Compact Robotics Board for BBC micro:bit

www.kitronik.co.uk/5693

The Compact Robotics Board enables the BBC micro:bit (connected via a standard card slot connector) to drive 4 motors (or 2 stepper motors) and 8 servos. Coupled with 17 other I/O expansion points, this means the BBC micro:bit can very easily become the core of a whole variety of robotics projects.

The Robotics Board features 2 Dual H-Bridge Motor Driver ICs (capable of driving 2 standard motors or 1 stepper motor each) and 8 servo outputs (capable of driving standard and continuous rotation servos), all controlled from the BBC micro:bit using the I2C protocol via a 16-channel driver IC. The Link header breaks out all the usable pins from the BBC micro:bit, and is designed to allow 2.54mm pitch pin header to be easily soldered into place. The 17 available I/O pins allow other input devices, for example, sensors, or output devices, such as ZIP LEDs, to be added to the board. The I2C communication lines are also broken out (Pins 19 & 20), which means other I2C compatible devices can also be added to the board and controlled by the BBC micro:bit. **(Note: I2C devices controlled by the same BBC micro:bit MUST have different addresses. The default address can be adjusted – see Page 3 for details).**

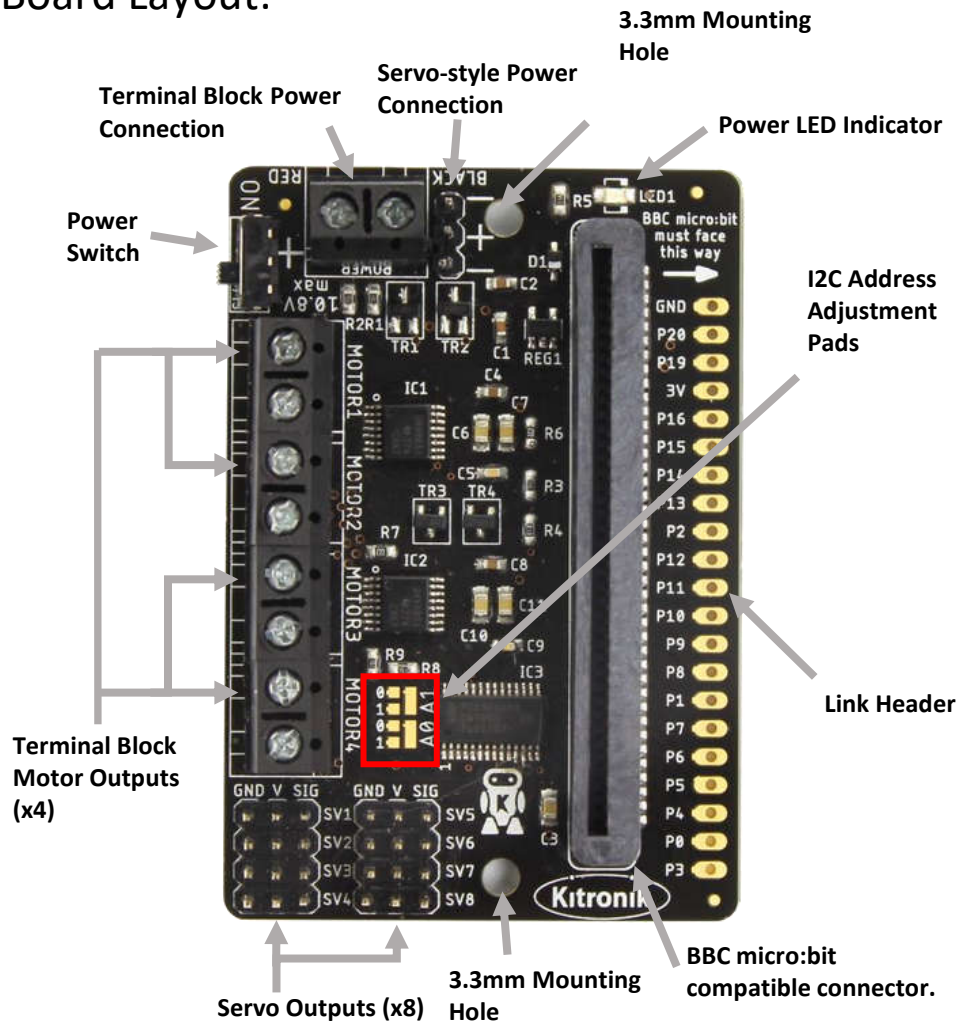
Power is provided via either a terminal block or servo-style connector, the supply is then controlled by an on/off power switch to the board. There is a green LED to indicate when the board is turned on. The board then produces a regulated 3.3V supply which is fed into the 3V and GND connections to power the connected BBC micro:bit, removing the need to power the BBC micro:bit separately. The 3V and GND pins are also broken out on the Link header, which means external devices can also be powered **(see Page 3 for the electrical specifications)**.

Inserting a BBC micro:bit:

To use the Robotics Board, the BBC micro:bit should be inserted firmly into the edge connector with the BBC micro:bit LED display facing the 'Link' header (see PCB text relating to this). This will give access to all the board functions and each pin broken out.



Board Layout:



Examples: For some further ideas of what you could do with the Robotics Board, go to: http://www.kitronik.co.uk/5693

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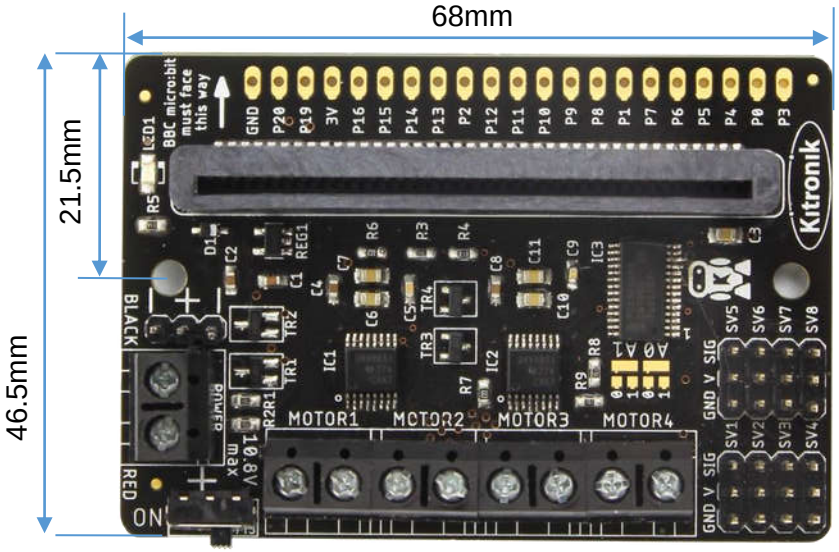
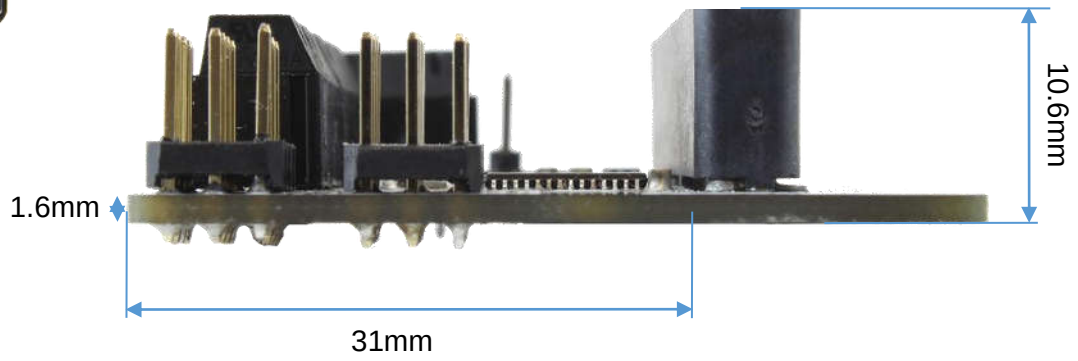
Board Dimensions:

(All measurements are given in mm)





(Dimensions +/- 0.8mm)

Mounting holes are 3mm Diameter

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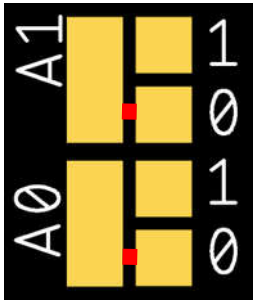
Electrical Information

Operating Voltage (Supply via Terminal Blocks or Servo Power Connector)	+3.0V – 10.8V (Recommended: 6.0V – 10.8V)
Regulated Voltage Supply (for BBC micro:bit)	+3.3V
Servo and Motor Voltage	Supply Voltage
Max Current (All Servos and Motors)	10A (Absolute max., 12A)
Servo Output Connections	8 (Provide supply voltage to servos)
Motor Output Connections	4 [2 stepper motors] (1.5A max current draw per motor)
External Connections (Link Header)	All BBC micro:bit Pins (IO Pins 5mA max sink/source current)
Power Supply via Link Header to External Devices	3.3V, 90mA max current draw

Changing default I2C address:

The default I2C address for the Robotics Board is set to 0x6C, but by using the adjustment pads A0 & A1, it is possible to change it to one of 0x6D, 0x6E or 0x6F. The picture to the right shows pads A0 & A1. Each one is made up of a long pad connected to one of the driver IC address pins, a small pad connected to 3.3V (marked '1'), and a small pad connected to GND (marked '0'). The address is determined by whether the long pads are connected to 3.3V or GND (binary '1' or binary '0'). As standard, the long pads for both A0 & A1 are connected to GND, setting the last two bits of the address to '00'. By cutting the small link track (marked in red), and soldering a connection from the long pad to the '1' pads, the address is changed. See table on right for address setup.



Address	A1	A0
0x6D	0	1
0x6E	1	0
0x6F	1	1

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Microsoft MakeCode Blocks Editor Code

The program shown to the right was created using the Microsoft MakeCode Blocks Editor for the BBC micro:bit. It demonstrates the control of stepper motors, normal motors and servos, all of which can be connected to the Compact Robotics Board.

When Button A on the BBC micro:bit is pressed, a stepper motor connected to motor outputs 1 and 2 will turn in the forward direction 180°; ordinary motors connected to motor outputs 3 and 4 will turn in opposite directions (Motor 3 at 10% speed, and Motor 4 at 100%); a servo connected to servo output 1 will turn to the 180° position if it is a standard servo, or will turn full speed in one direction if it is a continuous rotation servo; and finally, a servo connected to servo output 8 will turn to the 0° position, or will turn full speed in the opposite direction to Servo 1.

When Button B on the BBC micro:bit is pressed, Stepper 1 will turn 100 steps in the opposite direction to Button A (the stepper motor block allows turning to be set in either a certain number of degrees or steps; the default number of steps is 200, but this can be changed using the block shown in the 'On Start' section); Motor 3 will be turned off; Motor 4 will turn in the opposite direction to Button A at 50% speed; and finally, servos connected to servo outputs 3 and 6 will be set to the 90° position.

When Buttons A and B on the BBC micro:bit are pressed together all motor and servo outputs on the All-in-one Robotics Board will be switched off.

In the same way as the stepper motor steps value can be changed, if the Robotics Board I2C chip address has been changed, a new address can be selected in the package – see the 'robotics.ts' file in the MakeCode package for instructions.

Note: These programs use the Kitronik Robotics Board package available on Microsoft MakeCode (the green blocks shown here).

