zbit:toolbelt

for the BBC micro:bit
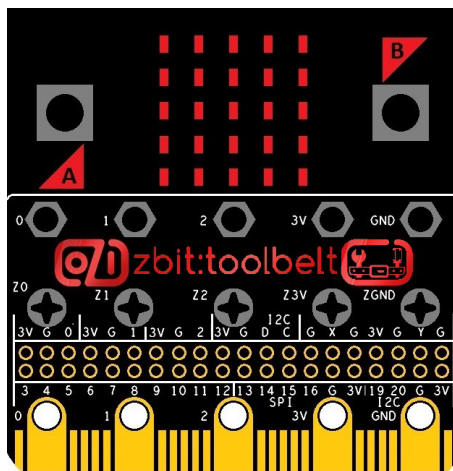
Have Fun while you Learn !

www.zbit-connect.co.uk

zbit:toolbelt for the BBC micro:bit

The **zbit:toolbelt** is a member of the **zbit:connect** family of add-on boards for the **BBC micro:bit** brought to you by *i*nnovations in *e*ducation.

The **zbit:connect** family is designed to *unleash the potential of the BBC micro:bit* allowing your **micro:bit** to connect to *multiple* **add-on boards** attached in the **'X', 'Y' or 'Z' axis**!

The **zbit:connect** family is designed to encourage an **understanding of software programming** by helping you to learn how to **write code** to **control external electronics**.

The **zbit:connect** family is also designed to encourage an **understanding of electronics** by encouraging '*positive hacking*' such as modifying **zbit:connect** boards to change or enhance their capabilities and/or **attaching your own electronic designs** to the **micro:bit**.

And above all the **zbit:connect** family is designed for you to

'*Have Fun while you Learn*'

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zbit:toolbelt Features

zbit:toolbelt provides the smallest, lightest and most compact way to access *all* **GPIO** on the **micro:bit**.

This is possible due to
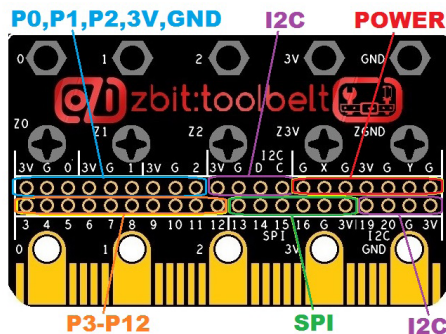the *unique* way **zbit:toolbelt** attaches to the **micro:bit**.

zbit:toolbelt connects using the custom designed
'**zbit:connector**' made from **advanced conductive elastomerics**.

By using this small light weight connector, once attached,
zbit:toolbelt *feels* like it is *part* of the **micro:bit!**

All **micro:bit GPIO** are made available on a **40 way socket connector**. This is the '**toolbelt connector**'.

The **micro:bit** compatible **Edge Connector** at the bottom also allows you to add additional **zbit:connect** boards or other **micro:bit** compatible accessories.

The pinout of the **toolbelt connector** is designed for maximum flexibility and convenience, allowing it to be used like a
mini breadboard...

P0, P1, P2, P8, P12, P13, P14, P15 & P16 have **adjacent 3V and/or GND pins** so 2 pin devices such as **LED's** can simply be plugged into the **toolbelt connector**.

P0, P1 & P2 have **adjacent 3V & GND pins** *both sides* so 3 pin devices such as **Sensors, Servos**, etc, can plug into the **toolbelt connector**, *what ever their signal order* (3V-GND-SIG, 3V-SIG-GND, SIG-3V-GND, etc)

SPI Connector [P13,P14,P15,P16,G,3V] allows you to plug in an **SPI Board** such as an **SD Card Interface**.

Two **I2C Connectors** [3V,G,D(P20),C(P19)] allow you to plug up to two I2C Boards into the **toolbelt connector**.

Widely available **I2C Boards** include
Proximity Sensors,
Gyro Sensors,
Seven Segment Displays,
Dot Matrix Displays,
Digital-to-Analog Converters,
Analog-to-Digital Converters,
Real Time Clock Modules, etc.
Or you could *design your own* **I2C board!**

Power pins 3V, G and **Auxiliary Signals X & Y** are available in the top right of the **toolbelt connector** to give access to power. For instance this is where **zbit:powerUSB** module can be fitted to give increased **3V current** to power **Servos** and **Displays** and to supply **5V** to power some **Motors** and **Sensors**.

The '**Z**' screws, whilst primarily used to secure the **zbit:connector** in place, can also be used add modules such as **NeoPixel Sticks** and **Rings** or to secure **zbit:tool*kit*** boards onto the **toolbelt connector.**
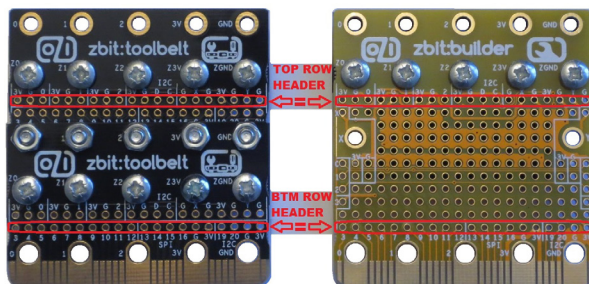
zbit:tool*kit* boards include:-
zbit:thumb,
zbit:trol,
zbit:shaker,
zbit:mic,
zbit:jack, etc.

The '**xspacer**' can be used to provide additional mechanical fixing points, attach to adjacent zbit:connect boards and/or allow you to feed **external power rails** onto your **zbit:connect** board to power **motors** and **sensors** that require a higher voltage than the 3V supplied by the **micro:bit.**

The '**zbit:pwr:bars**' can be used to connect **external power rails** and/or auxiliary signals from one **zbit:connect** board to another**.**

zbit:toolbelt is a '**half size**' **zbit:connect** board.
This means that *two* **zbit:toolbelt** boards bolted together are exactly the same size as a '**full size**' **zbit:connect** board such as **zbit:speaker** or **zbit:builder**.

Furthermore, with two **zbit:toolbelt** boards bolted together, the **top row** of the **toolbelt connector** is in the *same position* and has the *same pinout* as the **Top Row Header Connector** on a '**full size**' board and the **bottom row** of the **toolbelt connector** is in the *same position* and has the *same pinout* as the **Bottom Row Header Connector** as on a '**full size**' board.

Contents

1 x zbit:toolbelt board
1 x spacer board
1 x clip board
1 x xspacer board
2 x zbit:pwr:bars
5 x M3x8 Panel Head Screws
5 x M3x8 Countersunk Head Screws
10 x M3 Nuts
1 x 40 pin connector (*requires soldering*)
(zbit:connector* is an *optional* extra - sold separately)
*A **zbit:connector** is only required if the board needs to connect to the '**small pad**' GPIO **P3-20.**
For more information see the **'zbit:connect family guide'**

Tools Required

- Pozidrive Screwdriver
- Pliers
- Small File
- Soldering Iron
- Solder

Assembly Instructions

The 6 individual PCB's are supplied as in single piece as shown. The PCB's are attached to each other by 'break-off' tabs.

1) Break off all of the smaller boards (**spacer board**, **clip board**, **xspacer board** and **zbit:pwr:bars**) from the main **zbit:toolbelt PCB**. Snap off both ends of the connecting 'break-off' tabs. This will require a pair of pliers. (The **xspacer board** and **zbit:pwr:bars** are for advanced applications - see '**zbit:toolbelt Designer's Guide**' below)

2) File off any rough edges from where the break-off tabs were attached.

3) Solder the 40 way connector to the main **zbit:toolbelt** PCB. **Ensure the connector is fitted to the front of zbit:toolbelt. The front of zbit:toolbelt has the logos and 'zbit:toolbelt' text.** It is recommended you first solder two opposite corner pins. Then check that the connector is **fitted flush** with the surface of the PCB and is on the **front** surface of the PCB before soldering the remaining pins.
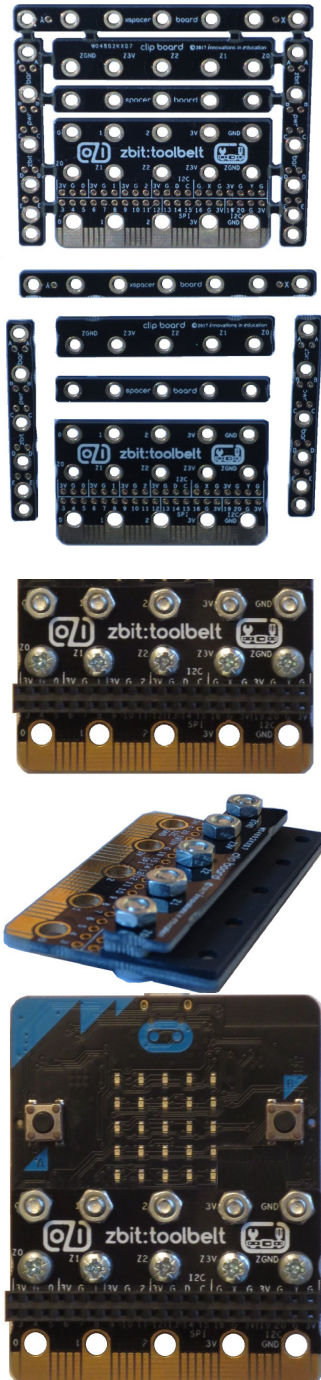
4) Attach the **zbit:connector**, **spacer board** and **clip board** with the **M3 pan head screws** as shown in the '**zbit:connector Assembly Diagram**' opposite. (If **zbit:toolbelt** is being used *without* the zbit:connector, fitting the **spacer board** and **clip board** is *optional*).

5) Insert your micro:bit into the slot at the top of **zbit:toolbelt** between the main **zbit:toolbelt PCB** and the **clip board**. Use the **M3 countersunk** head screws *inserted from the back of the micro:bit* as shown in the '**zbit:connector Assembly Diagram**' to secure your **micro:bit** to **zbit:toolbelt.**
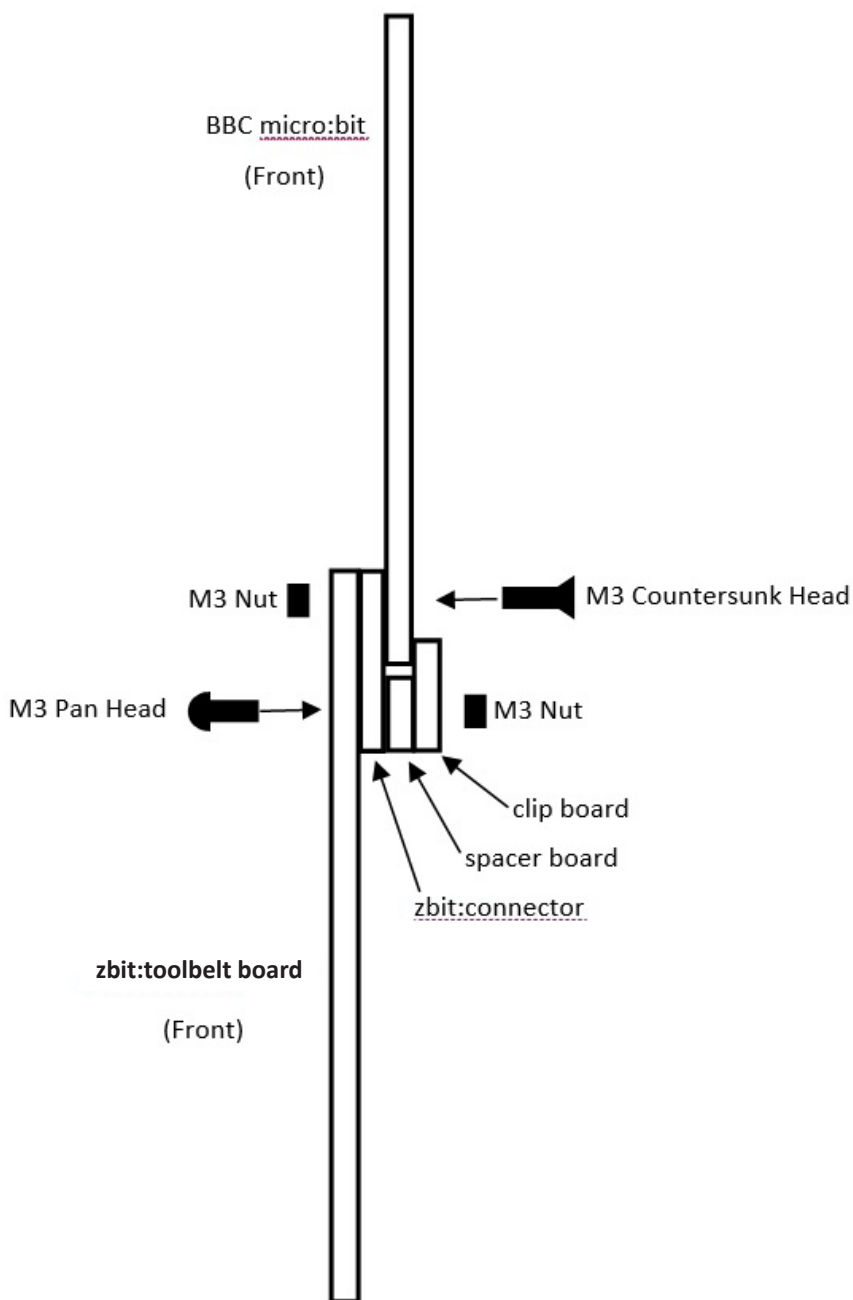
6) Tighten, but **don't over tighten** all screws.

zbit:toolbelt is now ready to use !

Visit **www.zbit-connect.co.uk** for **examples of what you can do with zbit:toolbelt** !

zbit:connector Assembly Diagram

BBC micro:bit

(Front)

M3 Nut

M3 Countersunk Head

M3 Pan Head

M3 Nut

clip board

spacer board

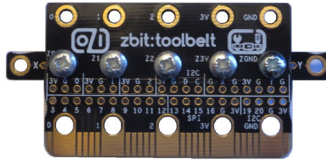zbit:connector

zbit:toolbelt board

(Front)

zbit:toolbelt Designers Guide

xspacer board

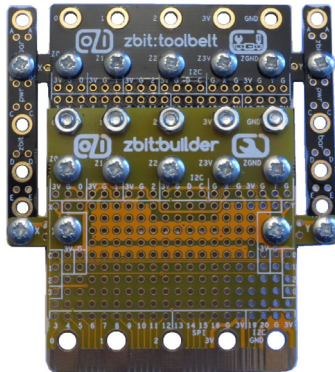The **xspacer** board can be fitted in place of the **spacer** board.

It can be used to:-

- provide additional mechanical fixing points

- bolt adjacent zbit:connect boards together

- connect **external power rails** and/or **auxiliary signals** to '**X**' & '**Y**' pins on the toolbelt connector

zbit:pwr:bars

The **zbit:pwr:bars** can be used in conjunction with the **xspacer** board to connect **external power rails** and/or **auxiliary signals** from one **zbit:connect** board to another**.**

For example, fitting the **xspacer** board and **zbit:pwr:bars** along with **zbit:power:usb** could make **5V** available for use on a **zbit:builder** board.

WARNING: The **micro:bit is a 3.3V device**. Connecting **5V** signals to its GPIO *could damage the micro:bit*. If using 5V to power motors and sensors, *ensure no 5V signals are directly connected to the micro:bit.*