPIC version of the MIAC loaded with the AllCode firmware.Usefull for SCADA, Control or Test applications.Allows you to control the MIAC using the programming language of choice.Compatible with simulation / Bluetooth / Wifi / RS232 and RS485
Animator	Basic animation and physics simulation for a single object.The target object can be set in motion by a simulation macro call, and will then continue inmotion under the control of the animator.Boundaries can be set beyond which the object cannot move, and the behaviour of the object defined when it meets them.Simple simulation of gravity and friction are also possible.
Traffic Light 2_Way	A set of two way traffic lights complete with manual light control, a simple state machine and anautomatic mode to allow the lights to take care of themselves.
Sheep Pen	A simple sheep pen simulation with two gates and two sensors.Allows for simple logical control to try and move all the sheep from one pen to another.
Simulation External Input	A simulation only component designed to allow a single digital pin to be toggled at a set frequency. Allows things like switch presses or external square waves to be used with the simulation.
Simulation LED 3mm	A single LED 3mm for sim only
Simulation LED SMD	A simple LED suitable for simulation that does not require a pin connection
Simulation Switch Template	A base for building switches that do not download to chip.Mouse interaction can send 'System.User' events with the following data...ID = The handle of the switch component sending the messageMessage = 1 (on) or 0 (off)Current state can also be read via simulation macros.
Time Stamp	A simple simulation component to collect the current system timestamp as a string.
COM Port	Serial based simulation component for use with systems such as RS232, Bluetooth and USB Serial
Console Debugger (Raspberry Pi)	Component to allow printing debug messages to the Raspberry Pi Console.When simulation the component will print the debug messages to the Console window.Raspberry Pi Only
Device Helper	A purely cosmetic component for viewing the details specific to your current selected target microcontroller.Lists stats like ADC resolution, ADC channels, UARTs, SPI, PWM, RAM, ROM etc
E_block Helper	A purely cosmetic component to help simplify E-block connections without having to keep referring to the datasheets.Specify which E-block your using and the component will give you options for the patch settings and display the connections required.
FCD helper	A helper control to query the current FCD file
IntOsc Helper	A component to help configure the speed of the internal oscillator.Currently only supports 8-bit PIC devices.
Scope monitor	A component to allow data from analogue and digital pins to be displayed on the scope window. Compatible with simulation and for showing ICT based debug data.
Serial Monitor	Allows data from a COM port to be piped through to the console window for easy program status and debugging.
ADC (CAL)	CAL - Code Abstraction LayerA low level implementation giving direct access to the analogue to digital converter peripheral.
I2C (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.A low level implementation giving direct access to the Two Wire IÂ°C peripheral.
PWM (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.A low level implementation giving direct access to the Pulse Width Modulation peripheral.
SPI (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.A low level implementation giving direct access to the Serial Peripheral Interface peripheral.
UART (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.A low level implementation giving direct access to the UART peripheral.Includes simulation functionality to communicate via a COM port or an Injector component.Also includes timestamped logging via the console and Data Recorder trace monitoring support.
Ellipse	A basic ellipse primitive shape.
Label	A basic text label.
Line	A basic line primitive shape.

Rectangle	A basic rectangle primitive shape.
Rounded rectangle	A basic rounded rectangle primitive shape.
Textbox	A basic textbox.
Bowl	A basic bowl primitive shape.
Cone	A basic cone primitive shape.
Cuboid	A basic cuboid primitive shape.
Cylinder	A basic cylinder primitive shape.
Diamond	A basic diamond primitive shape.
Hemisphere	A basic hemisphere primitive shape.
Honeycomb	A basic honeycomb primitive shape.
Prism	A basic prism primitive shape.
Pyramid	A basic pyramid primitive shape.
Sphere	A basic sphere primitive shape.
Tube	A basic tube primitive shape.
Bezel Radiused	A purely cosmetic component for creating smoothly radiused bezel or frame to fit around other components, or to define the edges of panel sections.
Component Label	Add a label to a component by including this component as a sub-component. The label will always face the viewer and move with its parent object. Text for the label is automatically read from the host component's name or any chosen property.
Component Labels	Automatically generates labels for all panel objects and components in a given context. Labels will always face the camera, and can show the name of each object, or any chosen property. Nesting can be used so that components within components are labelled, and so on.
RxTx Flasher	Simple indicator panel intended as a sub-component of communications components. The two arrow shapes can be set to flash by the host component to represent incoming and outgoing data packets. The panel can be labelled and use a custom icon for easy identification. The icon area can be set to open a pre-defined console window when clicked. LEDs can also be flashed by sending the component a User Notify event. Event 'Message ID' is ignored. Data should be: 1, to flash to Rx LED or 2 to flash the Tx LED.
Target Chip	A cosmetic only representation of the target microcontroller device showing the default package type complete with pins.
Wood Fence	A simple wooden fence used to create simple walls and pens for simulations.
Wood Gate	A simple gate that can be opened and closed via simulation macros. Used to control the flow of objects in the Flowcode simulator.

Comms A

CAN (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.Low level routines for controlling the internal CAN peripheral.
CAN (Internal, MCP2515)	Low level routines for controlling the CAN interface either using an external MCP2515 IC and a SPI bus connection or using an internal CAN peripheral if available on your device. Both methods will require a CAN driver IC like the MCP2551 to drive the CAN signals on the bus.
FTDI (FTD2XX)	Simulation only interface to allow communications with a FTDI USB 232 IC connected to the system.For more details refer to the D2XX_Programmers_Guide from FTDI.
I2C Master	Generic Two Wire I2C Communications Interface
MIDI	Low level routines for controlling or interacting with a standard MIDI interface.
One Wire	Low level routines for controlling or interacting with a standard one wire interface.
SPI Master	Low level routines for controlling or interacting with an SPI interface.SPI or Serial Peripheral Interface is a bus used for board level communications between devices.A target microcontroller will usually have at least one hardware SPI peripheral built in.If the hardware SPI pins are in use or more SPI channels are required then there is also a software mode available.
SPI Master (EB013)	Low level routines for controlling or interacting with an SPI interface.SPI or Serial Peripheral Interface is a bus used for board level communications between devices.A target microcontroller will usually have at least one hardware SPI peripheral built in.If the hardware SPI pins are in use or more SPI channels are required then there is also a software mode available.Has additional functions to work with the E-blocks EB013 SPI hardware.
UART (RS232)	Low level routines for controlling or interacting with a standard asynchronous serial interface.On a microcontroller the interface will be the onboard UART which will need voltage level shifting using a max2323 to become RS232 compatible.See the EB015 RS232 E-block for details.
TCPIP (ENC28J60)	A set of routines used to control a ENC28J60 TCP/IP Module.Required connections VCC, Reset, GND, SCK, MISO, MOSI, CS.Leave these pins disconnected CLKOUT, ENC_WOL, ENC_INT
TCPIP (NM7010A)	TCP/IP component designed to work with the WIZ3100 range of modules from Wiznet.Also available in the form of the version 1 EB023 E-block which uses the NM7010A module.
TCPIP (Raspberry Pi)	TCP/IP sockets component for use with Raspberry Pi.Raspberry Pi Only
TCPIP (WIZ810MJ)	TCP/IP component designed to work with the WIZ810MJ module from Wiznet,as used on version 2 EB023 E-block and the MIAC Industrial Addon module.
TCPIP (EB023 v1)	TCP/IP component designed to work with the WIZ3100 range of modules from Wiznet.Also available in the form of the version 1 EB023 E-block which uses the NM7010A module.
TCPIP (EB023 v2)	TCP/IP component designed to work with the WIZ810MJ module from Wiznet,as used on version 2 EB023 E-block and the MIAC Industrial Addon module.
Visi (4DSystems)	A way of interacting with the VISI interface designed by 4D systems.VISI firmware must be pre-loaded onto the SD card connected to the display to allow everything to work correctly.
Webserver (NM7010A) (NM7010A)	Webserver component designed to work with the NM7010A module from Wiznet,as used in the version 1 EB023 E-block.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.
Webserver (WIZ810MJ)	Webserver component designed to work with the WIZ810MJ module from Wiznet,as used in the version 2 EB023 E-block and MIAC System Industrial Addon.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.
Webserver (EB023 v1)	Webserver component designed to work with the NM7010A module from Wiznet,as used in the version 1 EB023 E-block.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.
Webserver (EB023 v2)	Webserver component designed to work with the WIZ810MJ module from Wiznet,as used in the version 2 EB023 E-block and MIAC System Industrial Addon.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.
InjectorCAN	An injector component allowing you to decode CAN IDs into meaningful strings.
InjectorCOM	An injector component allowing you to communicate via a COM port.
InjectorDS1307	An injector component designed to simulate a DS1307 RTC IC.
InjectorHI	An injector component allowing you to queue responses by typing data directly into the console window.
InjectorLoopback	An injector component designed to echo back any data sent to it.
InjectorVnet	An injector component designed to communicate to another instance of Flowcode running on the same machine or across a network.

I/O Expander PCF8574	Provides 8 digital input/output pins arranged into an 8-bit port using a I2C bus connection.Up to eight expanders can be connected to the same I2C peripheral by means of three address pins.Supports the PCF8574 and PCF8574A devices allowing up to 16 expanders to be connected to the same I2C bus (8 x PCF8574 + 8 x PCF8574A).
I/O Expander PCF8575	Provides 16 digital input/output pins arranged into 8-bit ports using a I2C bus connection.Up to eight expanders can be connected to the same I2C peripheral by means of three address pins.Supports the PCF8575 device allowing up to 8 expanders to be connected to the same I2C bus.
SPI Slave	Low level routines for controlling or interacting with an SPI interface.SPI or Serial Peripheral Interface is a bus used for board level communications between devices.A target microcontroller will usually have at least one hardware SPI peripheral built in.
IO Expander (MCP23017)	Provides 16 digital input/output pins arranged into two 8-bit ports using a I2C bus connection.Up to eight expanders can be connected to the same I2C peripheral by means of three address pins.
IO Expander (MCP23S17)	Provides 16 digital input/output pins arranged into two 8-bit ports using a SPI bus connection.Multiple expanders can be connected to the same SPI peripheral by means of individual chip select pins.

Comms B

Bluetooth (EB024, Generic AT)	Low level routines for controlling a standard AT Bluetooth interface.Also available in the form of the EB024 Bluetooth E-block.
Bluetooth (HC05 HC06)	Low level routines for controlling or interacting with a HC05 or HC06 Bluetooth module.Contains functions to allow the baud rate, bluetooth name and bluetooth key to be defined.
Bluetooth v2 (EB024, Generic AT)	Low level routines for controlling a standard AT Bluetooth interface.Also available in the form of the EB024 Bluetooth E-block.Uses an interrupt to receive characters from the UART and improve reliability, Must be used with a hardware channel.
GPS (EB056, Generic NMEA)	Component designed to process incoming NMEA style GPS data and convert into meaningful values such as longitude, latitude, ground speed, UTC date and time.Also available in the form of the EB056 GPS E-block.
GSM (EB066, Generic AT)	Low level routines for controlling a standard AT GSM / GPRS interface.Also available in the form of the EB066 GSM E-block.
IrDA (EB012, MCP1250, MCP2120)	Low level routines for controlling a standard IrDA interface.Also available in the form of the EB012 IrDA E-block.
RC5 (EB060, Generic 36KHz)	Low level routines for controlling a standard RC5 IR interface.Also available in the form of the EB060 RC5 E-block.
RF 2.4GHz (nRF24L01)	A simple RF communications module based on the 2.4GHz nRF24L01 modules.
RF ISM (EB063, MRF49XA)	A simple RF-ISM communications module based on the Microchip Alpha MRF49XA device.Also available in the form of the EB063 RF E-block.
RFID (EB052, RWD_MICODE)	Low level routines for controlling a RF Solutions RFID interfaceAllows communications between Mifare, ICode and HiTag type RFID tags.Also available in the form of the EB052 RFID E-block.
RFID (MFRC522)	Functions designed to work with the MFRC522 contactless reader IC.The MFRC522 supports all variants of the MIFARE Mini, MIFARE 1K, MIFARE 4K, MIFARE Ultralight, MIFARE DESFire EV1 and MIFARE Plus RF identification protocols.
SRF (WirelessThings) (SRF)	The SRF is designed for wireless transmission and reception of serial data in an easy to use surface mounted module. It has an on-board balun and chip antenna, which can be detached for applications where an external antenna is required.
WLAN (EB069, ESP8266) (ESP8266)	Wireless LAN component designed to work with the ESP8266 module.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.Also available in the form of the EB069 E-block.
WLAN (EB069, WIZ610wi)	Wireless LAN component designed to work with the WIZ610wi module from Wiznet.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.Also available in the form of the EB069 E-block.
Zigbee (EB051, XBEE) (XBEE)	Zigbee component designed to work with the XBEE range of modules from Digi.Provides a very simple interface to allow Zigbee mesh networks and communications.Also available in the form of the EB051 Zigbee E-block. Can also be used with Zigbee MIAC Addon module
InjectorAT	An injector component allowing you to simulate a basic AT type serial interface.
InjectorGPS	An injector component allowing you to simulate a GPS serial terminal.
Bluetooth (RN4677)	Low level routines for controlling a Microchip RN4677 Bluetooth Module.Also available in the form of the BL0170 Bluetooth E-block.Uses an interrupt to receive characters from the UART and improve reliability, Must be used with a hardware UART channel.
Bluetooth (BL0170)	Low level routines for controlling a Microchip RN4677 Bluetooth Module.Also available in the form of the BL0170 Bluetooth E-block.Uses an interrupt to receive characters from the UART and improve reliability, Must be used with a hardware UART channel.
WLAN (ESP12S)	Wireless LAN component designed to work with the ESP-12S module.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.Also available in the form of the BL0136 WIFI E-block.
WLAN (BL0136)	Wireless LAN component designed to work with the ESP-12S module.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.Also available in the form of the BL0136 WIFI E-block.

Comms C

Base 64	Component to allow base 64 encoding and decoding.Sometimes when communicating raw binary data it is useful to perform base 64 encoding to ensure that noneof your data bytes trigger any escape codes or other special case conditions. Base64 converts your binary datainto readable data using standard ASCII characters so you can be fairly certain that the data you send is the same as the data that is received.
DALI Master	A serial based communications protocol designed for controlling lighting, specifically digitallycontrolled dimmable fluorescent ballasts. DALI requires the signals to be level shifted from VCC and GND to +9.5V - +25.5V and GND. The master component can address up to 64 individual slaves & up to 16 groups.
DALI Slave	A serial based communications protocol designed for controlling lighting, specifically digitallycontrolled dimmable fluorescent ballasts. DALI requires the signals to be level shifted from VCC and GND to +9.5V - +25.5V and GND using external circuitry.
DMX_512 Master	A serial based communications protocol designed for controlling theatrical equipment suchas dimmers, fog machines and intelligent lights. DMX-512 Slave devices are daisy chained together with a final 180R terminating resistor at the end of the chain. DMX requires the signalto be level shifted from VCC and GND to +2.5V and -2.5V.
DMX_512 Slave	A serial based communications protocol designed for controlling theatrical equipment suchas dimmers, fog machines and intelligent lights. DMX-512 Slave devices are daisy chained together with a final 180R terminating resistor at the end of the chain. DMX requires the signalto be level shifted from VCC and GND to +2.5V and -2.5V.
I2C Slave	Generic Two Wire I2C Communications Interface
Modbus Master	Modbus component for talking to Modbus compatible hardware via RS232 or RS485.
Modbus Slave	Modbus component for creating Modbus compatible slave hardware via RS232 or RS485.
Modbus TCP Master	Modbus component for talking to Modbus compatible hardware via Ethernet or WIFI.Ensure TCP/IP or WIFI component is initialised and connected to a network before calling the ModbusMasterTCP component macros.
Modbus TCP Slave	Modbus component for creating Modbus compatible slave hardware via Ethernet or WIFI.Ensure TCP/IP or WIFI component is initialised and connected to a network before calling the ModbusSlaveTCP component macros.
PicoScope (PS2000)	A set of functions designed for interacting with a 2000 series Pico scope via simulation.
TTi TG5011 Signal Generator (TG5011)	TTi TG5011 50 MHz Signal Generator
TTi Power Supply _ PL155_P (TTi PL155-P PSU)	TTi PL155-P Power Supply Unit Component. 15V - 5A
USB HID	Component to create and communicate using a standard HID type USB class.Compatible with simulation and USB enabled microcontroller devices PIC/dsPIC/AVR.Note that AVR is currently in Beta and may have problems with custom descriptors.
USB MIDI	Component to create and communicate using a standard MIDI connection.Compatible with simulation and USB enabled microcontroller devices.Currently only compatible with the 16-bit PIC range of devices.
USB Serial	Component to create and communicate using a standard CDC type COM port.Compatible with simulation and USB enabled microcontroller devices PIC/dsPIC/AVR.
USB Slave	Component to create and communicate using a generic USB communications profile.Has the ability to allow the device to be a slave to the PC.Compatible with simulation and USB enabled microcontroller devices (PIC/dsPIC).
K8055D	Support for the Velleman K8055 USB input/output board.Allows Flowcode to communicate with up to four K8055 boards, or to simulate them withinteractive on-screen controls. All digital and analog I/O functions are supported.
MQTT Client	A component providing access to MQTT IoT client.The client can connect to a MQTT server such as ThingSpeak.Allowing IoT type data to be published and read back.
Webserver	Webserver component designed to work with Network Comms abstraction layer.Provides a very simple interface to allow webpages to be hosted from hardware or simulation.Webpages can be embedded into ROM or can be pulled directly from an SD card using the FAT component.

Displays

Bitmap Drawer ROM	A component to simplify the process of drawing bitmap images to a graphical display.Stores up to 10 bitmap images inside ROM based look up tables.Compatible with 24-bit / 256 Colour / 16 Colour / Monochrome Bitmaps.The gLCD object property specifies which LCD component to draw the bitmap to.
GLCD Graph Creator	A component to simplify the process of drawing graphs and charts using a graphical LCD.
GLCD Textfield	A component to simplify the process of drawing text to a graphical display.Allows the graphical LCD to be used more like a standard alphanumeric display.Compatible with the Graphical LCDs.
GLCD (SSD1306)	Graphical display component based on the SSD1306 monochrome graphical controller IC.
GLCD (SSD1305)	Graphical display component based on the SSD1305 monochrome graphical controller IC.
GLCD (ST7565R) Parallel	Graphical display component designed to work with the ST7565 type monochrome displays.
GLCD (STM32F469NI)	Graphical display component designed to work with the STM32F469NI Discovery board from ST. Compatible with the large display and capacitive touch input.
GLCD (ST7565R) SPI	Graphical display component designed to work with the ST7565 type monochrome displays.
GLCD (ST7036) I2C	Graphical display component based on the I2C version of the ST7036 monochrome graphical controller IC.
GLCD (SSD1351)	Graphical display component based on the SSD1251 16-bit colour graphical controller IC.
GLCD (SSD1306) Buffered	Graphical display component based on the SSD1306 monochrome graphical controller IC.
GLCD (PDC8544) Nokia5510	Graphical display component based on the PCD8544 monochrome graphical controller IC as used on the popular Nokia 5510 displays.
GLCD (ILI9341)	Graphical display component designed to work with the ILI9341 controller IC
GLCD (T6963C)	A Graphical LCD component to drive displays fitted with a T6963C controller IC.
GLCD (SSD1322) Buffered	Graphical display component based on the SSD1322 monochrome graphical controller IC.
GLCD (SSD1306) I2C	Graphical display component based on the I2C version of the SSD1306 monochrome graphical controller IC.
GLCD (KS0108)	Graphical display component designed to work with the KS0108 type monochrome displays.
GLCD (SH1106) I2C	Graphical display component designed to work with the SH1106 type monochrome displays.
GLCD (STM32F746NG)	Graphical display component designed to work with the STM32F746NG Discovery board from ST.
GLCD (SH1106) SPI	Graphical display component designed to work with the SH1106 type monochrome displays.
GLCD (EB075, 4D-Goldelox)	Graphical display component designed to work with the Goldelox range of displays from 4D Systems.
GLCD (SSD1963) Parallel	Graphical display component designed to work with the SSD1963 controller IC
GLCD (EB076, 4D-Picasso)	Graphical display component designed to work with the Picasso range of displays from 4D Systems.
GLCD (SSD1322) Parallel	Graphical display component designed to work with the SSD1322 type monochrome displays.
GLCD (EB043-00-1)	Graphical display component designed to work with the legacy version 1 EB043 E-blocks.
GLCD (ST7920) Parallel	Graphical display component designed to work with the ST7920 ype monochrome displays.
GLCD (ST7567) SPI	Graphical display component designed to work with the ST7567 type monochrome displays.
GLCD (SSD1306) SPI	Graphical display component based on the SPI version of the SSD1306 monochrome graphical controller IC.
GLCD (UC1701)	Graphical display component based on the UC1701 monochrome graphical controller IC.
GLCD (SSD1305) Buffered	Graphical display component based on the SSD1305 monochrome graphical controller IC.
GLCD (TLS8201)	A Graphical LCD component to drive displays fitted with a TLS8201 controller IC.
GLCD (STM32F429ZI)	Graphical display component designed to work with the STM32F429ZI Discovery board from ST.
GLCD (SSD1289)	Graphical display component based on the SSD1289 16-bit colour graphical controller IC.
GLCD (EB076v2, 4D-Picasso)	Graphical display component designed to work with the Picasso range of displays from 4D Systems.
GLCD (EB043-00-2)	Graphical display component designed to work with the legacy version 2 EB043 E-blocks.
LCD (Adafruit, OLED)	Adafruit OLED LCD display

LCD (Generic)	Generic configurable alphanumeric LCD display component based on the standard Hitachi HD44780 controller IC with selectable 4/8 bit interface
LCD 4x20 (Adafruit, OLED)	Adafruit OLED LCD display 4 x 20 characters
7Segment (Single)	Seven segment display modelled after a standard 14mm high unit.LED colour can be changed in properties.
Starburst Display	Starburst 14 or 16 segment display modelled after a standard 14mm high unit.LED colour can be changed in properties.
GLCD (EB057)	Graphical display component designed to work with the EB057 modules and EB058 E-blocks.
GLCD (ILI9341 SPI)	Graphical display component designed to work with the EB057 modules and EB058 E-blocks.
GLCD (Raspberry Pi)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
GLCD (SSD1331)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
GLCD (Grove OLED)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
GLCD (BL0139)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
LCD (Grove I2C)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
LCD (Grove Uart)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
LCD (I2C)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
LCD (W162-XBLW)	Graphical display component designed to work with the HDMI screen output of the Raspberry Pi.
LCD (I2C_LCM1602)	Generic alphanumeric LCD display based on the standard Hitachi HD44780 controller IC.Connected using an I2C based PCF8574 IO Expander IC.

DSP

Control	Allows for several types of control operations to be performed on a buffer. On/Off - Standard on/off control as used on most ovens, toasters, irons. P/PI/PID - Mathematical control process to get to the setpoint as fast as possible, similar to the process in the human brain when steering a car.
DSP System	DSP System main buffer manager responsible for allocating memory, taking care of buffer indexes and reading / writing the buffers. Must be added to a project to allow the other DSP components to connect together correctly. Multiple DSP systems can be added to a single project to allow for more than 8 individual buffers.
Delay	Allows an adjustable delay to be inserted into the DSP system
Fast Fourier Transform (FFT)	Provides a way of converting a buffer full of time domain data into frequency domain data. The output of the FFT is a set of frequency bins which correspond to the frequencies present in the signal. The number of frequency bins is equal to half the input buffer size with each bin being responsible for a portion of the frequency up to 1/2 the Nyquist.
Filter	Filter component to allow basic filtering to be performed. Filters include: LowPass, HighPass, BandPass, BandStop, FIR, IIR
Frequency Generator	A frequency generator component designed to plug into the DSP system component and allow several discrete waveforms to be generated. Functions available include: Sine, Square, Pulse, Triangle, Sawtooth, Noise, Custom
Input	Allows the values from a buffer to be assigned. Either a value at a time or from an array. The input signal would usually take the form of an ADC reading or raw data values.
Level	Allows for detection and collection of peaks, troughs and averages.
Output	Allows the values from a buffer to be read. Either a value at a time or as an array.
Scale	Allows the values in a single buffer to be scaled uniformly. Functions include: AddOffset, Divide, LeftShift, Multiply, RightShift, Subtract, ScaleReal
Sum	Component to combine together two DSP buffers into one at an index at a time. Functions include: Add, Average, Difference, Max, Min, Subtract

Basic IO

DAC Output	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips. A low level implementation giving direct access to the Digital to Analogue Converter peripheral.
ADC Template	Base ADC component with no graphical interface. Contains all of the embedded side component calls to provide an ADC interface suitable for wrapping with a new ADC style component.
Touch Pads (EB088)	This board provides five touch areas for use with capacitive sensing. Hence five digital touch switches can be implemented. This component directly interfaces with the EB088 CapTouch E-block.
Keypad (Generic)	Generic component to create a raster scanned custom keypad or button matrix. By default, each key is labelled with its ASCII return character. Alternatively, each key may use an image as a label. To use a custom key shape, build a single key, then point to it with the 'Custom key shape' property. If the custom shape is a group, any item within the group that has a handle beginning with 'label' will have the key label/image applied to it automatically.
PWM	Pulse Width Modulation, a versatile way of generating a digital pulse using mark / space modulation. Uses the capture compare peripherals onboard most Microcontrollers to generate accurate waveforms without any intervention from the processor. Useful for generating audio, controlling the speed of motors, brightness of LED etc.
Encoder Rotary	Encoder component implements a rotary encoder connected to two pins
Switch Array Template	A base component for creating an evenly spaced array of switches. Each will be connected to sequential pins of a given I/O port. Set target object to point at any standard switch component to change the type of switch used by the array.
Switch Template	Base single pin switch with no graphical interface. Suitable for building your own switches with custom graphics. If the parent component has properties 'pin', 'polarity', 'debounce' and/or 'operation', they will automatically be forwarded to the base component.
LED (Generic, RGB)	An LED with red, green and blue elements that can be mixed together to produce almost any colour at any brightness.
LED Array Template	Create an evenly spaced array of LED indicators. Each will be connected to sequential pins of a given I/O port. Set target object to point at any standard LED component to change the style.
LED Charlieplex	Create an evenly spaced array of LED indicators using a reduced amount of I/O pins. Only one LED can be switched on at once, high speed multiplexing allows multiple LEDs to appear to be lit at once. Each will be connected in line with the standard charlieplex scheme. Set target object to point at any standard LED component to change the style.
LED Cube	LED Cube component for driving 3D arrays of LEDs. A typical cube could consist of 4x4x4 or 8x8x8 but does not necessarily need to be a cuboid.
Buzzer	Drives a simple fixed frequency buzzer in hardware and simulates the sound of a buzzer in simulation. To actually drive a buzzer you would have to amplify the signal from the microcontroller using a transistor or MOSFET.
LED Matrix (HT16K33)	LED Matrix component designed to work using a HT16K33 LED driver IC. Can drive up to 16 x 8 (128) LEDs.
LED Matrix (Parallel)	LED Matrix component designed to work using multiple data pins and a single clock pin. Each LED on the display can be controlled in a chain by setting the data appropriately and then generating the appropriate amount of clock pulses.
LED Matrix (Serial)	LED Matrix component designed to work using a single data and clock pin. Each LED on the display can be controlled in a chain by setting the data appropriately and then generating the appropriate amount of clock pulses.
LED MultiColour Bi (5mm, PCB)	An industry standard 5mm diameter bi-colour LED. Any color may be chosen, and the leads trimmed to length.
LED MultiColour Tri (5mm, PCB)	An industry standard 5mm diameter tri-colour LED. Any color may be chosen, and the leads trimmed to length.
LED Template	Base for creating LEDs and other on/off visual indicators. Choose a 'Target Object' that will change colour when the pin changes. If multiple objects must change color, group them, and target the group. When 'Auto off color' is selected, changing the 'on color' will automatically choose an off color by reducing the on-color intensity.
NeoPixel LED APA102C	A simple chained RGB LED controller IC allowing multiple LEDs to be controlled using a serial data stream. Allows RGB LEDs to be driven with full 24-bit colour depth. Allows single chains, 2D arrays and 3D cube formations to be simulated. Supports Bit Banged or SPI peripheral based data modes.
NeoPixel LED WS2801	A simple chained RGB LED controller IC allowing multiple LEDs to be controlled using a serial data stream. Allows RGB LEDs to be driven with full 24-bit colour depth. Allows single chains, 2D arrays and 3D cube formations to be simulated. Supports Bit Banged or SPI peripheral based data modes.

<p>NeoPixel LED WS2811 WS2812 APA106</p>	<p>A simple chained RGB LED controller IC allowing multiple LEDs to be controlled using a serial data stream. Compatible with the WS2811, WS2812, WS2812B, APA104 and APA106 Type Controller ICs. Allows RGB LEDs to be driven with full 24-bit colour depth. Allows single chains, 2D arrays and 3D cube formations to be simulated. Requires a high speed microcontroller to generate the critical timings to drive the device.</p>
<p>Piezo Sounder</p>	<p>Drives a simple variable frequency piezo sounder in hardware and simulates the sound in simulation. To actually drive a piezo you may have to amplify the signal from the microcontroller using a transistor or MOSFET.</p>
<p>DAC MCP48x1</p>	<p>Component to drive a digital to analogue converter (DAC) IC from Microchip via an SPI interface. Compatible with MCP4801 (8-Bit), MCP4811 (10-Bit) and MCP4821 (12-Bit) devices.</p>
<p>DAC MCP49x2</p>	<p>Component to drive a dual digital to analogue converter (DAC) IC from Microchip via an SPI interface. Compatible with MCP4902 (8-Bit), MCP4912 (10-Bit) and MCP4922 (12-Bit) devices.</p>

Sensors

Touch Screen (XPT2046)	Low level routines for controlling or interacting with the XPT2046 touch screen controller IC found on a lot of common low cost resistive touch screen products.
Accel Gyro 6_Axis (MPU-6050)	MPU-6050 Combined 6-Axis Accelerometer and Gyroscope sensors. Useful for working out data such as Pitch and Roll. Can be combined with a Magnetometer to also provide Yaw.
Accel Gyro Mag 9_Axis (MPU9250)	MPU9250 Combined 9-Axis Accelerometer, Gyroscope and Magnetometer sensors. Useful for working out orientation data such as Pitch, Yaw and Roll.
Accel Mag 6_Axis (LSM303D)	LSM303D Combined 6-Axis Accelerometer and Magnetometer sensors. Useful for working out data such as Pitch and Yaw.
Accel Mag 6_Axis (LSM303DLHC)	LSM303DLHC Combined 6-Axis Accelerometer and Magnetometer sensors. Useful for working out data such as Pitch and Yaw.
Accelerometer 3_Axis (LIS3LV02DQ)	LIS3LV02DQ Accelerometer sensor with options for I2C or SPI communications. Useful for approximating Pitch and Roll or for detecting acceleration. Also available in the form of the EB068 Accelerometer E-block.
Barometer (BME280)	A small PCB surface mount barometric pressure sensor with a I2C bus interface. Pressure range 300 to 1100 hPa. Temperature range -40 to +85 °C. Works with I2C interface only.
Barometer (MS5637)	A small PCB surface mount barometric pressure sensor with a I2C bus interface. Pressure range 0 to 30 Bar. Temperature range -20 to +85 °C.
Collision Detector Template	Polls a chosen panel object to see if it has collided with another object. When collisions happen, a user notification event is generated and a pin is set or reset. Another event is sent when the two objects separate.
Colour Sensor (TCS3200)	This board provides the ability to detect colours using the TCS3200 sensor. It will return RGB and W values, dependent on the colour of the object under test.
Gyroscope 3_Axis (L3G4200D)	Interface to the L3G4200D three axis digital gyroscope. Panel GUI can be used to simulate incoming data for testing.
Gyroscope 3_Axis I2C (L3GD20)	Interface to the L3GD20 three axis digital gyroscope. Panel GUI can be used to simulate incoming data for testing.
Gyroscope 3_Axis SPI (L3GD20)	Allows access to a three axis digital gyroscope via an SPI interface. Useful for gaming, VR, motion control, navigation and robotics.
Hall Effect Analog	Simple analogue hall effect triggered by the proximity of another object.
Hall Effect Digital	Simple digital hall effect on/off switch triggered by the proximity of another object.
Humidity (SHT21)	Humidity and temperature sensor using an SHT21 IC connected via I2C. On screen GUI allows temperature and humidity values to be simulated, and will show all I2C communication in a console window.
Infrared Array AMG88xx	An 8x8 (64) Pixel infrared sensor array allowing basic non-contact temperature detection.
Photo Reflector	Uses InfraRed light to detect if an external object is near to the sensor. Returns a discrete analogue signal which can represent distance from the nearest object. Useful for applications like wall following, control based systems and robotics.
Photo Transistor	Uses InfraRed light to detect if an external object is near to the sensor. Returns a digital signal which can represent detected or not detected states. Useful for applications like line following, punched card based data systems and robotics.
Proximity Analog Template	Polls a chosen panel object to test its distance from this component. When the test object is within the detection range, the state of a pin is changed, and a User event generated. Used for building models of reed switches and hall sensors.
Proximity Switch Template	Polls a chosen panel object to test its distance from this component. When the test object is within the detection range, the state of a pin is changed, and a User event generated. Used for building models of reed switches and hall sensors.
Reed Switch	Simple on/off switch triggered by the proximity of another object.
Temp Humidity (DHT11)	The DHT11 temperature and humidity sensor is a popular sensor allowing the ambient temperature and relative humidity to be monitored digitally. Humidity Range = 20% - 90% +/- 5% Temperature Range = 0 - 50 Degrees C +/- 2 Degrees C
Temp Humidity (DHT22)	The DHT22 temperature and humidity sensor is a popular sensor allowing the ambient temperature and relative humidity to be monitored digitally. Humidity Range = 0% - 100% +/- 2% Temperature Range = -40 - 80 Degrees C +/- 0.5 Degrees C
Temperature (LM75B)	A digital temperature sensor based around the NXP LM75B chip.

Thermistor	A generic thermistor component that can be used to simulate and create code for any thermistor with a known temperature/resistance curve. Thermistor is connected in a simple potential divider circuit - thermistor between ADC input and 0V, and a fixed resistor between ADC and the positive supply. Default calibration is for the EBM003 module.
Thermistor Template	Base component for creating thermistors. Has no GUI - this would be added by concrete examples using this base which may or may not expose the properties.
Accel Gyro 6_Axis LSM6DS3 (105020012)	Combined 6-Axis Accelerometer and Gyroscope sensors. Useful for working out data such as Pitch and Roll. Can be combined with a Magnetometer to also provide Yaw.
Barometer BMP280 (101020192)	Barometric pressure sensor with a I2C bus interface. Pressure range 300 to 1100 hPa. Temperature range -40 to +85 °C.
Chainable RGB LED v2.0 (104020048)	Grove-Chainable RGB LED V2.0 is based on P9813S14 chip. This chip is a full-color light source driver chip that can provide three constant current driver and 256 greyscale modulation output. The key word of this product is "Chainable", so how many LEDs can it be chained? By connecting the output grove connector of one LED to the input grove connector of another one, you are able to chain 1024 RGB LEDs at most!
Grove Water Sensor (101020018)	The water sensor uses a 1M ohm pull-up resistor. The resistor will pull the sensor trace value high until a drop of water shorts the sensor trace to the ground trace. You can use it with an analog input pin to detect the amount of water in contact between the grounded and sensor traces.
I2C Color Sensor (101020341)	Based on the color sensor TCS34725FN with digital output I2C. Based on the 8'2 array of filtered photodiodes and 16-bits analog-to-digital converters, you can gain the color chromaticity of ambient light or the color of objects. Of the 16 photodiodes, 4 have red filters, 4 have green filters, 4 have blue filters and 4 have no filter (clear). With the synchronization input pin, external pulsed light source can provide precise synchronous conversion control.
Infrared Reflective Sensor (101020174) (101020174)	Uses InfraRed light to detect if an external object is near to the sensor. Returns a digital signal which can represent detected or not detected states.
LED Bar v2.0 (104020006)	LED Bar is comprised of a 10 segment LED gauge bar and an MY9221 LED controlling chip. It can be used as an indicator for remaining battery life, voltage, water level, music volume or other values that require a gradient display. There are 10 LED bars in the LED bar graph: one red, one yellow, one light green, and the rest green. It lights up the LEDs sequentially from red to green, so the entire bar graph is lit up in the end.
PIR Motion BISS0001 (101020020)	PIR motion sensor component for digital output sensors. Simulates range sensitivity and output hold.
Relay (103020005)	The Relay is a digital normally open switch capable of switching much higher voltages and currents than your normal Microcontroller outputs. When set to HIGH, the LED will light up and the relay will close allowing current to flow. The peak voltage capability is 250V at 10 amps. Simulated component is shaded green when the relay is active.
Sound Sensor (101020023)	The Sound sensor module is a simple microphone. Based on the power amplifier LM386 and the electret microphone, it can be used to detect the sound strength of the environment.
Temp Humidity DHT22 (101020019)	The DHT22 temperature and humidity sensor is a popular sensor allowing the ambient temperature and relative humidity to be monitored digitally. Humidity Range = 0% - 100% +/- 2% Temperature Range = -40 - 80 Degrees C +/- 0.5 Degrees C
Temperature Sensor (101020015)	Temperature Sensor uses a thermistor to measure ambient temperature. The resistance of thermistor changes based on ambient temperature. This resistance value alters the output of a voltage divider which is measured by an analog input pin and converted to a temperature value. The operating range is -40 to 125 °C, with an accuracy of 1.5 °C.
Ultrasonic Ranger (101020010)	The ultrasonic sensor is a non-contact distance measurement module. It's designed for easy modular project usage with industrial performance. Detecting range: 3cm to 4m, best in 30 degree angle.
Heelight Sensor (101020312)	Heelight Sensor is a smart voice sensor that can recognize up to 500 digital voice commands. It was originally used on the Heelight "a" smart colorful bulb that can be controlled by digital sound waves. Allows you to realize smart control in your own projects. Compatible with Heelight smart phone apps and other Heelight controllers.
Accelerometer (EB068)	LIS3LV02DQ Accelerometer sensor with options for I2C or SPI communications. Useful for approximating Pitch and Roll or for detecting acceleration. Also available in the form of the EB068 Accelerometer E-block.
Accel Mag 6_Axis (EBM015)	EBM015 Combined 6-Axis Accelerometer and Magnetometer sensors. Useful for working out data such as Pitch and Yaw.
Colour Sensor (EBM018)	This board provides the ability to detect colours using the TCS3200 sensor. It will return RGB and W values, dependent on the colour of the object under test.
Digital Temperature (EBM004)	A digital temperature sensor based around the LM75B chip.
Dual Potentiometer _ Trimmer (EBM006)	This board provides two rotary potentiometers. This component directly interfaces with the EBM006 Dual Trimmers sensors board.

Gyroscope (EBM009)	Interface to the L3G4200D three axis digital gyroscope. Panel GUI can be used to simulate incoming data for testing.
Hall Effect (EBM011)	The board has a Hall Effect sensor (SL353) that gives a digital output in the presence of a magnetic field (in the region of 60 Gauss) from a permanent magnet or electromagnet, either North or South pole.
Humidity (EBM016)	Humidity and temperature sensor using an SHT21 IC connected via I2C - as used by the Matrix e-block module EBM016. On screen GUI allows temperature and humidity values to be simulated, and will show all I2C communication in a console window.
Infrared (EBM020)	The Infrared sensor board contains both an IR transmitter and receiver. The transmitter is enabled via a digital control signal and the receiver provides an analogue output. By enabling the transmitter and reading the variable voltage output of the receiver it is possible to measure the distance of a reflecting object in the region of 1cm to 10cm.
PIR (EBM012)	This board provides a PIR sensor which is read as a digital input.
Potentiometer (EBM002)	This board consists of a standard shaft rotary potentiometer that provides a linear voltage output ranging between the microcontroller power rails. This can be connected to an Analogue to Digital input of the microcontroller in order to provide a control value.
Rotary Encoder (EBM007)	Provides a rotary encoder with dual digital outputs that provide rotation and direction information. When connected to two digital inputs of a microcontroller a "digital pot" can be implemented to convert to digital values.
Thermistor (EBM003)	A generic thermistor component that can be used to simulate and create code for any thermistor with a known temperature/resistance curve. Thermistor is connected in a simple potential divider circuit - thermistor between ADC input and 0V, and a fixed resistor between ADC and the positive supply. The component is also used with the EBM003 module, in which case the extra circuitry is already included. Default calibration is for the EBM003 module.
Thermocouple TypeK (EBM008)	A component match in the Matrix EBM008 thermocouple board. As well as an interface to a standard TypeK thermocouple, this also includes a thermistor that is used for cold junction compensation.
Touch Pads (EBM013)	This board provides two touch areas for use with capacitive sensing. Hence two digital touch switches can be implemented. This component directly interfaces with the EBM013 Sensors board.
Touch Slider (EBM014)	This board provides two touch slide areas for use with capacitive sensing. Therefore, two digital touch sliders can be implemented. This component directly interfaces with the EBM014 Sensors board.
Ultrasonic (EBM019)	This board has both an ultrasonic transmitter and receiver. The transmitter is driven by an on-board 40KHz oscillator which is enabled by the host microprocessor. The receiving sensor signal is amplified and provided as an analogue signal to be processed by a single channel ADC of the microprocessor. By measuring the time delay between enabling a transmit pulse and receiving an echo the distance of objects in a range of around 3cm to 3m can be determined.
Humidity (SHT31)	Humidity and temperature sensor using an SHT31 IC connected via I2C. On screen GUI allows temperature and humidity values to be simulated, and will show all I2C communication in a console window.
Accel Gyro 9 Axis LSM9DS1	LSM9DS1 Combined 9-Axis Accelerometer, Gyroscope and Magnetometer sensors Useful for working out orientation data such as Pitch, Yaw and Roll.
Humidity (HTS221)	A temperature and relative humidity sensor allowing the ambient temperature and relative humidity to be monitored digitally. Humidity Range = 0% - 100% +/- 3.5% Temperature Range = -40 - 120 Degrees C +/- 0.5 Degrees C
Load Cell (HX711)	The HX711 load cell amplifier is used to get measurable data out from a load cell or strain gauge.
Grove Rotary Angle Sensor	The Rotary Angle sensor is based on a simple analogue potentiometer.
Grove Light Sensor	The Light sensor module is a simple analogue photo transistor. Used to detect the intensity of the indoor light.

Mechatronics

3D Printer	A simulation only version of a very basic 3D printer such as a standard RepRap.
Reprap Mendel 3D Printer	A version of the basic 3D printer simulation which has been wrapped with a Reprap Mendel style mesh.
G Code Parser	A set of routines to allow a G-Code type file to be parsed a line at a time and the coordinates to be collected.
Motor Template	Base component for constructing continuous motion - e.g. motors. Automatically animates two objects - one within the same host components (e.g. moving parts of the motor itself), and one external (e.g. the mechanism to which the motor is connected).
Motor (Half Bridge)	Simple animated motor turned on and off with a single pin connection.
Motor (Full Bridge)	Motor that can be driven at a preset speed in either forwards or reverse direction with inertia.
Servo Controller	Can control up to eight standard PWM driven servo's. Supports 8-bit and 16-bit movement resolutions. 'Servo Object' properties allow you to connect the controller to on-screen simulations using the 'Servo Motor' component and its derivatives.
Servo Motor Template	Base component for creating custom servo motor simulations. Receives messages from the 'Servo Controller' component. Macro 'SetTarget' allows external objects to be moved by the servo for mechanical simulations.
Standard Servo	Standard Servo
Micro Servo (Tower Pro gg)	Micro Servo (Tower Pro gg)
Servo Motor (BL0162)	Servo motor component to drive the E-blocks 2 BL0162 Servo Motors board. Provides up to eight individually addressable connections for standard DC servo motors to be connected.
Solenoid Template	Base component for constructing solenoids. These take a single input pin and move an actuator between two positions depending on the pin state.
Solenoid DC1	Simple open frame solenoid based on the Benson BDC.4 series.
Stepper Motor Template	Enables the creation of a stepper motor component by specifying objects for its appearance. 'Attach to...' property should be exposed in any components built from this - this sets a target object to be joined to the motor shaft. The target can then be rotated around the axis with a custom gear ratio, or moved linearly according to the pitch of a given lead screw.
Stepper (NEMA8)	A NEMA8 stepper motor model. Includes a visual simulation showing the activation pattern of the coils.
Stepper - Generic	A generic stepper motor model. Includes a visual simulation showing the activation pattern of the coils.

Storage

EEPROM (CAL)	CAL = Code Abstraction Layer - Allows one code base to run on a wide range of chips.A low level implementation giving direct access to the EEPROM peripheral.
Auto Version Identifier	Basic component designed to provide the program with the date and time of the build.Embedded assigns the time and date of compilation.Simulation assigns the time and date of the start of simulation.
Circular Buffer	Circular buffer component allowing easy and efficient first in first out (FIFO) style data byte storage.Useful when used with a comms component to capture data as it comes in ready for processing when we have time.Also features macros to allow you to check for specific incoming responses such as 'OK' or 'ERROR'.
EEPROM	A means of reading data from and writing data to the EEPROM memory onboard the microcontroller.Fully functional with simulation but the target microcontroller must have EEPROM memory available to allow compilation to work.
Embed File	A component to simplify the process of embedding files into ROM.Stores the file inside a ROM look up table.
FAT (SD, SDHC)	FAT component allowing access to read and write files on a SD, SDHC or MMC card.The component automatically detects the filesystem on the card on initialise so FAT16 and FAT32 are fully supported.
RTC (MCP7940N)	Serial (I2C) Real Time Clock component for MCP7940N device.When used with a MIAC project this component gives access to the internal RTC (if fitted, depending upon model) and the component properties will be automatically configured.
Real Time Clock (RTC)	A Real Time Clock component allowing things like clocks and timers to easily be created.Compatible with the internal RTCC module and external DS1307 or DS3231 RTC ICs.
Serial EEPROM (24C16)	Serial (I2C) EEPROM component for 24C01 to 24C16
Serial EEPROM (24C32)	Serial (I2C) EEPROM component for 24C32 Can be added to a MIAC project to give read and write access to the internal non-volatile memory device (if fitted, depending upon model).
String Translator	A simple component to allow multiple language support by substituting different strings depending on the selected language.
Timer	Allows you to measure the passage of time via the use of a hardware timer peripheral.Works like a stopwatch with macros to start and stop the timer counter.Returns time as integer Seconds, Milliseconds, Microseconds and also Floating Point and String.
Bitmap Drawer FAT	A component to simplify the process of drawing bitmap images to a graphical display.Reads Bitmap files directly from a SD card formatted with a FAT file system.Compatible with 24-bit & Monochrome Bitmaps. The gLCD object property specifies which LCD component to draw the bitmap to.
InjectorFile	An injector component allowing you to log outgoing data to a file and read incoming responses from another file.
Speech	Speech component allowing Phoneme based speech for use on an embedded platform.The simulation also has an advanced speech engine allowing realistic text to speech in multiple languages using the RealSpeak voice engine.
WAV Player FAT	Allows WAV files to be played or recorded using an SD card component.Complete with buffer to allow for uninterrupted playback when performing other tasks.Playback compatible with analogue outputs such as DAC or PWM.Recording compatible with analogue inputs such as a Microphone.
RealSpeak	Advanced speech engine allowing realistic text to speech in multiple languages using the RealSpeak voice engine.

Models

Marking control	A control to draw markings on any component
Motion Helper	Helper for building components which require simulation of constant motion. Linked objects can be issued speed and acceleration parameters, and will then be animated automatically until another command is issued. The helper can control motion for up to four objects simultaneously, all with their own discrete motion settings.
Clone Matrix	Takes a single object and produces a three dimensional array of evenly spaced clones. Individual items in the array can be found from their position and individually modified after the array has been created.
Meter Square	Square analogue panel meter. A simulation only component - the needle value is set solely by the 'SetValue' macro.
Scale Arc Template	A base component for drawing circular dials. This allows a simple way to create graduated and labelled dials, for example, within meter and rotary control components. Mouse handling is built in for ease of building interactive controls.
Scale Linear Template	A base component for drawing scales on horizontal or vertical strips. Can be used to simplify the building of rulers, meters and slider controls. Mouse handling is built in for easy construction of interactive controls.
Slider control	A simple graphical interface for a vertical meter or slider control. This can be used with custom components to give them a way to display an analogue value, or to allow setting a value by clicking and dragging with the mouse.
Dashboard Text	A simulation only text box that can be used to display text and numbers.
Formula Flowcode Racetrack (HP458)	A simple race course for the Formula Flowcode buggy. Using Matrix product HP458, users are able to construct an exact replica of this course.
Maze Generator (HP458)	Creates a simulation only randomised maze out of standard micromouse maze walls and pillars. Compatible with the Formula Flowcode robot.
Airplane Landing Gear	A simulation of an Airplane Landing Gear containing, switches, locking mechanisms and retracting landing gear.
CNC Machine	A CNC Machine that allows for simulation movement in the X, Y, Z directions and also providing access to the Drill.
Car Seat	An electric car seat chassis with a series of motors and sensors. Students should work through exercises to learn the principles of electric car seats including how to save and load memory positions.
Pedestrian Crossing	A set of pedestrian crossing lights complete with manual light control, a simple state machine and an automatic mode to allow the lights to take care of themselves.
Traffic Light 1_Way	A set of one way traffic lights complete with manual light control, a simple state machine and an automatic mode to allow the lights to take care of themselves.

SCADA

	Matrix SCADA is a low-cost and simple way of allowing visual and feature-rich PC control and data acquisition for electronic and electromechanical systems. It allows users to quickly and easily create PC-based control and data acquisition programs with graphical Human Machine Interfaces (HMI) based on flowcharts.
	Matrix SCADA is comprised of two components: Flowcode SCADA, and the Matrix SCADA runtime.
	As a developer, you can create a Flowcode SCADA program, and then export it as a Matrix SCADA runtime application. This Matrix SCADA runtime application can run standalone, on any Windows PC, without a license. This allows for great portability and lets you create sellable items that you can roll out to customers without writing a dedicated application from scratch.
	The Matrix SCADA runtime version of your program is protected from editing, and its code is hidden. You can provide your end-user access to the traditional Flowcode panels, such as the 3D/2D, Console or Data recorder panels.
	The main goal of Matrix SCADA is to remotely control hardware from your PC, whether it's on your bench or on the other side of the world. Applications may include the development of software to control the following: production batch testing, home automation, IoT, robotics / embedded systems control, and industrial systems control.
Numeric Display	Allows a numeric value to be displayed on the user panel using virtual 7 seg displays.Used for displaying the value of a variable during simulation runtime.Provides up to 5 customisable ranges to automatically alter the colour of the label based on the value.
Control Knob	Rotary control designed for SCADA.Has customisable value markings around the control.Simulation only.
DMX512 Master SCADA	A serial based communications protocol designed for controlling theatrical equipment such as dimmers, fog machines and intelligent lights. DMX-512 Slave devices are daisy chained together with a final 180R terminating resistor at the end of the chain. DMX requires the signal to be level shifted from VCC and GND to +2.5V and -2.5V.
Event Log	A simulation component designed to create a simple log record of events in your SCADA system.Logs to a file and / or to a console tab including optional automated time stamp.
Event Trigger	Component that will check to see if a predetermined amount of time has passed.Useful for doing things on a regular basis, e.g. every minute or every hour.
Fan / Pump	A simple rotating fan or pump.The component has macros to set and get the current rotational speed. Compatible with SCADA interconnecting pipe components.
FAT SCADA	FAT component allowing access to read and write files on the local Windows file system.
GLCD SCADA	A simple simulation only canvas to allow for text, bitmaps and drawings to appear on the panel
Graph Plotter	A simple component to allow a number of values to be plotted onto a panel primitive.
Hopper	A simple hopper that can be used to store produce.The hopper has component macros to set and get the current level of produce.The hopper can be initialised to be full or empty when starting.Compatible with SCADA interconnecting pipe components.
Indicator Gauge	Simulation only round gauge/dial for SCADA applications. The range of values displayed is easily adjusted.
Indicator Logo	A simple component to display multiple icons relating to the state of a machine or process.Includes icons such as: tick, cross, alert, stop, go and coloured lights.
Indicator Meter	Square analogue panel meter.A simulation only component - the needle value is set solely by the 'SetValue' macro.
Joystick	A simple joystick component allowing for easy mouse or touchscreen based analogue control.
Modbus SCADA	Modbus component for talking to Modbus compatible hardware via RS232 or RS485.
Modbus Slave SCADA	Modbus component for creating Modbus compatible slave hardware via RS232 or RS485.
Numeric Label	Allows a numeric label to be displayed on the user panel.Used for displaying the value of a variable during simulation runtime.Provides up to 5 customisable ranges to automatically alter the colour of the label based on the value.
Pipe	A simple pipe Component
Right Angle Pipe	A Right Angle Component For Connecting Pipes Around Corners

Text Label	Allows a numeric label to be displayed on the user panel.Used for displaying the value of a variable during simulation runtime.Provides up to 5 customisable ranges to automatically alter the colour of the label based on the value.
Valve	A simple digital valve that can be either open or closed. The valve has component macros to set and get the current state of the valve.The valve can be initialised to be open or closed when starting.The valve can be clicked to open or close via the runtime.Compatible with SCADA interconnecting pipe components.

Test & Debug

	Unlocking this pack will give the developer access to the debugging features of Flowcode such as Code Profiling and Ghost technology (In Circuit Debug and In Circuit Test), including the Data Recorder, Console and Oscilloscope features.
Data Recorder	Allows you to track and monitor a number of analog and digital waveforms either inside the Flowcode simulation or directly from Ghost (ICT) enabled hardware.
Console	Allows you to log events as they happen, enter user text and debug communications systems directly from within the Flowcode environment.
Oscilloscope	Allows you to track and monitor up to four repeating signals with standard oscilloscope functionality such as triggering, scaling and overlaying waveform signals.

C-Code Simulation

	Unlocks the ability to simulate the most common C code constructs in your projects or to convert your custom C-code into easier to visualise Flowcharts using the new C-code conversion tool.
	C Code icons can be simulated directly
	C Code icons can be translated into native Flowcode icons (Flowchart / Blocks / Pseudocode)

User Types

Standard	The most basic licence type for users, we would recommend this licence for users looking to learn programming themselves, those who are producing personal projects to use in their own homes and other hobby uses. Customise your license by selecting appropriate feature packs to licence the components you require for learning or a personal project undertaken.
Professional	The Flowcode Professional license is for users who are intending on producing projects intended for Commercial Use. The underlying code behind the Flowcode components is under licence and to use the code in a product intended for sale to the general public you will need the Professional Licence. Feature Packs suggested for Professional usage will be made later in the purchasing wizard.
Academic	Flowcode offers Academic licences to customers who are either Students or Teachers for an academic institution. Educational licenses contain all the available features plus a chosen 'Chip Pack'. Academic licences are reduced in price when compared to standard or professional licences. If you are interested in purchasing a Flowcode Academic licence then please proceed to the next step where you will be instructed to fill out a form and we will contact you as soon as possible.

User Types

Version	Author	Date	Changes
8.0	BR	23/05/2018	Document creation
8.1	BR	27/11/2018	SCADA, Test & Debugging, C - Code Simulations and User Types sections added Updates to previous sections



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