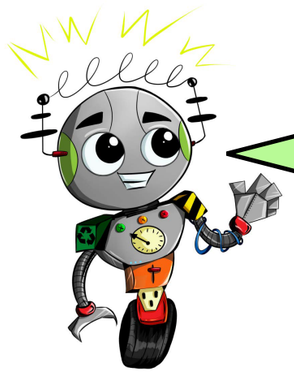
BLOOMING BOTS
Making worksheet

Here's what you will need to get started:

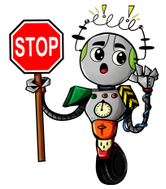
- 1 x **BBC micro:bit** attached to a **servo:lite** board
- 1 x **180° servo** (HS-422) with attached arm
- 3 x AAA rechargeable batteries
- 1 x small, clean and dry, plastic bottle with cap
- 2 x paper coffee cups
- 1 x paper clip
- 1 x piece of gardening wire, 20cm long
- 1 x piece of scrap cardboard around 30cm x 30cm

You will also need a bradawl, cutting mat, pencil, scissors, sticky tape and a glue gun, as well as scraps for decorating.



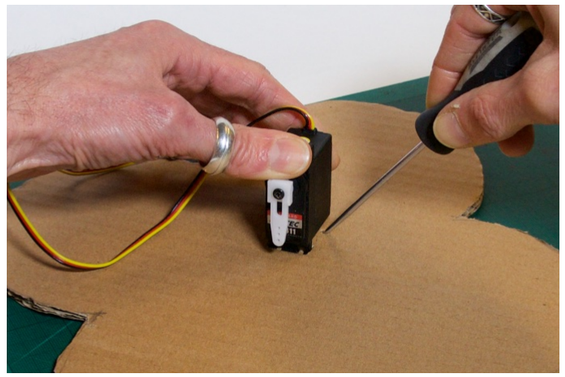
Use rechargeable batteries wherever possible or plug equipment into the mains. Try to buy appliances that use renewable energy, like a wind-up torch or a solar-powered calculator.

Shops that sell a lot of batteries have to provide battery recycling collection in-store. This means there are now lots more places where you can take your old batteries, including your local library!

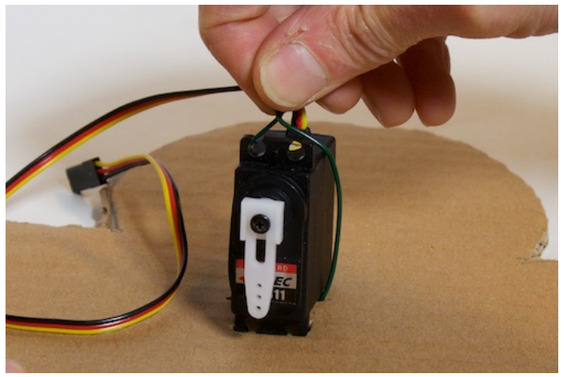


It is easier to follow the programming worksheet to learn how to program the servo before making your flower.

Draw a large clover shape on the cardboard and cut this out. Cut off the larger waste pieces first and keep them aside to reuse later.



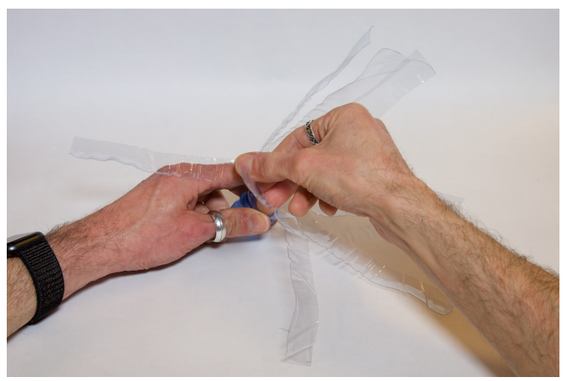
Place the servo with the arm in the centre of the cardboard and the cable at the top. Make a hole on either side with the bradawl on a cutting mat.



Push both ends of a **20cm** piece of gardening wire through the two holes from the back and then twist these together around the servo **tightly**.

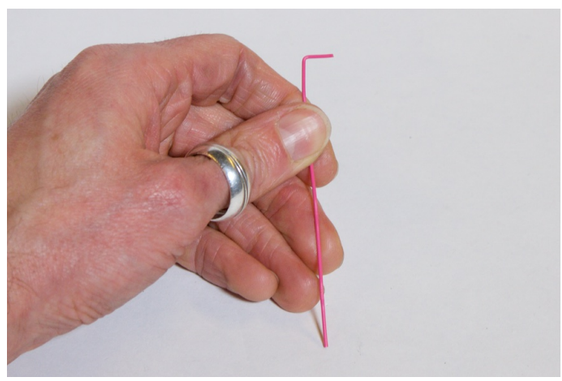
Pinch the plastic bottle flat at one side near the bottom and make a small scissor cut in it. You may need to take the cap off the bottle to pinch it.

Insert one blade of the scissors into the hole you have just made and then cut around the bottle to remove the bottom – **remember to recycle this!**

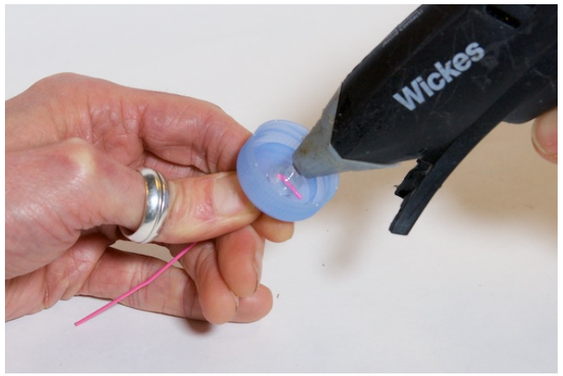


Make straight scissor cuts from the bottom of the bottle to near the lid all the way around, then fold these strips out to make the flower petals.

With the flattened bottle held firmly on a cutting mat, make a hole in the middle of the cap with the bradawl.

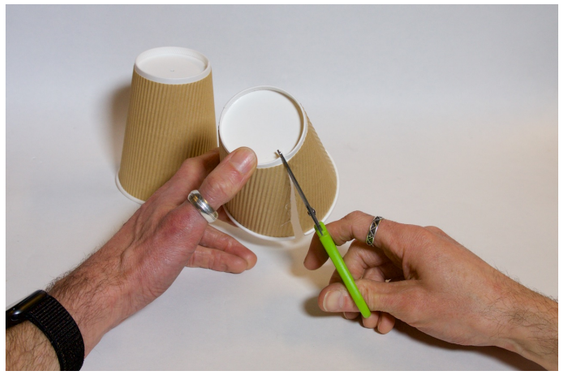


Open out the paper clip and bend a small length (a bit less than 1cm) at one end 90° to make a hook.



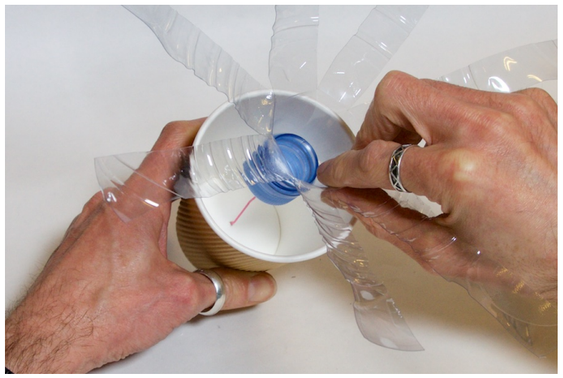
Remove the bottle cap and poke the paper clip through the hole, hook on the inside. Squeeze a blob of glue over the hook and allow to harden.

Take the first paper cup and make a hole in the middle of the bottom with the bradawl.



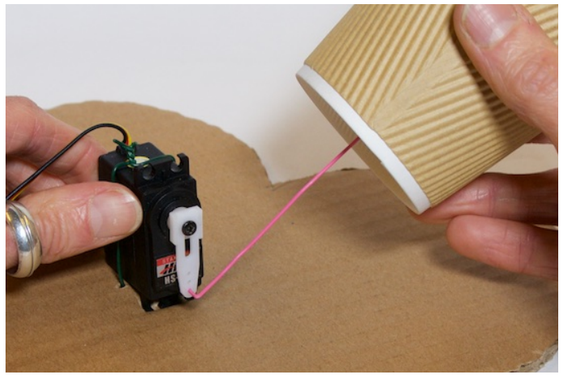
Take the **second** paper cup and make a straight cut with scissors from the lip all the way down and through the bottom.

Starting at the cut you have just made, carefully cut out the bottom of the cup with small snips of the scissors.



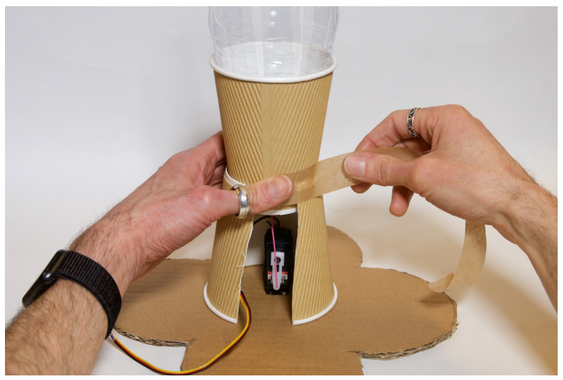
Screw the cap back on the bottle and then place inside the first cup, poking the paper clip through the hole in the bottom.

Pull the paper clip fully through the cup and bend another small 90° hook in the end.

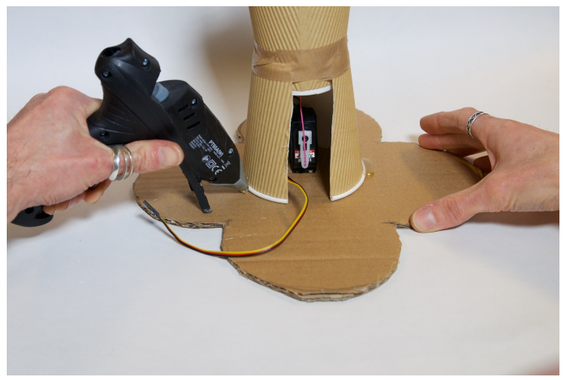


With the servo arm pointing straight down, poke the hook into the lowest hole. **Be very gentle if turning the servo arm**, it only turns one way.

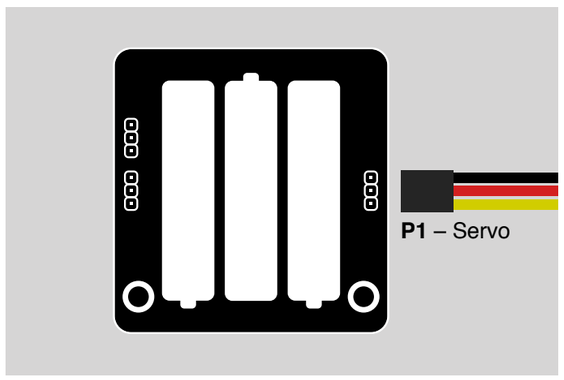
Pull the cup gently upwards so that the bottle is pulled all the way into it, then slide the split cup around it upside down.



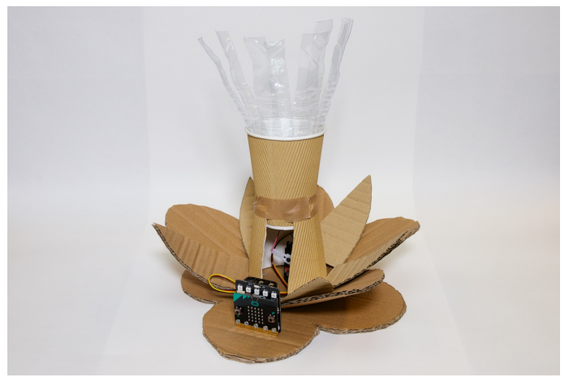
Holding the top cup so that it doesn't slip down, wrap a strip of sticky tape around to join the two cups.



Make sure that the paper clip is vertical and won't catch on the servo, then glue the bottom cup to the cardboard with a blob on each side.



Connect the servo cable to the three pins on the back right of the servo:lite board **with the black wire at the top**.



Your flower is now finished! You can make extra leaves with the leftover bits of cardboard if you have time or decorate it with other scraps.

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