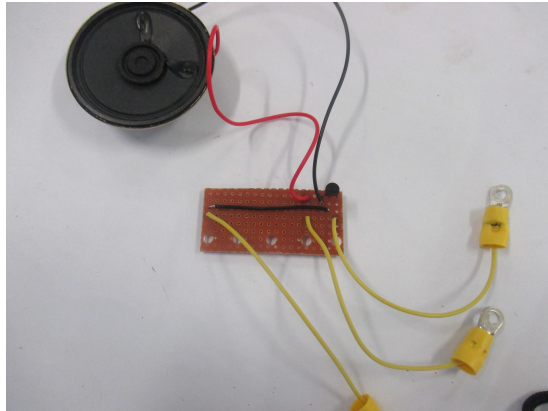


Y8 Micro:bit STEM Circuit Board Guide

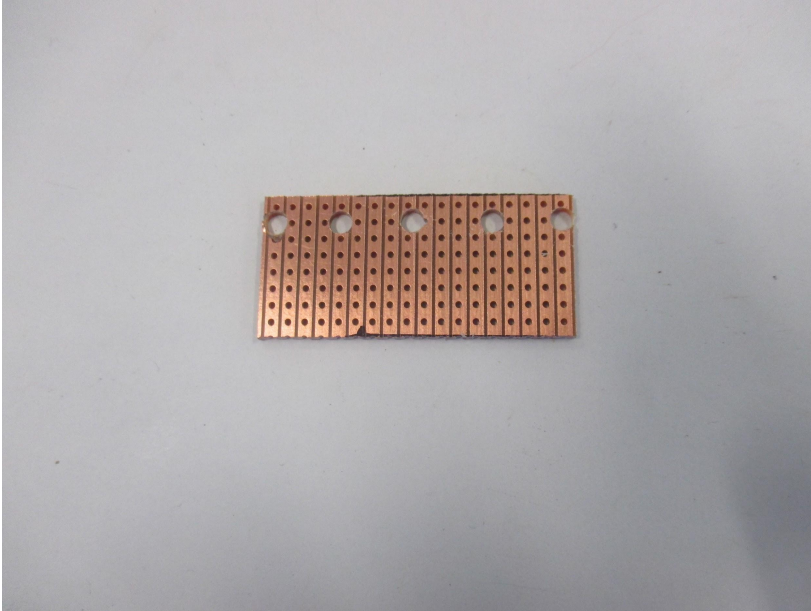
This guide shows how to construct the circuit board which is needed for the Y8 STEM Micro:bit project

It shows each stage of the process for making the circuit board, follow the photos and the notes that show each stage and how to complete the circuit board and attach the circuit board to the Micro:bit which will be programmed with the code that has been tested by building and using the Micro:bit bread board.

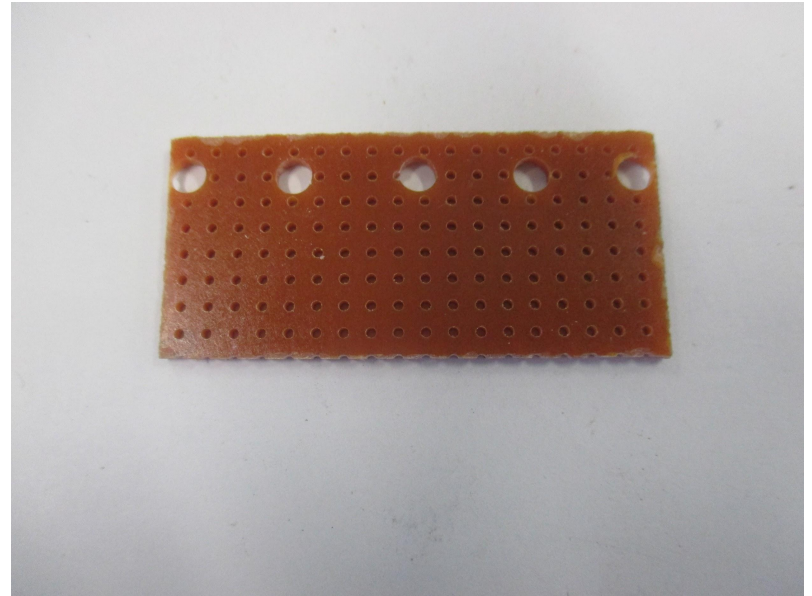


This photo shows a completed circuit board with its speaker

The circuit board

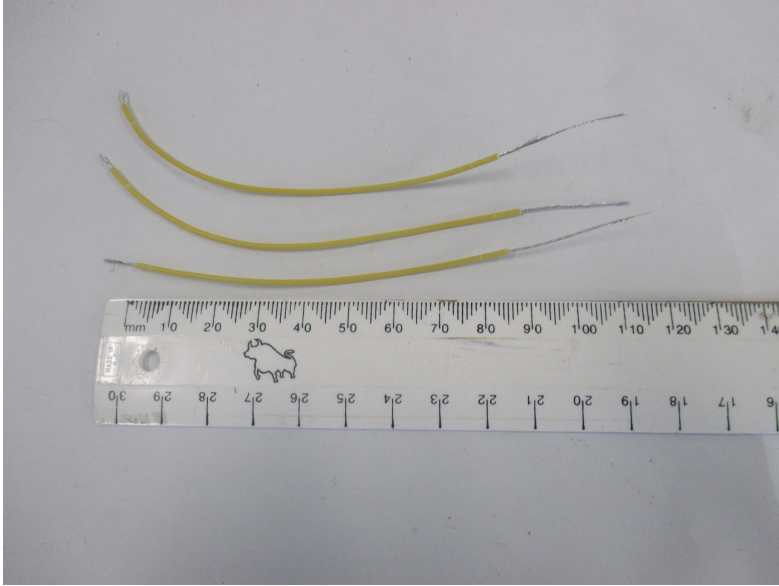


The Micro:bit circuit board is made from a piece of copper faced board called strip board or Vero board. It has two sides, a component side which is the plastic side (brown colour) and a copper side, which is where components and wires are soldered to.

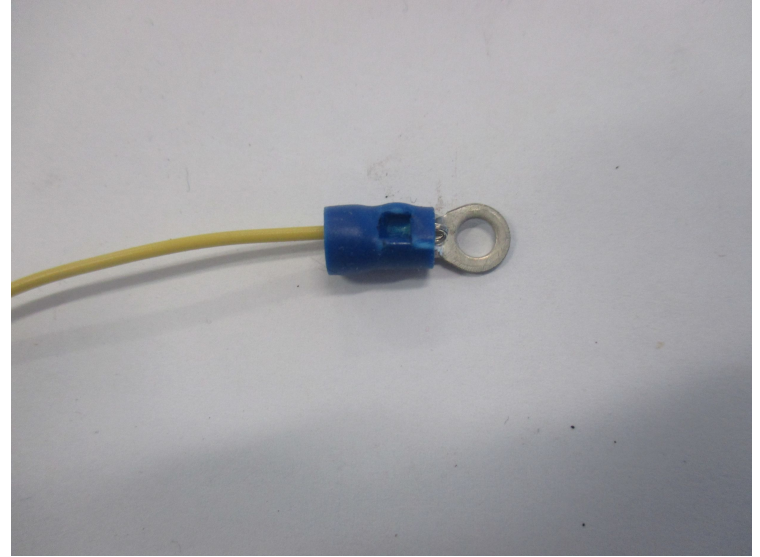


The photos show the component side (right photo) and the copper side (left photo). It has rows of holes and on the copper side these are joined to form solid rows where the holes are all connected, just like on a bread board. The five large holes have been drilled so it can connect to the Micro:bit.

Making the connector wires

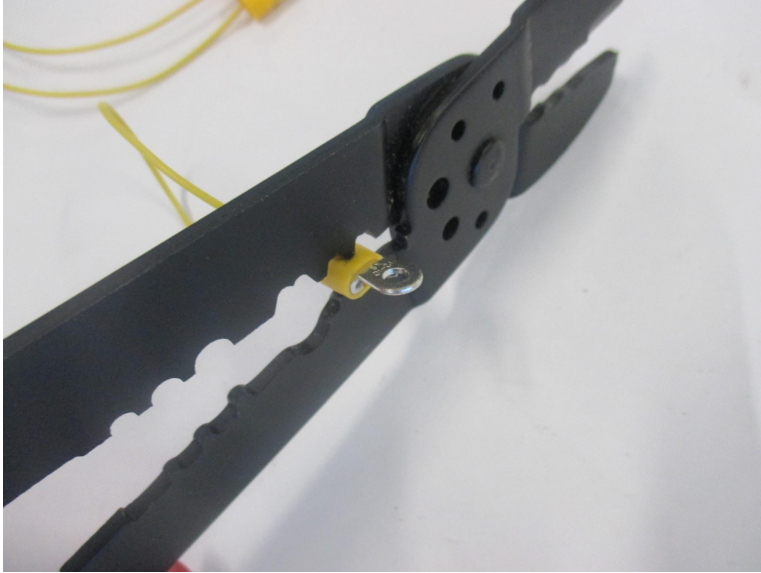


Three wires are needed to make connections between the circuit board and the Micro:bit pins. Cut three wires 100mm long, the wires can be yellow, green or blue but **NOT red or black** Use wire strippers to strip the plastic insulation from each end.

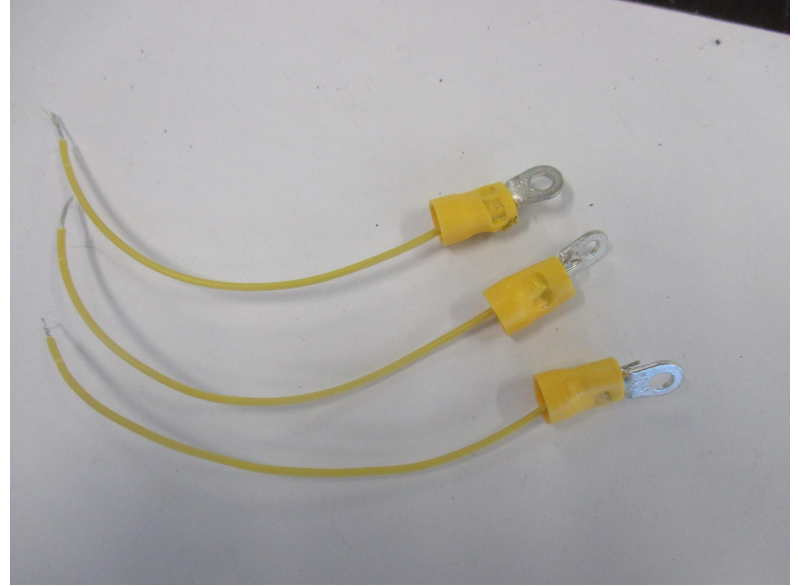


One end should be **stripped 10mm** and the opposite end should be **stripped 25mm** (you will need to do this in two or three stages) Bend the 25mm wire end over three times to form a thicker end, this needs to be thicker to fit inside the ring connector (next stage)

Attaching the ring connectors

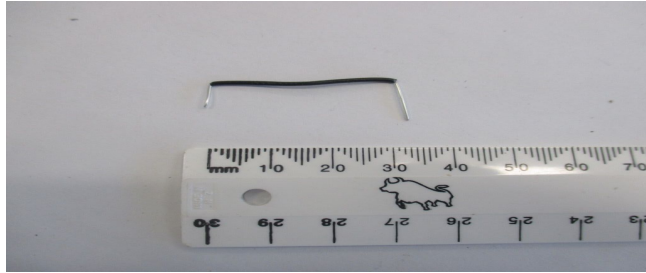
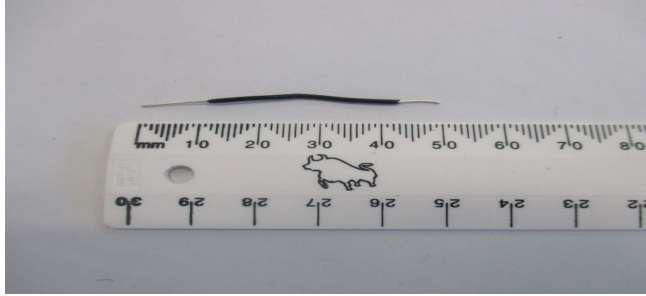


Slip a ring connector over the looped end.
Squeeze the connector onto the wire using the wire crimp tool.



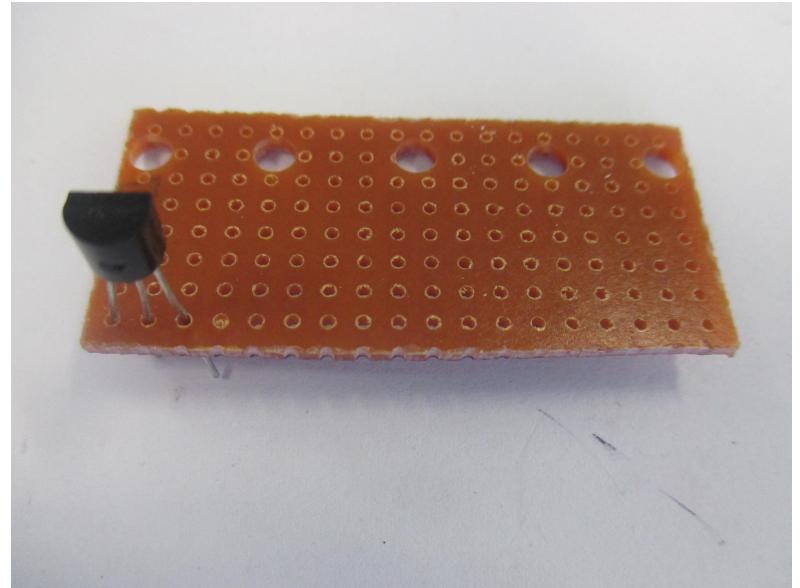
The ring connector is now squeezed on to the end of the wire, there should be three of wires in total..

Inserting the transistor



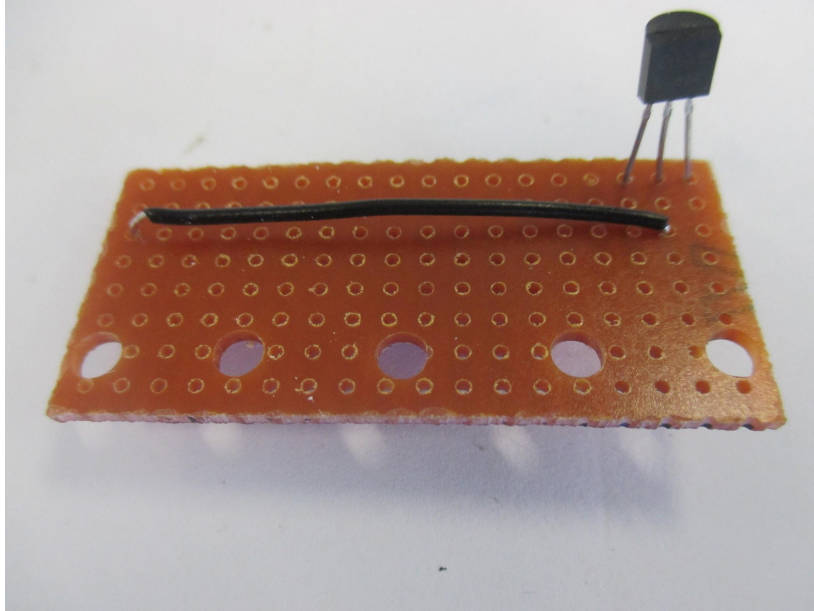
Cut a piece of solid core wire 50mm long, strip both ends 5mm, after stripping the centre has about 40mm of insulation left on the wire.

Bend both ends about 90 degrees using long nose pliers. This wire is now ready to insert into the circuit board.



Insert the transistor as shown. **The rounded side MUST face the edge** and the three leads **MUST** be inserted into the board as shown.

Soldering the transistor and solid wire

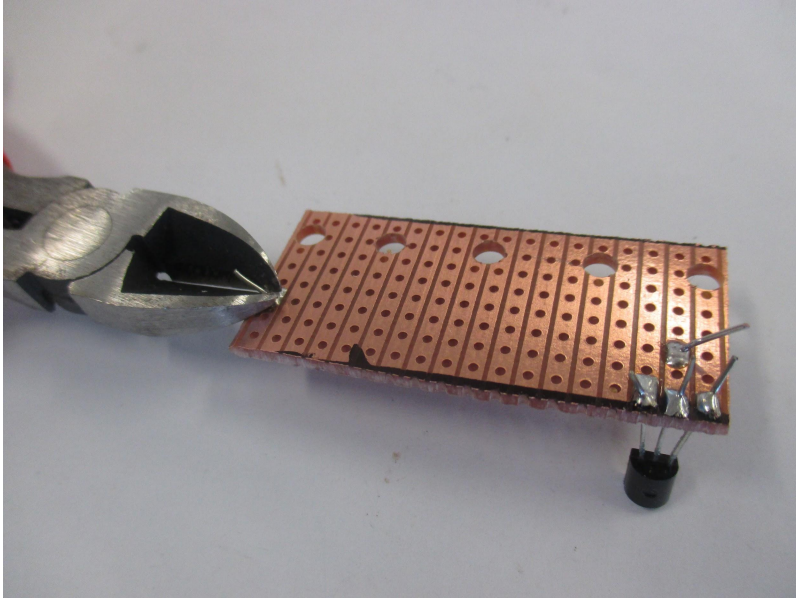


Insert the solid core wire into the board between the centre lead of the transistor and the end row of the board as shown, the wire **MUST** connect the centre lead of the transistor with the end row of the circuit board.

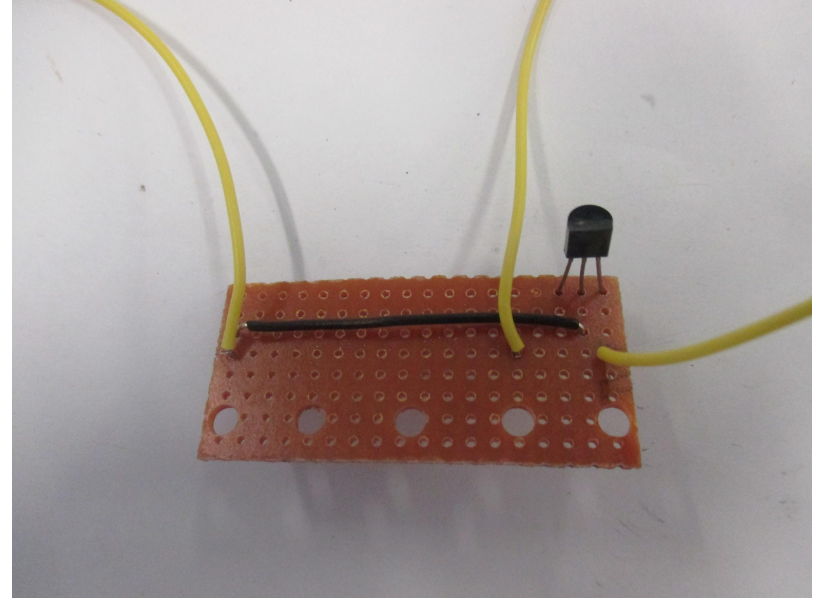


Solder the transistor and wire as shown, the transistor does not need to be pushed right through the board, only as far so the leads can be soldered (as the photo on the left shows)

Trimming the wires and soldering the three connector wires

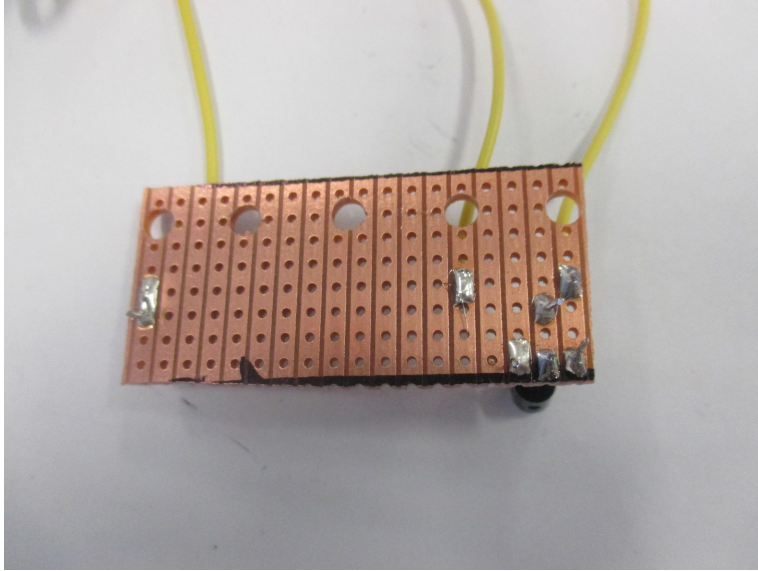


Trim the transistor and wires using side cutters

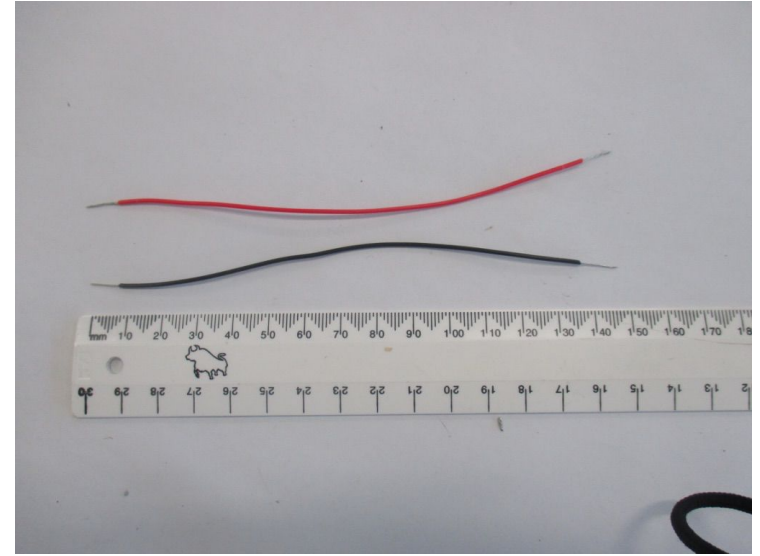


Insert the three connector wires in the places as shown.
The insulation on the wire should be touching the component side of the board so there is no bare wire showing.

Soldering the connector and speaker wires

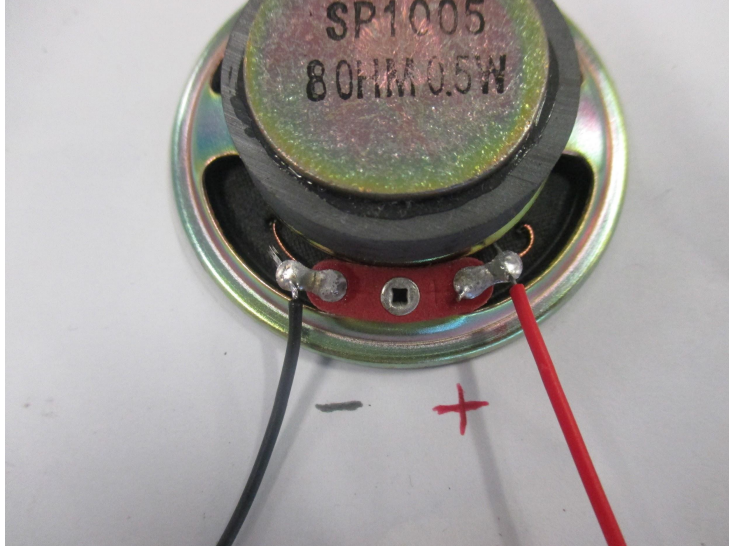


Solder the three connector wires into the circuit board and trim the wires down to the solder.

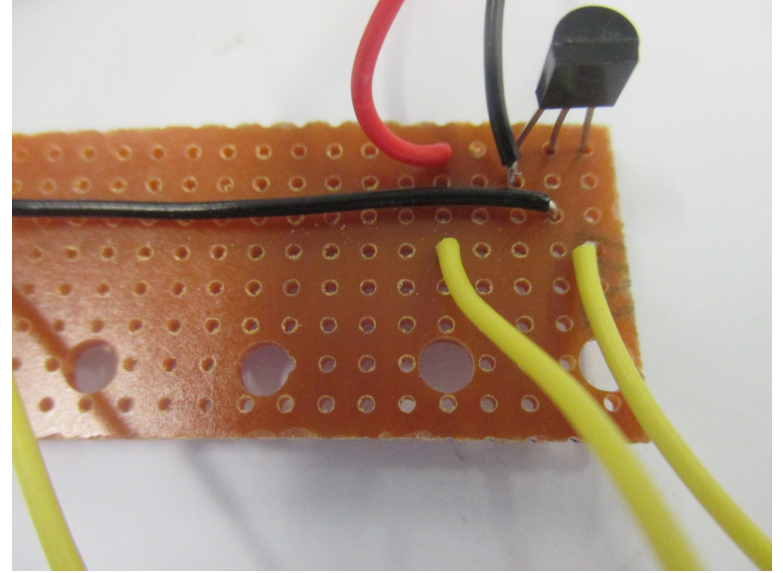


Cut one red and one black speaker wire each 150 mm long and then strip 10 mm of insulation from each end.

Soldering the speaker wires to the circuit board

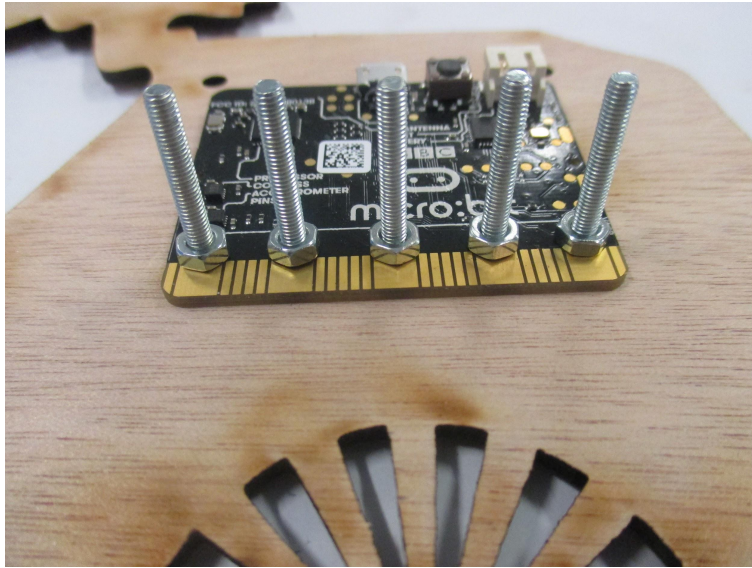


The speaker has two rings to solder wires to. The right ring is marked with a + to show it is positive. Solder the red wire to the + ring and the black wire to the other ring, make sure these are soldered securely as shown.

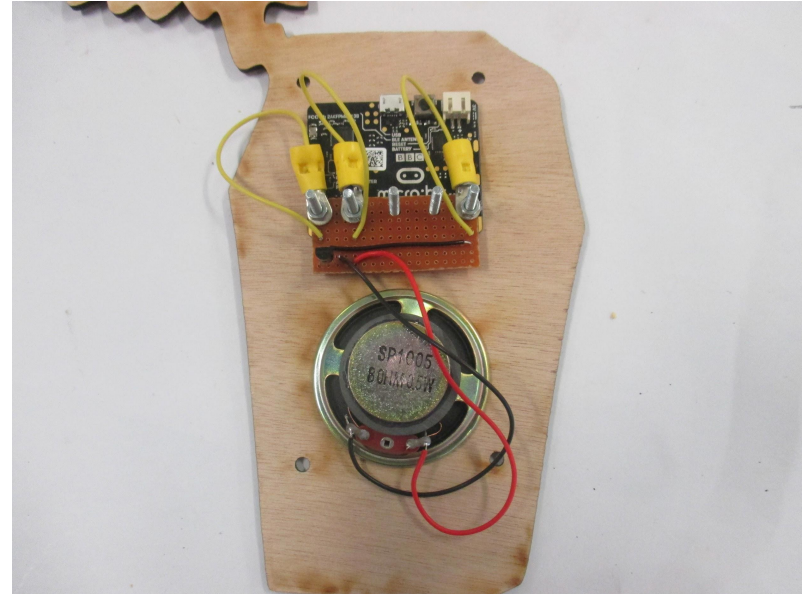


Insert the speaker wires to the board then solder them and trim off down to the solder. The red wire must be in the same row as the second yellow wire (5th row) and the black wire in the same row as the left side transistor lead (3rd row)

Assembling the circuit board and Micro:bit

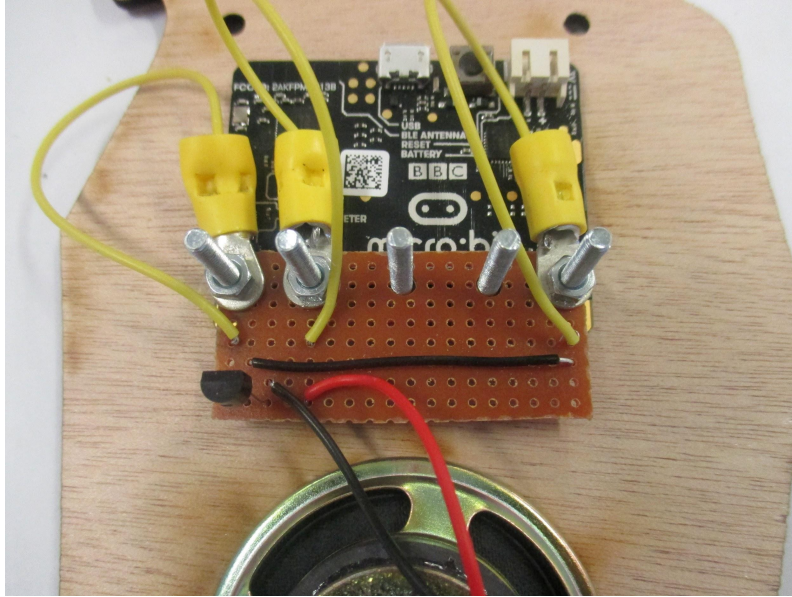


Fix the Micro:bit to the faceplate (the face plate is the front part you have designed)
You will need 5 x 3mm screws and 10 x 3mm nuts.
Add the 5 screws and nuts to the board as shown and tighten the nuts.
Next, connect the circuit board to the Micro:bit.

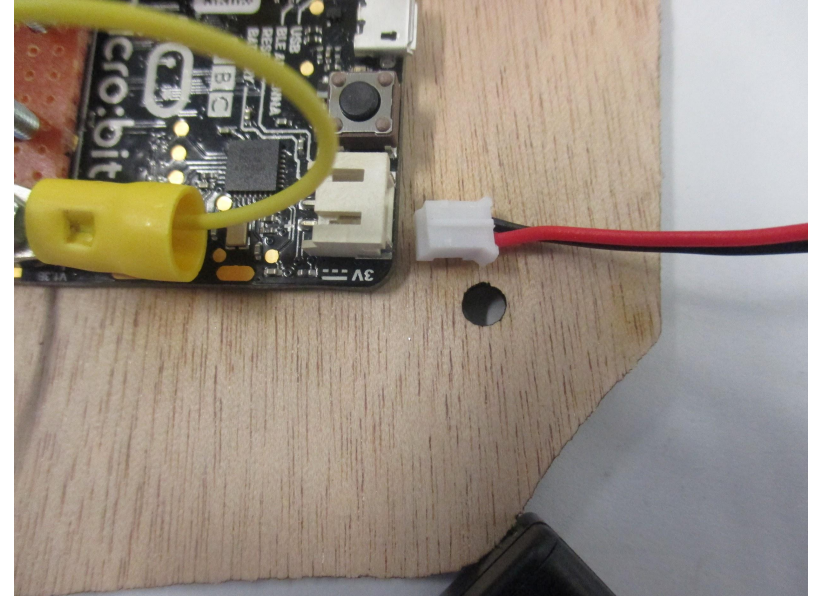


The copper of the circuit board must have a good connection to the Micro:bit pins so the nuts are used to make a good contact.
Place the circuit board over the five screws that are already in place.

Assembling the circuit board and Micro:bit (2)

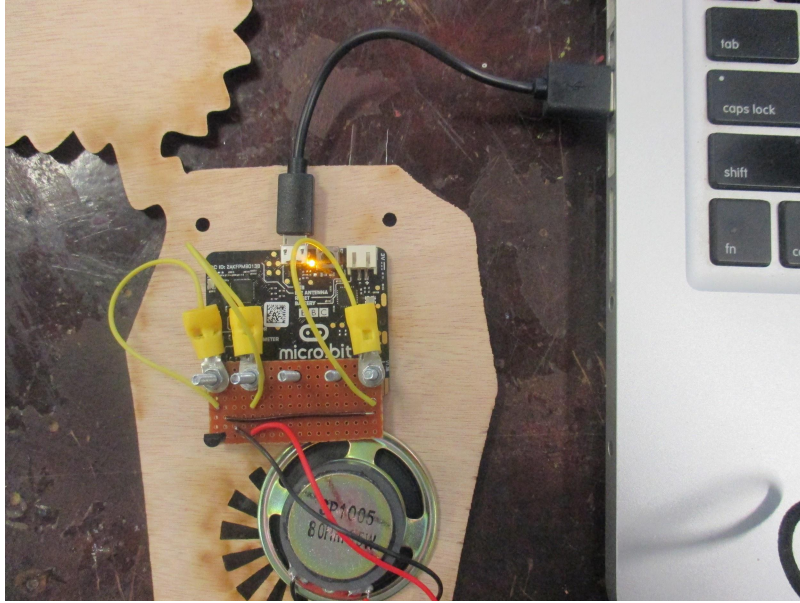


Place the three ring connectors over the screws as shown, add washers over the rings then use three more nuts to secure the rings to the board (only 3 nuts are needed, one for each ring connector)
This gives a good connection between the circuit board and the Micro:bit pins.

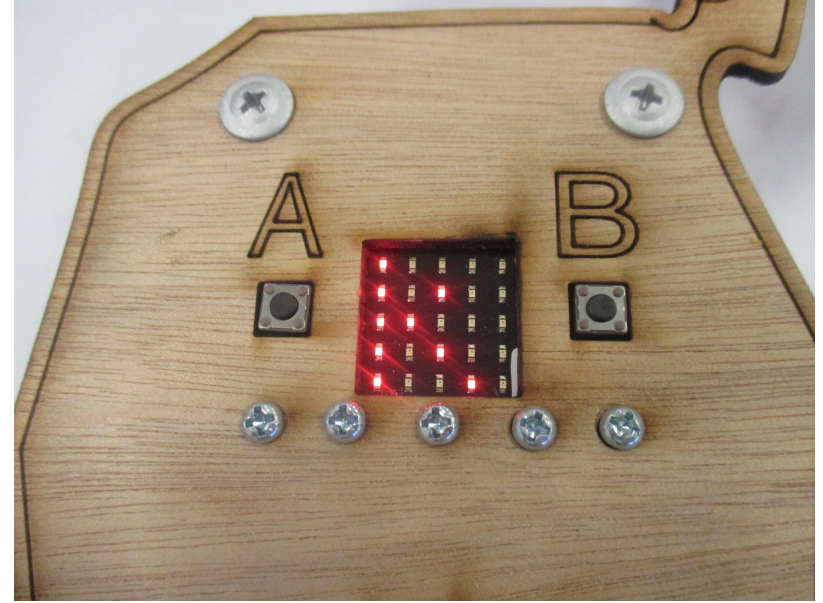


Connect the 3 volt battery to the Micro:bit. Be careful to push the white connector in the correct way, **there is a very small ridge on the connector that lines up with a groove in the Micro:bit, the ridge should face up.** The small yellow power light should be on to show the Micro:bit is powered..

Connections , downloading and testing

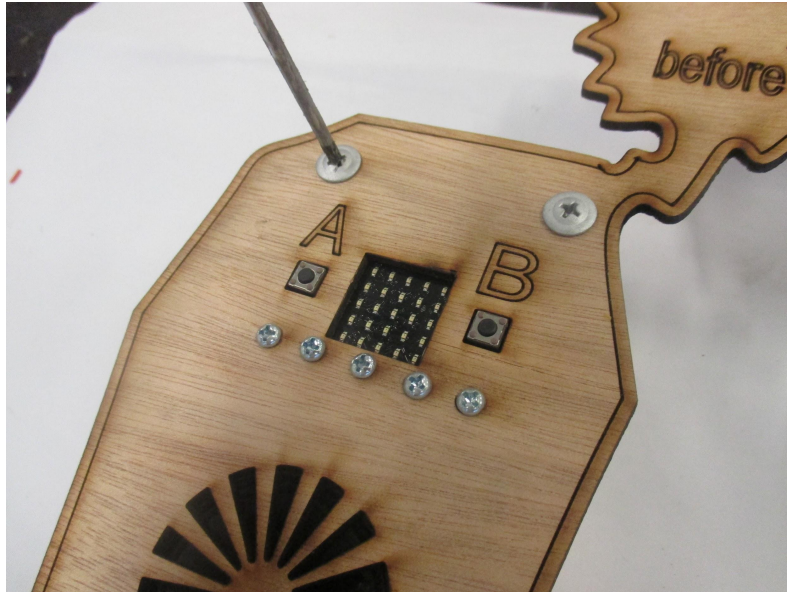


Plug in the USB cable between the Micro:bit and the computer,, be careful to plug it in the correct way, you should then download the programme you have written for your project to the Micro:bit.

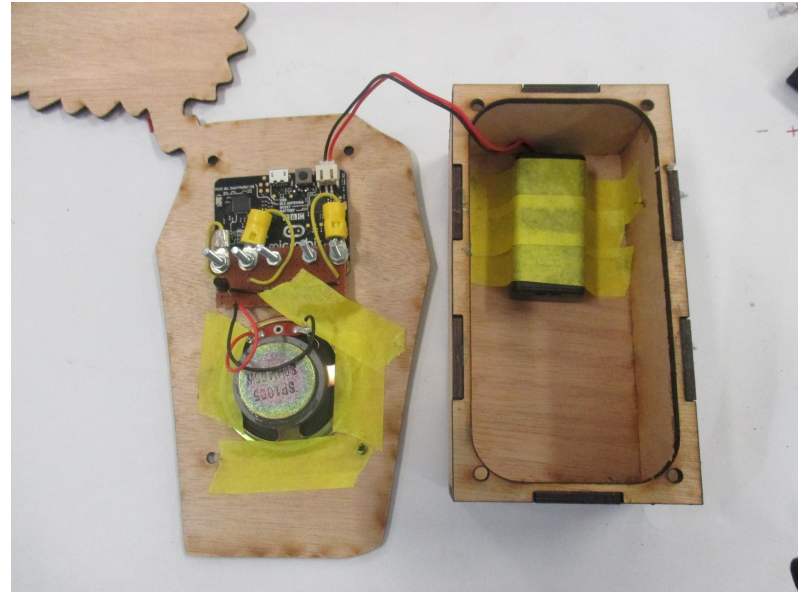


Test your programme by pressing a button.

Assemble the faceplate to the circuit box

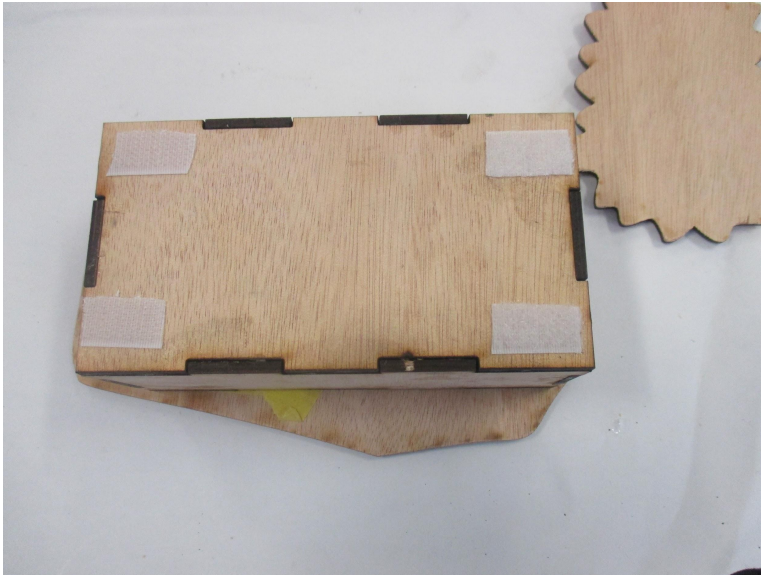


Use four small screws to assemble the face plate to the circuit box.
Do not over tighten the screws, just tight enough to secure it is fine.

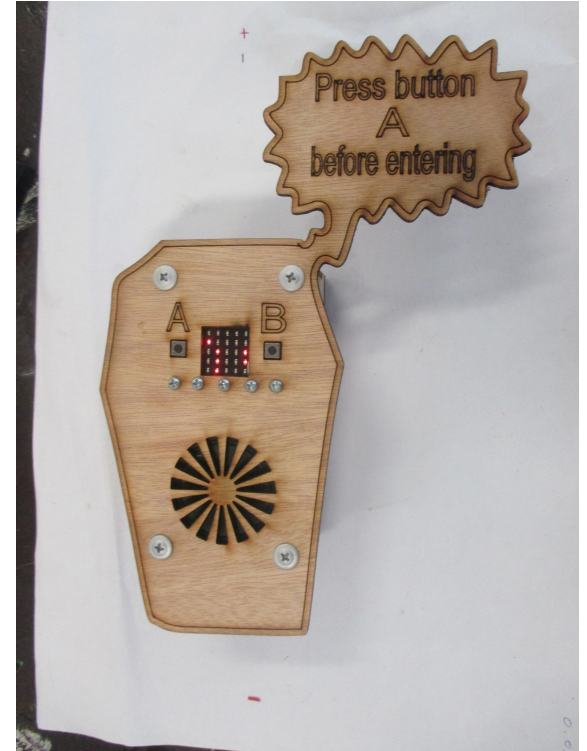


Masking tape can be used to secure the battery case and the speaker to the wooden box and the faceplate.

Fastening to a wall or door



Velcro dots are a good way of fastening the case to a surface, if you want to be able to remove the velcro without damaging the surface then use **3M Command Strips** (available at Bunnings or a hardware store)



The completed project