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Contents

Free Components

Name	Description
Accelerometer (EB068, 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.
ADC	A low level implementation giving direct access to the CAL
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.
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 in motion 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.
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.
Simulation Push Switch	Simple push button switch with LED indicator with no pin assignment. State can only be determined by simulation macro read. Momentary or latching action can be chosen in the properties.
Simulation Slide Switch	Simple slide switch with no pin assignment. State can only be determined by simulation macro read. Momentary or latching action can be chosen in the properties.
Beam Breaker	Automatically sets and resets a pin depending on whether a panel object breaks the 'light beam'. Can also send simulation notification events.
Bezel Radiused	A purely cosmetic component for creating a smoothly radiused bezel or frame to fit around other components, or to define the edges of panel sections.
Button helper	A button overlay that allows any object to behave like a button
Target Chip	A cosmetic only representation of the target microcontroller device showing the default package type complete with pins.
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.

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.
Rx/Tx 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.
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.
Dashboard Knob	Rotary control designed for the dashboard panel. Has customisable value markings around the control. Simulation only - the control value can be read using simulation macros but is not connected to a chip pin.
Dashboard Meter	Simulation only round meter/dial. The range of values displayed is easily adjusted.
Dash Scale Horizontal	Horizontal based slider with a user defined scale, typically used on in SCADA based solution
Dash Scale Vertical	Vertical based slider with a user defined scale, typically used on in SCADA based solution
Dashboard Text	A simulation only text box that can be used to display text and numbers.
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.
Panel Console Viewer	An easy way to display the data from up to four console windows on the panel.
Combo Board (EB083)	A simulated version of the EB083 Combo board including LEDs, Switches, LCD, 7-Segs and analogue inputs.
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.

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. 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.
Digital Temperature (LM75B, EBM004)	A digital temperature sensor based around the LM75B chip.
Thermocouple TypeK	A component matching 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.
Gyroscope (L3G4200D, EBM009)	Interface to the L3G4200D three axis digital gyroscope. Panel GUI can be used to simulate incoming data for testing.
Hall Effect (SL353, EBM011)	The board has a Hall Effect sensor 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.
PIR	This board provides a PIR sensor which is read as a digital input.
Touch Pads	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	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.
Humidity (SHT21, 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.
Color Sensor (TCS3200, EBM018)	This board provides the ability to detect colors. It will return RGB and W values dependent on the color of the object under test.
Ultrasonic	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.

Infrared	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.
Formula AllCode	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.
FCD helper	A helper control to query the current FCD file
Formula Flowcode Racetrack	A simple race course for the Formula Flowcode buggy. Using Matrix product HP458, users are able to construct an exact replica if this course.
Formula AllCode API	A simulation only component to allow the Formula AllCode robot to be controlled via its 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.
GLCD base	Base graphical LCD with simulation only interface to allow graphics to be drawn in simulation. Suitable for inheriting to simplify the creation of further graphical LCD components.
GLCD (EBM001)	Graphical display component designed to work with the EBM001 modules and EB084 E-blocks. Based on the ILI9163C 16-bit color graphical controller IC.
Data Injector Template	A base data injector used as a placeholder in components which reference the data injector interface. Not recommended for use in projects.
Keypad (EB014 3x4)	Preset keypad based around the 3 * 4 unit, as used by the Matrix EB014 E-block
Potentiometer (Color)	Potentiometer with black plastic knob with colored cap. Cap and pointer colors can be changed in component properties.
LCD (EB005, 16x2)	LCD based on the unit used in the Matrix EB005 E-block
LED (5mm, Panel)	Standard 5mm LED mounted in a panel clip. Color can be changed in component properties.
7Segment (Single)	Seven segment display modelled after a standard 14mm high unit. LED color can be changed in properties.
MIAC Advanced	Advanced Add-on for MIAC System

MIAC Basic	Basic Add-on expansion module for MIAC System
MIAC Bluetooth	Bluetooth Add-on for MIAC System
MIAC GPS	GPS Add-on expansion module for MIAC System
MIAC GSM	GSM Add-on for MIAC System.
MIAC Industrial	MIAC Industrial Add-on component for MIAC System. Add (WIZ810MJ) TCP/IP or Webserver component to the panel to add functionality.
MIAC Serial	Serial Add-on expansion module for MIAC System
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 Zigbee Coordinator	MIAC Zigbee Coordinator Add-on component for MIAC System. Add the Zigbee component to the panel to add functionality.
MIAC Zigbee Router	MIAC Zigbee Router Add-on component for MIAC System. Add the Zigbee component to the panel to add functionality.
Marking control	A control to draw markings on any component
Maze Generator	Creates a simulation only randomised maze out of standard micromouse maze walls and pillars. Compatible with the Formula Flowcode robot.
Meter Square	Square analogue panel meter. A simulation only component - the needle value is set solely by the 'SetValue' macro.
MIAC (Arduino-Compatible)	MIAC - Matrix Industrial Automotive Controller (Arduino-Compatible)
MIAC (dsPIC)	MIAC - Matrix Industrial Automotive Controller (dsPIC)
MIAC (PIC)	MIAC - Matrix Industrial Automotive Controller PLC type module based on a PIC18F4455 device, produced by Matrix Component includes functions to drive the functionality of the MIAC and MIAC system.
MIAC (PIC) USB Slave	Allows Matrix's MIAC PLC to be used as a PC peripheral controlled by Flowcode via a USB connection. Requires that the MIAC (PIC) has the USB Slave firmware downloaded to it.
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.

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.
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.
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.
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.
Ellipse	A basic ellipse primitive shape.
Hemisphere	A basic hemisphere primitive shape.
Honeycomb	A basic honeycomb primitive shape.
Label	A basic text label.
Line	A basic line primitive shape.
Prism	A basic prism primitive shape.
Pyramid	A basic pyramid primitive shape.
Rectangle	A basic rectangle primitive shape.
Rounded rectangle	A basic rounded rectangle primitive shape.
Sphere	A basic sphere primitive shape.
Textbox	A basic textbox.

Tube	A basic tube primitive shape.
Simulation LED	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 message Message = 1 (on) or 0 (off) Current state can also be read via simulation macros.
Slider control	A simple graphical interface for a vertical meter or slider control. This can be used within 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.
Switch (Push, Panel)	Large round push switch with chrome bezel for panel mounting.
Switch (Toggle, Panel)	Miniature toggle switch with metal tag - solder lugs and nut for panel mounting.

Comms Pack A

Name	Description
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.
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.
CAN	Low level routines for controlling the CAN interface
DALI Master	A serial based communications protocol designed for controlling lighting, specifically digitally controlled 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 digitally controlled 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 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.
DMX-512 Slave	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.
Magnetometer (LSM303DLHC, EBM015)	LSM303DLHC Combined 6-Axis Accelerometer and Magnetometer sensors Useful for working out data such as Pitch and Yaw.
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	Chip Abstraction Layer for Two Wire I2C Communications

I2C Master	Generic Two Wire I2C Communications Interface
I2C Slave	Generic Two Wire I2C Communications Interface
Injector (CAN)	Comms data injector to allow CAN message identifiers to be decoded to specific message strings. Uses an external CSV file to specify the IDs and descriptive strings.
Injector (COM)	Comms data injector to allow a COM port peripheral to be attached to a comms component. The component will forward any outgoing bytes to the COM port and forward any incoming bytes to the comms component. Useful for controlling hardware such as Bluetooth, RS232, USB to Serial, MODBUS...
Injector (DS1307 RTC)	Comms data injector to allow simulation of a DS1307 Real Time Clock and RAM.
Injector (Human Interface)	Comms data injector to allow typed data values to be inserted into a component. Allows data to be input in raw ASCII form or as numeric byte data 0-255.
Injector (Loopback)	Comms data injector to replicate a basic loopback setup. The component will return any outgoing data back to the receiver.
MIDI	Low level routines for controlling or interacting with a standard MIDI 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.
One Wire	Low level routines for controlling or interacting with a standard one wire interface.
RS232	Low level routines for controlling or interacting with a standard asynchronous serial interface. On a microcontroller the interface will be the on-board UART which will need voltage level shifting using a max2323 to become RS232 compatible. See the EB015 RS232 E-block for details.
COM Port	Serial based simulation component for use with systems such as RS232, Bluetooth and USB Serial.
SPI	A low level implementation giving direct access to the CAL
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.

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.
UART	A low level implementation giving direct access to the CAL
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.

Comms Pack B

Name	Description
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 none of your data bytes trigger any escape codes or other special case conditions. Base64 converts your binary data into 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.
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 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.
Injector (AT)	Comms data injector to replicate basic AT command syntax. The component will record each incoming character until the termination character is received. Once this happens the component will respond by echoing back the received data followed by an "OK" reply.
Injector (GPS NMEA)	Comms data injector to allow simulation of NMEA style GPS messages
Injector (Flowcode vNet)	Comms data injector to allow components to talk to each other between instances of Flowcode. The injector allows the data to be sent and received between multiple instances of Flowcode either running on a single machine, across a network or via the internet.
IrDA (EB012, MCP1250, MCP2120)	Low level routines for controlling a standard IrDA interface. Also available in the form of the EB012 IrDA 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.
RF 2.4GHz	A simple RF communications module based on the 2.4GHz nRF24L01 modules.
RC5 (EB060, Generic	Low level routines for controlling a standard RC5 IR interface. Also available in the

36KHz)	form of the EB060 RC5 E-block.
RFID (EB052, RWD-MICODE)	Low level routines for controlling a RF Solutions RFID interface Allows communications between Mifare, ICode and HiTag type RFID tags. Also available in the form of the EB052 RFID E-block.
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.
SRF (WirelessThings)	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.
TCP Template	Base TCP/IP component with simulation only interface to allow TCP/IP style network communications in simulation. Suitable for inheriting
TCP/IP	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.
TCP/IP	TCP/IP component designed to work with the WIZ810MJ module from Wiznet, as used on version 2 EB023 E-block and the MIAC Industrial Add-on module.
TCP/IP (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
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).
Webserver (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 Add-on. Provides a very simple interface to allow webpages to be hosted from hardware or simulation.
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.
WLAN (EB069, 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.
Zigbee (EB051, 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 Add-on module

Display Pack

Name	Description
GLCD (EB075, 4D-Goldelox)	Graphical display component designed to work with the Goldelox range of displays from 4D Systems. Also available in the form of the EB075 GLCD E-block.
GLCD (EB076, 4D-Picaso)	Graphical display component designed to work with the Picaso range of displays from 4D Systems. Also available in the form of the EB076 GLCD Touchscreen E-block. Component based around the uLCD-32PT display.
GLCD (EB076v2, 4D-Picaso)	Graphical display component designed to work with the Picaso range of displays from 4D Systems. Also available in the form of the EB076 GLCD Touchscreen E-block. Component based around the uLCD-32PTU display.
LCD (Adafruit, OLED)	Adafruit OLED LCD display
LCD 4x20 (Adafruit, OLED)	Adafruit OLED LCD display 4 x 20 characters
Bitmap Drawer	A component to simplify the process of drawing bitmap images to a graphical display. Stores the bitmap image inside a ROM look up table. Compatible with 24-bit Bitmaps and Monochrome Bitmaps. The gLCD object property specifies which LCD component to draw the bitmap to. Use multiple BitmapDrawer components for multiple bitmap images.
GLCD (EB043-00-1)	Graphical display component designed to work with the legacy version 1 EB043 E-blocks.
GLCD (EB043-00-2)	Graphical display component designed to work with the legacy version 2 EB043 E-blocks.
GLCD (EB057)	Graphical display component designed to work with the EB057 modules and EB058 E-blocks.
GLCD (ILI9341)	Graphical display component designed to work with the ILI9341 controller IC Based on the ILI9341 16-bit color graphical controller IC.
GLCD (KS0108)	Graphical display component designed to work with the KS0108 type monochrome displays.
GLCD (SSD1289)	Graphical display component based on the SSD1289 16-bit color graphical controller IC.
GLCD (SSD1305)	Graphical display component based on the SSD1305 monochrome graphical controller IC.

GLCD (SSD1305) Buffered	Graphical display component based on the SSD1305 monochrome graphical controller IC. Functions without the use of a read pin by hosting the 1K of graphical memory using the microcontroller's RAM memory.
GLCD (SSD1306)	Graphical display component based on the SSD1306 monochrome graphical controller IC.
GLCD (SSD1306) Buffered	Graphical display component based on the SSD1306 monochrome graphical controller IC. Functions without the use of a read pin by hosting the 1K of graphical memory using the microcontroller's RAM memory.
GLCD (SSD1306) I2C	Graphical display component based on the I2C version of the SSD1306 monochrome graphical controller IC. Functions without the use of a read pin by hosting the 1K of graphical memory using the microcontroller's RAM memory.
GLCD (SSD1322) Parallel	Graphical display component designed to work with the SSD1322 type monochrome displays. Compatible with 6800 and 8080 type 8-bit parallel displays.
GLCD (SSD1322) Buffered	Graphical display component based on the SSD1322 monochrome graphical controller IC. Functions without the use of a read pin by hosting the 2K of graphical memory using the microcontroller's RAM memory.
GLCD (SSD1351)	Graphical display component based on the SSD1251 16-bit color graphical controller IC.
GLCD (ST7036) I2C	Graphical display component based on the I2C version of the ST7036 monochrome graphical controller IC. Functions without the use of a read pin by hosting the 1K of graphical memory using the microcontroller's RAM memory.
GLCD (ST7565R) Parallel	Graphical display component designed to work with the ST7565 type monochrome displays. Transfers data using an 8-bit digital data bus.
GLCD (ST7567) SPI	Graphical display component designed to work with the ST7567 type monochrome displays. Transfers data using a 4-wire SPI interface, cannot read back so pixel based routines won't work Not for public release.
GLCD (T6963C)	A Graphical LCD component to drive displays fitted with a T6963C controller IC.
LCD (Generic, 20x4)	LCD based on the standard 4 x 20 character unit.
LCD (I2C)	Standard alphanumeric LCD based on a standard I2C control bus.
LCD control	An LCD control pane supporting up to 64 x 64 units Suitable for simulation only
LCD (Generic)	Generic configurable alphanumeric LCD display component based on the standard Hitachi HD44780 controller IC with selectable 4/8 bit interface
7Segment (Quad)	14mm seven segment display. LED color can be set from properties.

DSP Pack

Name	Description
Control	Allows for several types of control operations to be performed on a buffer. On/Off - Standard on off control as used on most overs, 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.
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 discreet 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 buffers into one an index at a time. Functions include: Add, Average, Difference, Max, Min, Subtract
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.

Input/Output Pack

Name	Description
Switch (Generic)	Simple push button switch with LED indicator. Momentary or latching action can be chosen in the properties.
Touch Pads	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.
DAC Output	DAC - Digital to Analogue Converter support for PIC 8-bit and 16-bit devices.
Switch (Push, Dashboard)	Simple momentary push-button using the Matrix dashboard theme.
Dashboard lamp	Indicator with bezel and label, particularly suitable for viewing on the dashboard. Indicator on/off colors, bezel color and label all editable via properties.
Switch (Slide, Dashboard)	Simple latching slide switch using the default Matrix dashboard theme.
Potentiometer	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.
Dual Potentiometer - Trimmer	This board provides two rotary potentiometers. This component directly interfaces with the EBM006 Dual Trimmers sensors board.
Rotary Encoder	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.
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.
Keypad (Cursor 3x3)	A preset keypad component with up, down, left and right cursors, and a selection of function keys, in a 3 by 3 matrix. Return values (Index or Number) are... 0 = F1, 1 = Up, 2 = F3 3 = left, 4 = OK, 5 = right 6 = F2, 7 = down, 8 = F4. 255 = No key pressed.

Keypad (Hex 4x4)	Preset keypad for entering hexadecimal numbers. Macros 'GetIndex' or 'GetNumber' will return the decimal equivalent of the number pressed, or 255 when no key is pressed. 'GetString' will return the character, including 'ABCDEF'.
Potentiometer (Panel)	Analogue potentiometer with chicken head style pointer.
Potentiometer (Black)	Potentiometer with black plastic knob. Pointer color can be changed in component properties.
Potentiometer (Trimmer)	Trim Pot for 0.1mm pitch PCB. With finger dial knob. Pointer color can be changed from component properties.
LED (LES, Panel)	Panel lamp for a LES bulb. Color can be changed in component properties.
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 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 (Generic)	Basic LED component using simple geometric shapes.
LED (5mm, PCB)	An industry standard 5mm diameter LED. Any color may be chosen, and the leads trimmed to length.
LED Array (PCB)	An LED matrix made up of standard PCB mount 5mm LEDs.
LED Template	Base for creating LEDs and other on/off visual indicators. Choose a 'Target Object' that will change color 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.
LED (SMD, PCB)	Surface mount LED in standard PLCC2 package. Color can be set from

	component properties.
Starburst Display	Starburst 14 or 16 segment display modelled after a standard 14mm high unit. LED color can be changed in properties.
Switch (Push, PCB)	Simple tactile PCB switch for PCB mounting. Approx. 12 * 12mm. Color and operation can be set from properties.
PWM	A low level implementation giving direct access to the CAL
PWM	Pulse Width Modulation, a versatile way of generating a digital pulse using mark / space modulation. Uses the capture compare peripherals on-board 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
LED (Generic, RGB)	An LED with red, green and blue elements that can be mixed together to produce almost any color at any brightness.
LED (RGB, PCB)	A smeltable RGB LED in a standard 5mm through-hole PCB mount package. Three port pins each output a simple PWM signal - one for each of the primary colors. The colors can then be mixed in any proportions to allow the desired color to be produced.
Potentiometer (Slider)	Slider with plastic cap and 100mm travel that simulates an analogue chip input. Cap and marker color can be changed in component properties.
Microswitch	Industry standard V3 size microswitch fitter with a roller arm - activated by other panel objects coming into contact with the roller. Changes the state of a chip pin, and sends a simulation notification message when its state changes.
Switch (Push, PCB, SMT)	Surface mount click switch, standard 6mm square size.
Switch (Rocker)	Rocker switch with indicator lamp and properties for changing the colors of each part.
Switch (Slide, PCB)	Subminiature slide switch with black tang, PCB mount.
Switch (Toggle, PCB)	Miniature toggle switch with metal tang. Pins for PCB mounting.
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.

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 Array (Push)	An array of up to eight momentary push switches, each connected to a single pin of the specified port.
Switch Array (Slide)	An array of up to eight slide switches, each connected to a single pin of the specified port.
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.

Mechatronics Pack

Name	Description
3D Printer	A simulation only version of a very basic 3D printer such as a standard RepRap.
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. Simulates the G commands via a simulation only 3D printer component but can also be used to pass values to actual hardware.
Magnetometer	LSM303D Combined 6-Axis Accelerometer and Magnetometer sensors Useful for working out data such as Pitch and Yaw.
Micro Servo (Tower Pro 9g)	Small size 9g servo motor suitable for control by the 'Servo Controller' component. Use the 'Link to...' property to attach other objects to the rotor for emulating mechanical systems. Send a virtual PWM signal to the servo by selecting it as a target of the 'Servo Controller' component.
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. Can be linked to other objects to make them move.
Motor (Full Bridge)	Motor that can be driven at a preset speed in either forwards or reverse direction with inertia. Properties support several pin options to allow matching with different hardware driving circuits. Can be connected to other objects to make them move.
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.
Servo Controller	Can control up to eight standard PWM driven servo's. '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.
Solenoid DC1	Simple open frame solenoid based on the Benson BDC.4 series.

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.
Standard Servo	Standard size servo motor suitable for control by the 'Servo Controller' component. Use the 'Link to...' property to attach other objects to the rotor for emulating mechanical systems. Send a virtual PWM signal to the servo by selecting it as a target of the 'Servo Controller' component.
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 ration, or moved linearly according to the pitch of a given lead screw.
Stepper - Generic	A generic stepper motor model. Includes a visual simulation showing the activation pattern of the coils. Make another object move along with the stepper shaft using the 'Target' property. The target object can rotate with the stepper shaft with a given gearing ratio, or be moved linearly according to a given lead screw pitch.
Stepper (NEMA8)	A NEMA8 stepper motor model. Includes a visual simulation showing the activation pattern of the coils. Make another object move along with the stepper shaft using the 'Target' property. The target object can rotate with the stepper shaft with a given gearing ratio, or be moved linearly according to a given lead screw pitch.

Misc Pack A

Name	Description
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 on-board 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.
Injector (File)	Comms data injector to allow data to be streamed to and from a file during simulation. The component will read data from the incoming file and write data to the outgoing file.
K8055D	Support for the Velleman K8055 USB input/output board. Allows Flowcode to communicate with up to four K8055 boards, or to simulate them with interactive on-screen controls. All digital and analog I/O functions are supported.
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.
Accelerometer / Gyro (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.
PicoScope	A set of functions designed for interacting with a 2000 series Pico scope via simulation.
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.

String Translator	A simple component to allow multiple language support by substituting different strings depending on the selected language.
TTi Power Supply - PL155-P	TTi PL155-P Power Supply Unit Component. 15V - 5A
TTI TG5011 Signal Generator	TTi TG5011 50 MHz Signal Generator