

WILD ECO BUILDERS

Coding Eco Places

iOi Challenge: Invent eco-friendly ideas for places of the future using movement, the BBC micro:bit computer and servo board and motor to bring them to life!



YOU WILL NEED

- Computer or a tablet
- The BBC micro:bit and battery pack
- Simple Servo Control board
- Servo motor
- 2x AAA batteries
- 3x AA batteries
- Craft materials: wool, lollipop sticks, kebab sticks, coloured card
- Junk materials: boxes, bottles, egg cartons, toilet rolls
- Scissors
- Tape
- Velcro
- My Invention Idea Resource
- micro:bit Coding Resource

Getting started

Think of all the places and spaces in your community such as libraries, schools, hospitals, playgrounds or sports pitches.

Imagine who uses those spaces and what challenges or problems they might encounter.

For this activity you will be using a micro:bit, a small computer which you can code, and a servo motor which can move in different directions.

Using the 'My Invention Idea' resource, design a solution that uses movement (open and close, move side to side or turn around). Maybe your design is a greenhouse door that automatically opens when it is hot or a roof that turns slowly with the movement of the sun to provide shade. The possibilities are endless!

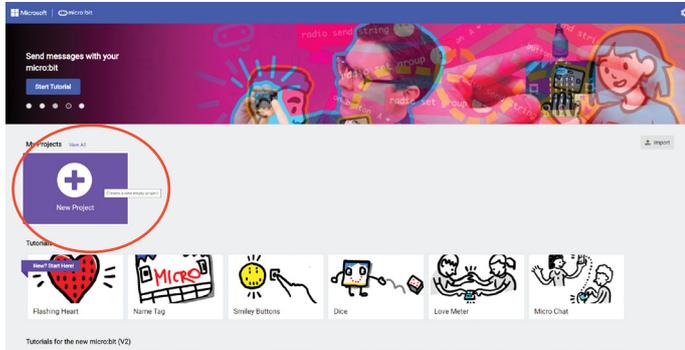




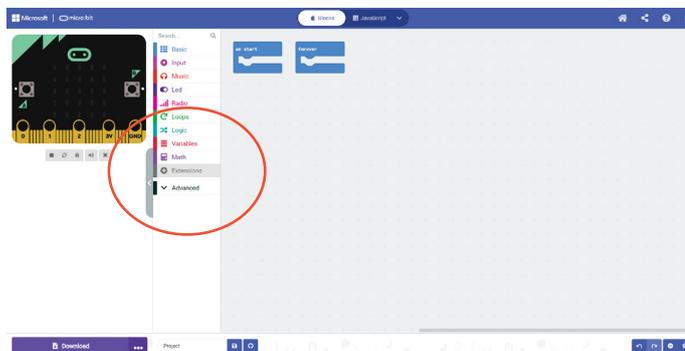
Building with micro:bit

Follow these steps if you are using a computer

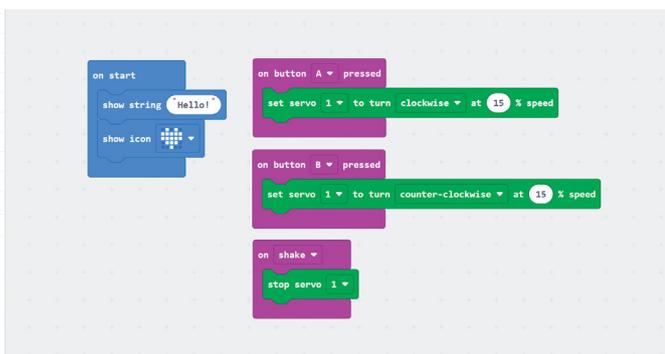
1. Go to makecode.microbit.org and click on 'New Project'



3. Click on 'Extensions'

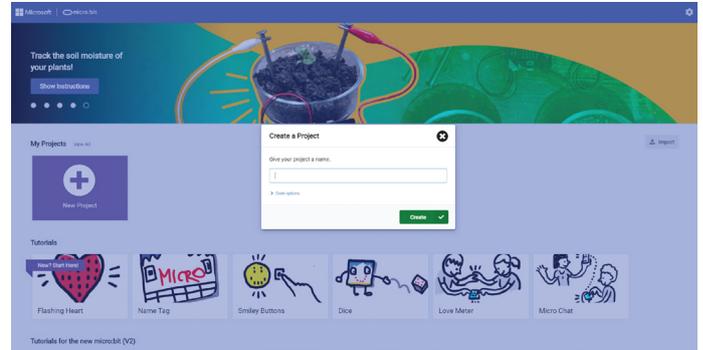


5. From 'Basic' choose blocks to get your micro:bit to do something when it starts. Add commands from 'Input' and 'Servo' to make your motor move. You can play and test with this code!

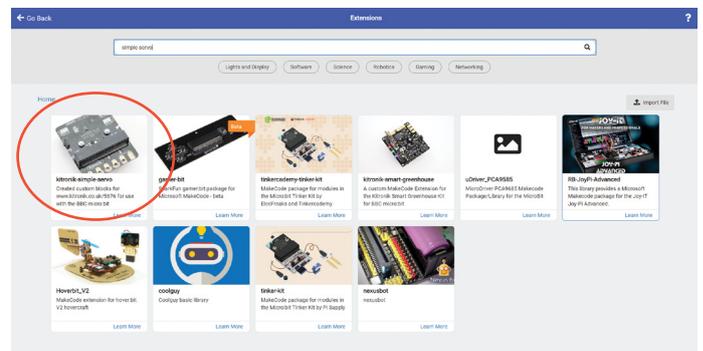


7. Connect the micro:bit to your computer via USB and transfer the code by clicking 'Download'. Once micro:bit stops flashing the code has been transferred. Disconnect your micro:bit from the computer and test your code!

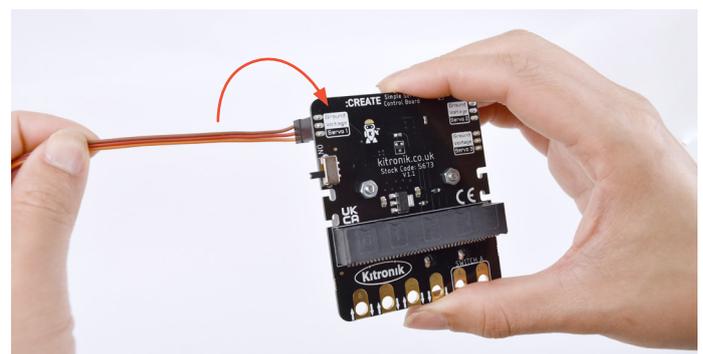
2. Name your project



4. Search 'kitronik-simple-servo'



6. Put the batteries in the Simple Servo Control board and connect the Servo motor to pin 1 on the board. Make sure the brown wire is in 'GND' (ground). Then, connect the micro:bit to the board



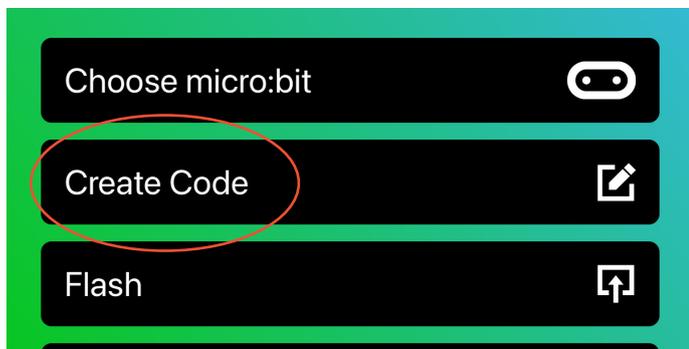
8. Now build your Eco Place using craft and junk materials!



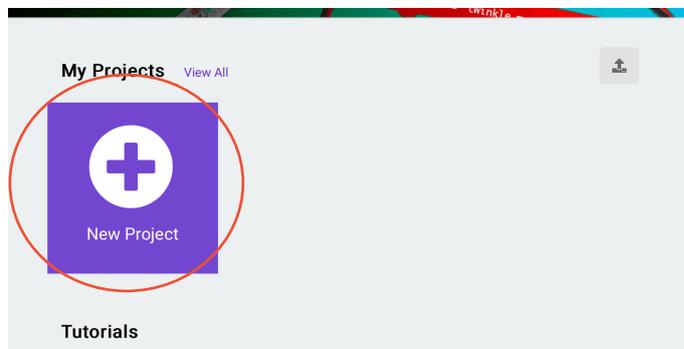
Building with micro:bit

Follow these steps if you are using a tablet

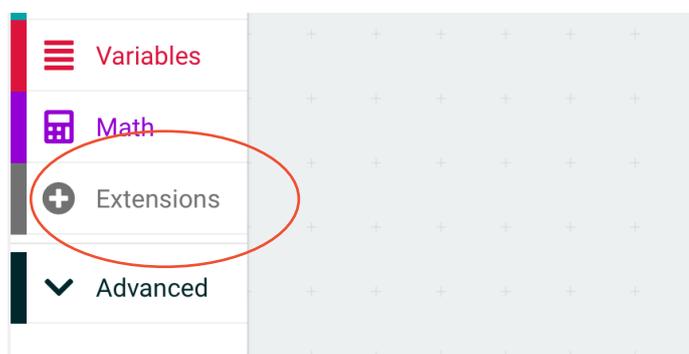
1. Download the micro:bit app on your tablet. Open the app and tap on 'Create Code'



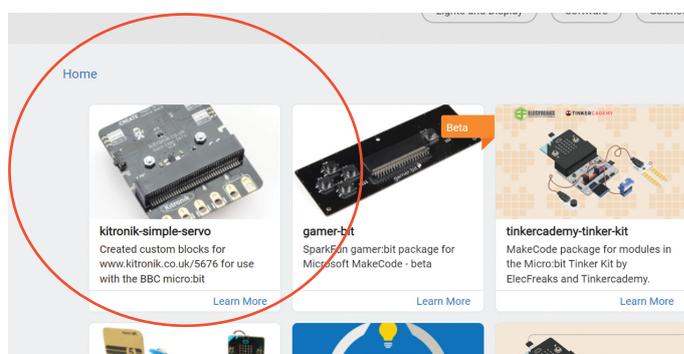
2. Tap on 'New Project' and name your project



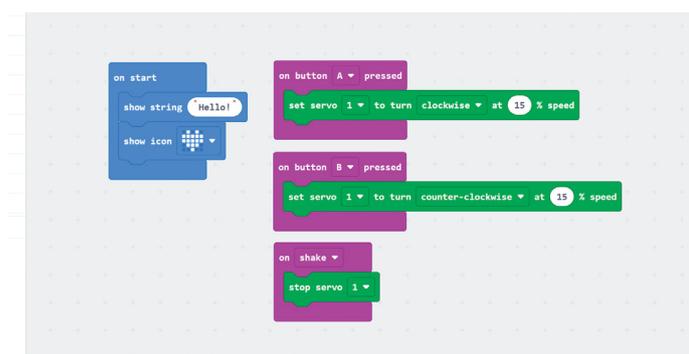
3. Tap on 'Extensions'



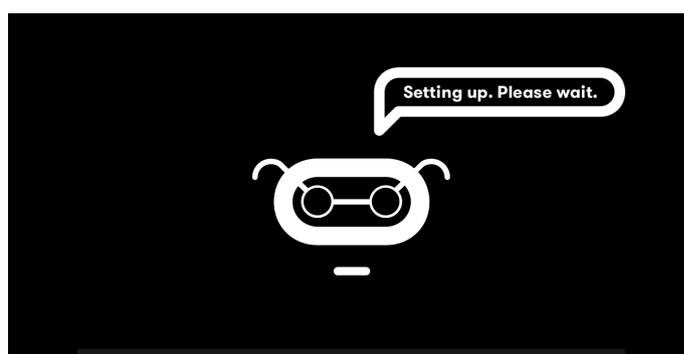
4. Search 'kitronik-simple-servo'



5. From 'Basic' choose blocks to get your micro:bit to do something when it starts. Add commands from 'Input' and 'Servo' to make your motor move. You can play and test with this code!



6. Connect your micro:bit to the battery pack. To pair your micro:bit with your tablet go back to the 'Menu' and tap 'Choose micro:bit' then 'Pair a new micro:bit' and follow the steps on the app



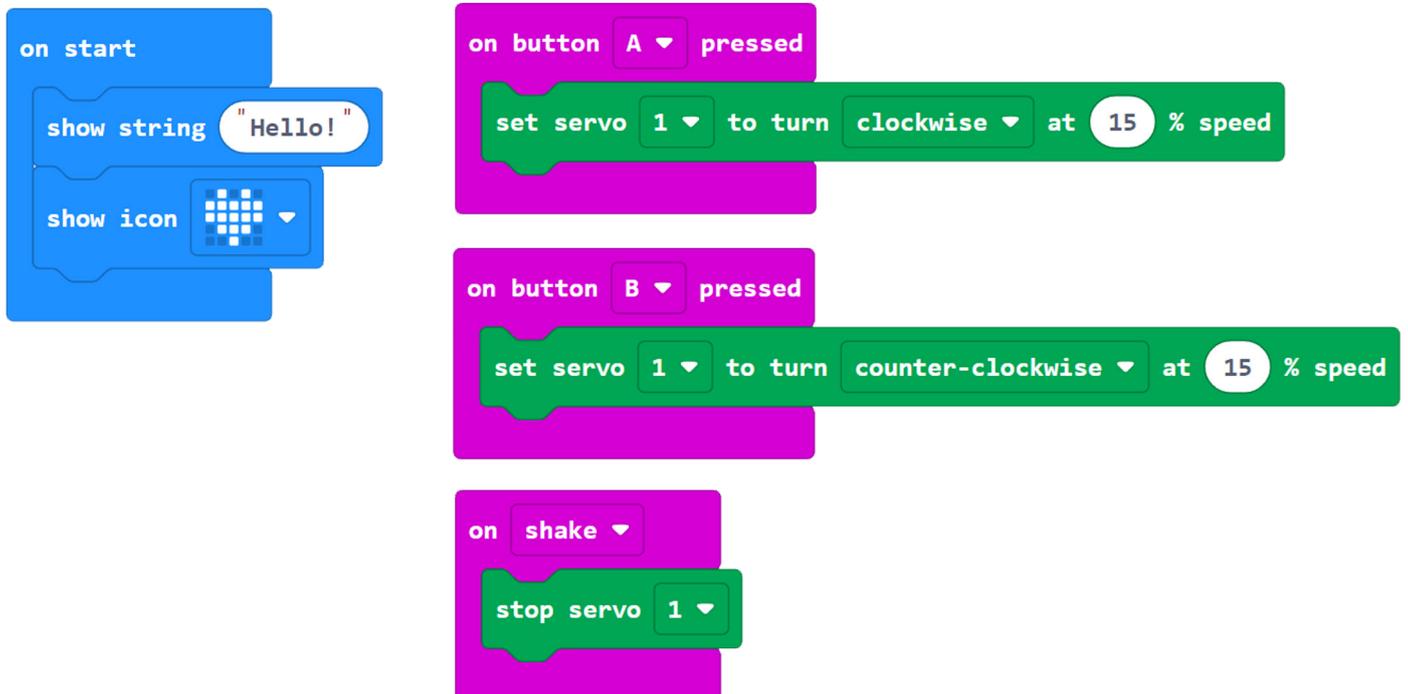
7. Once paired, go back to 'Create Code', tap 'Download' and follow the instructions to upload your code onto the micro:bit. Once it is done, disconnect it from the battery pack. Connect the Servo motor to the Simple Servo Control board pin 1. Make sure the brown wire is in 'GND' (ground)

8. Now connect the micro:bit to the Simple Servo Control board and insert the batteries into the board. Your micro:bit will light up and you can test your code!



micro:bit Coding Resource

Example 1



```
on start
  show string "Hello!"
  show icon [grid icon]

on button A pressed
  set servo 1 to turn clockwise at 15 % speed

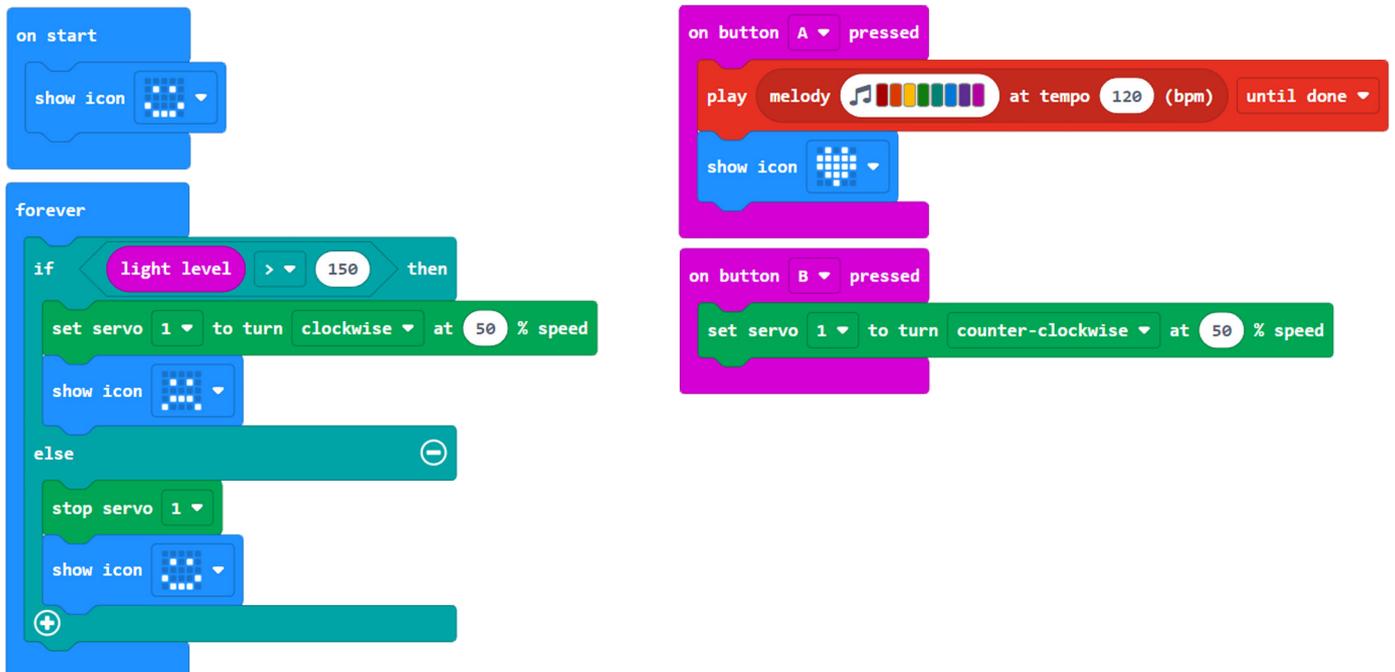
on button B pressed
  set servo 1 to turn counter-clockwise at 15 % speed

on shake
  stop servo 1
```

The image displays a Scratch-style code editor for a micro:bit. It features three main sections of code blocks. The first section, under 'on start', includes a 'show string' block with the text 'Hello!' and a 'show icon' block with a grid icon. The second section, under 'on button A pressed', contains a 'set servo 1 to turn clockwise at 15 % speed' block. The third section, under 'on button B pressed', contains a 'set servo 1 to turn counter-clockwise at 15 % speed' block. A fourth section, under 'on shake', contains a 'stop servo 1' block.

micro:bit Coding Resource

Example 2



```
on start
  show icon [LEDs]

forever
  if light level > 150 then
    set servo 1 to turn clockwise at 50 % speed
    show icon [LEDs]
  else
    stop servo 1
    show icon [LEDs]

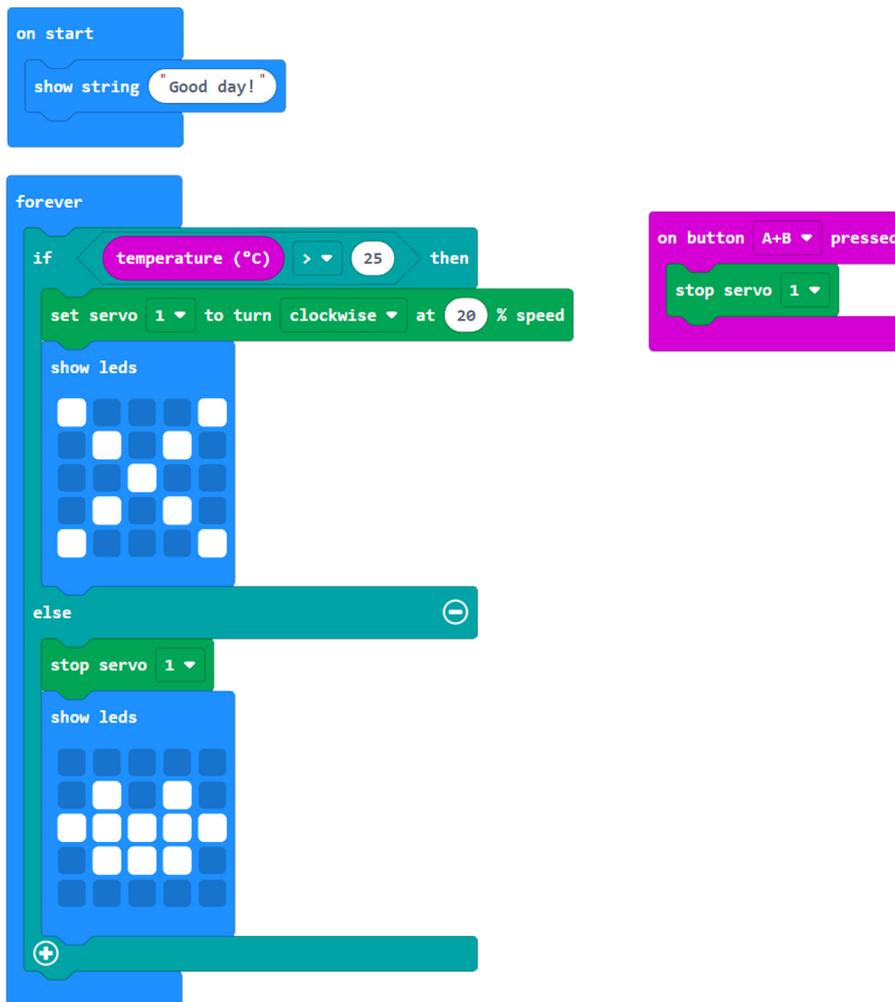
on button A pressed
  play melody [C4-D4-E4-F4-G4-A4-B4-C5] at tempo 120 (bpm) until done
  show icon [LEDs]

on button B pressed
  set servo 1 to turn counter-clockwise at 50 % speed
```

The code is written in Scratch blocks for a micro:bit. It starts with an 'on start' block containing a 'show icon' block with the 'LEDs' icon. This is followed by a 'forever' loop. Inside the loop, there is an 'if' block: 'if light level > 150 then'. The 'then' branch contains 'set servo 1 to turn clockwise at 50 % speed' and 'show icon [LEDs]'. The 'else' branch contains 'stop servo 1' and 'show icon [LEDs]'. To the right, there are two event-driven blocks. The first is 'on button A pressed', which contains 'play melody [C4-D4-E4-F4-G4-A4-B4-C5] at tempo 120 (bpm) until done' and 'show icon [LEDs]'. The second is 'on button B pressed', which contains 'set servo 1 to turn counter-clockwise at 50 % speed'.

micro:bit Coding Resource

Example 3



```
on start
  show string "Good day!"

forever
  if temperature (°C) > 25 then
    set servo 1 to turn clockwise at 20 % speed
    show leds
  else
    stop servo 1
    show leds

on button A+B pressed
  stop servo 1
```

The image shows a Scratch-style code editor with the following blocks:

- on start** block containing a **show string** block with the text "Good day!".
- forever** loop block containing:
 - if** block: **temperature (°C)** **>** **25** **then**
 - set servo 1** **to turn clockwise** **at 20 % speed**
 - show leds** block (5x5 grid)
 - else** block (minus sign)
 - stop servo 1**
 - show leds** block (5x5 grid)
- on button A+B pressed** block containing a **stop servo 1** block.