

## 5 words to remember

**accelerometer:** a hardware component that provides data based on changes in motion, for example when a device is tilted or moved in a certain direction

**controller:** a programmable device that controls the electronic output based on inputs

**decomposition:** breaking a problem down into smaller parts, for example using a divide-and-conquer approach

**micro:bit:** a small, single-circuit board, programmable computer with different inputs and outputs, which can be programmed

**simulator:** software that allows one computer system to behave as another; on-screen simulators allow programs to be tested before running them on a device

## Knowledge check: Inputs and outputs

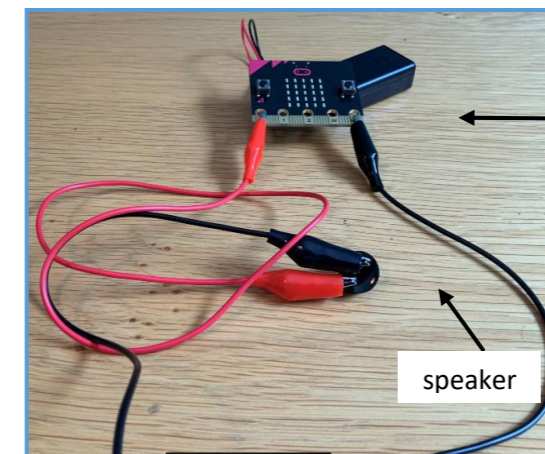
Inputs refer to data (information) supplied to a computer; an output is the data produced by a computer. The speaker bears below are an example of a programmable toy that consists of inputs and outputs.

**Test yourself:** The output of the bears is the audio from the speakers. What might the inputs be?



## Key takeaways

- Many people think of computers as PCs, laptops, tablets or smartphones, but there are a number of systems that also contain micro **controllers** for specific roles, such as calculators, digital cameras, heating controllers and electronic toys.
- Electronic toys are interactive because they have inputs and outputs that can be controlled.
- The micro:bit can be used as a controller; additional input and output components can be connected to it.



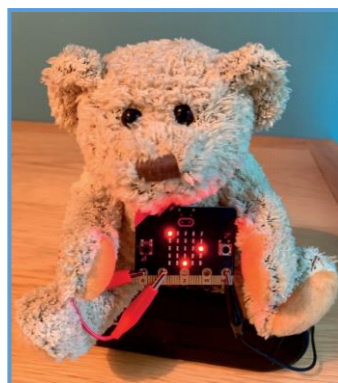
Additional components can be added to the micro:bit's edge connector. In this photograph, a mini-speaker has been added.

- Programming in MakeCode allows programs to be tested in the **simulator** before downloading and transferring to the micro:bit. This means that the micro:bit controller stores the program and can be run off a battery pack, allowing it to be inserted into a toy.

## Knowledge check: Micro:bit and MakeCode

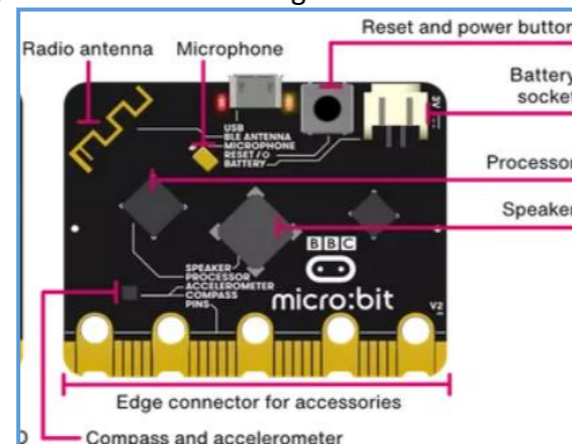
**Test yourself:** You plan to make a toy with multiple inputs and outputs, including flashing LEDs and sound. When planning, you break down the project into smaller parts. What is this approached called in computing?

- Abstraction
- Logical reasoning
- Decomposition**
- Debugging



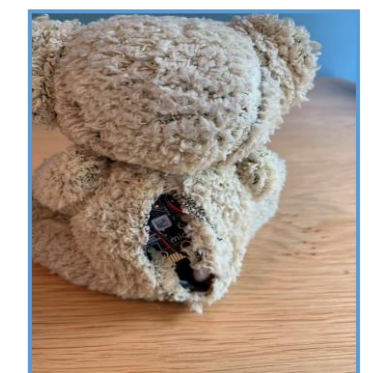
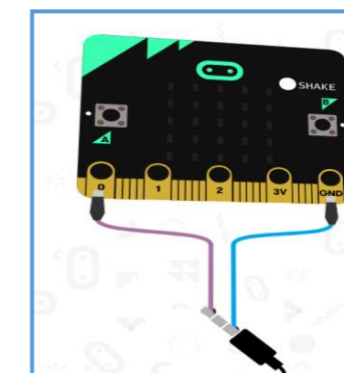
**Test yourself:** The **micro:bit** contains an **accelerometer**, which detects motion and acceleration changes. Which of the following types of micro:bit projects do not need to use the accelerometer feature?

- Flashing LED patterns
- Musical projects
- Dice that can be rolled
- Electronic name badges



```

on shake
  play tone Low A for 1/2 beat
  play tone Middle D for 1 beat
  play tone Middle F for 1/2 beat
  play tone Middle E for 1/2 beat
  play tone Middle F for 1/2 beat
  play tone Middle E for 1/2 beat
  play tone Middle D for 1 beat
  play tone Middle F for 1/2 beat
  play tone Middle E for 1/2 beat
  
```



Plan the algorithm and code in MakeCode.

Test in the MakeCode simulator to check and debug code.

Download and transfer code to the micro:bit. Insert the micro:bit in the toy.