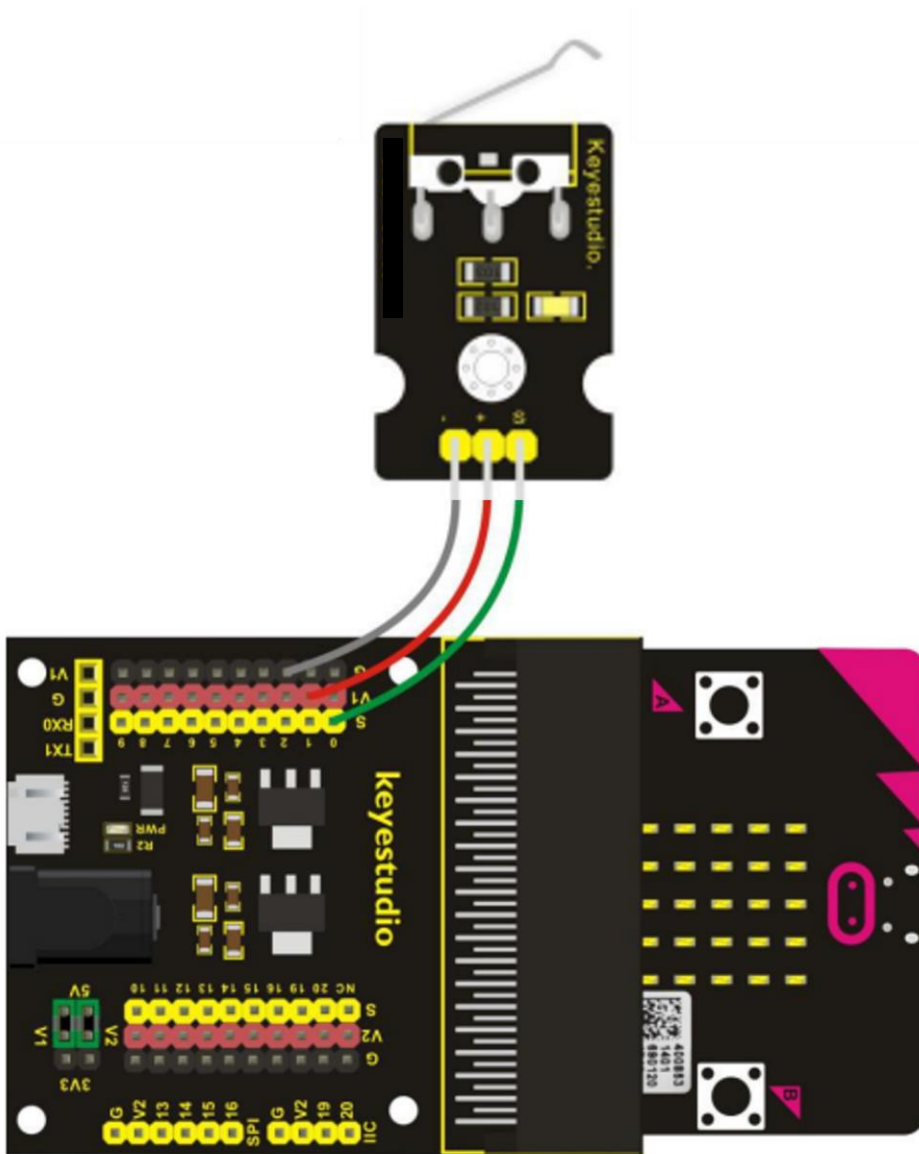
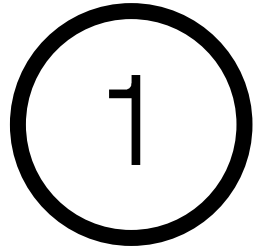


1



Group 3



## Crash/Bumper Sensor

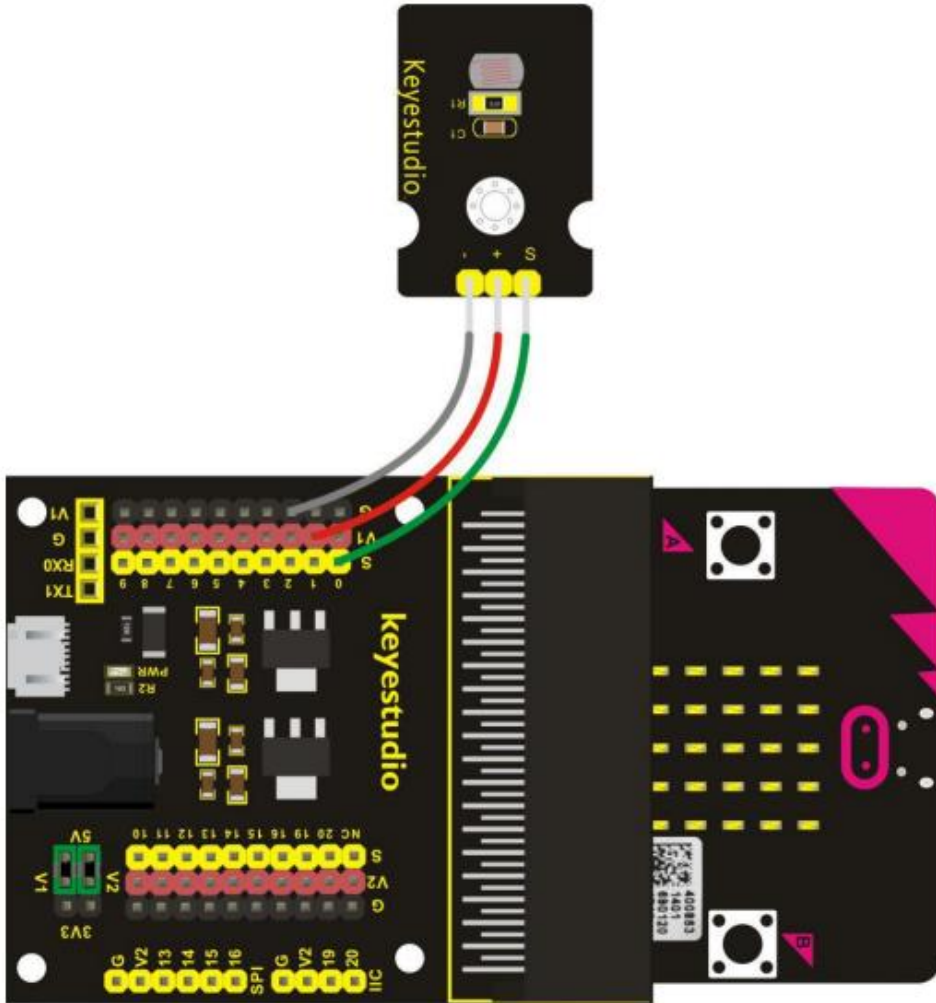
- Detects if the sensor has touched an obstacle
- Test idea: Press your finger on and off the sensor to see the readings.

This is an input.

It is either pressed or not pressed, making it a digital component.

Uses the digital input program

2



Group 1



## Light Sensor

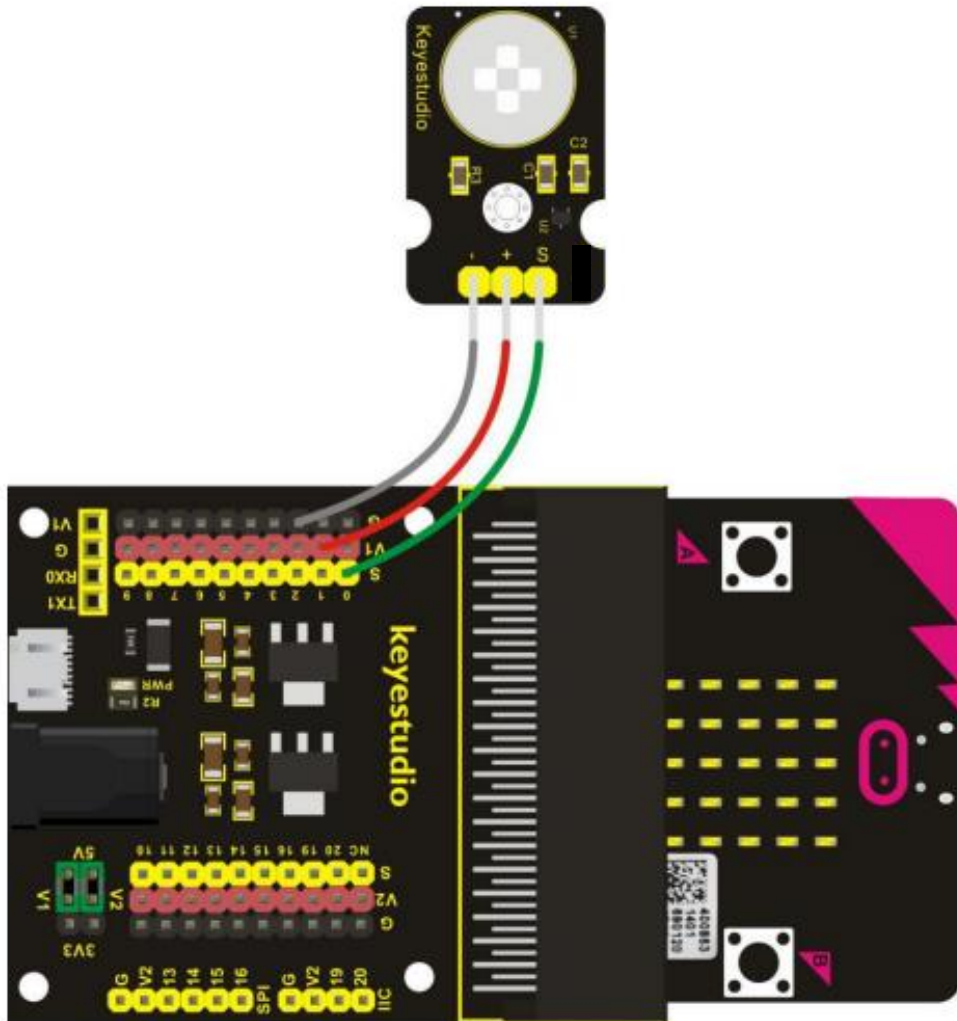
- Measures light level
- Test idea: Cover the sensor with your hand to make it darker.

This is an input.

It gives a range of different values for the light level, meaning it is an analog component.

Uses the analog input program

3



Group 2

## PIR Sensor

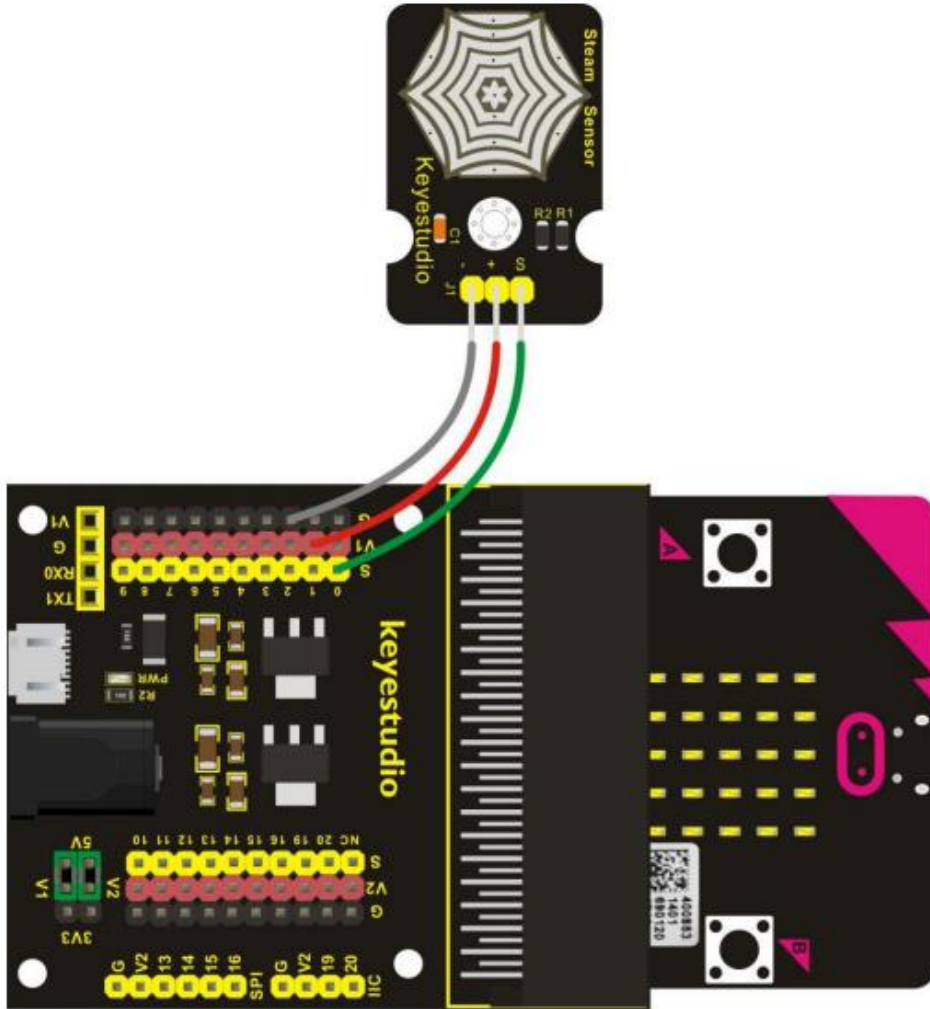
- Detects if there is movement.
- Test idea: Have the sensor on the table, then move it, and repeat to see reading changes. This component is slow to respond.

This is an input.

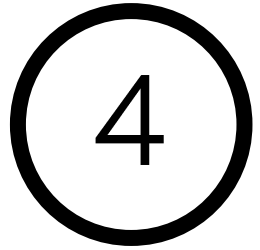
It detects if there is movement or not, meaning it is a digital component.

Uses the digital input program

4



Group 1



## Steam/Humidity Sensor

- Measures water in the air
- Test idea: We can 'trick' this sensor by putting a finger on it – your skin contains water.

This is an input.

It measures the amount of water, making it an analog component.

Uses the analog input program







## Sound Sensor

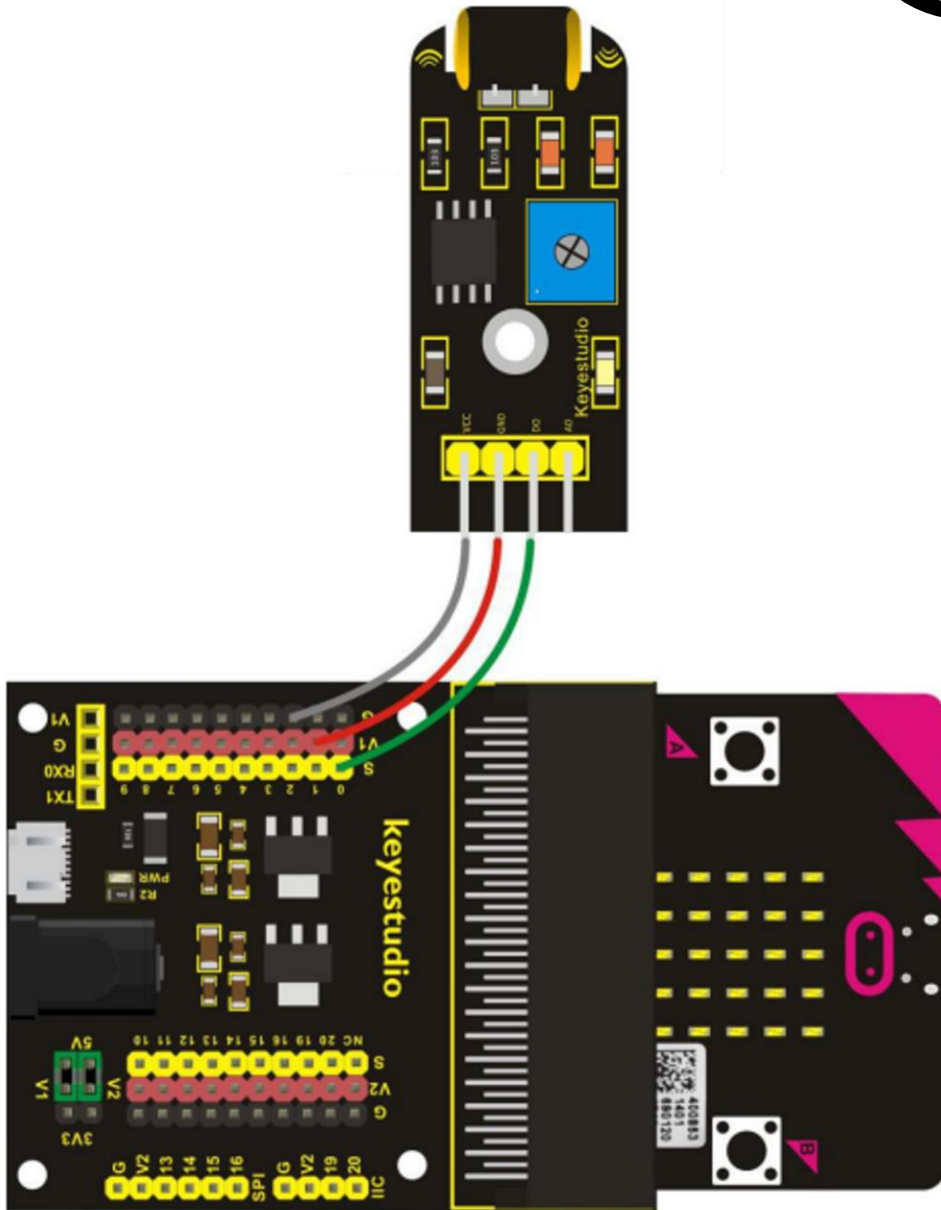
- Measures sound level
- Test idea: Talk into it – remember, there will be background noise all the time.

This is an input.

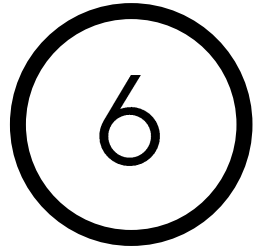
It detects a range of different volumes, making it an analog component.

Uses the analog input program

6



Group 2



## Shake Sensor

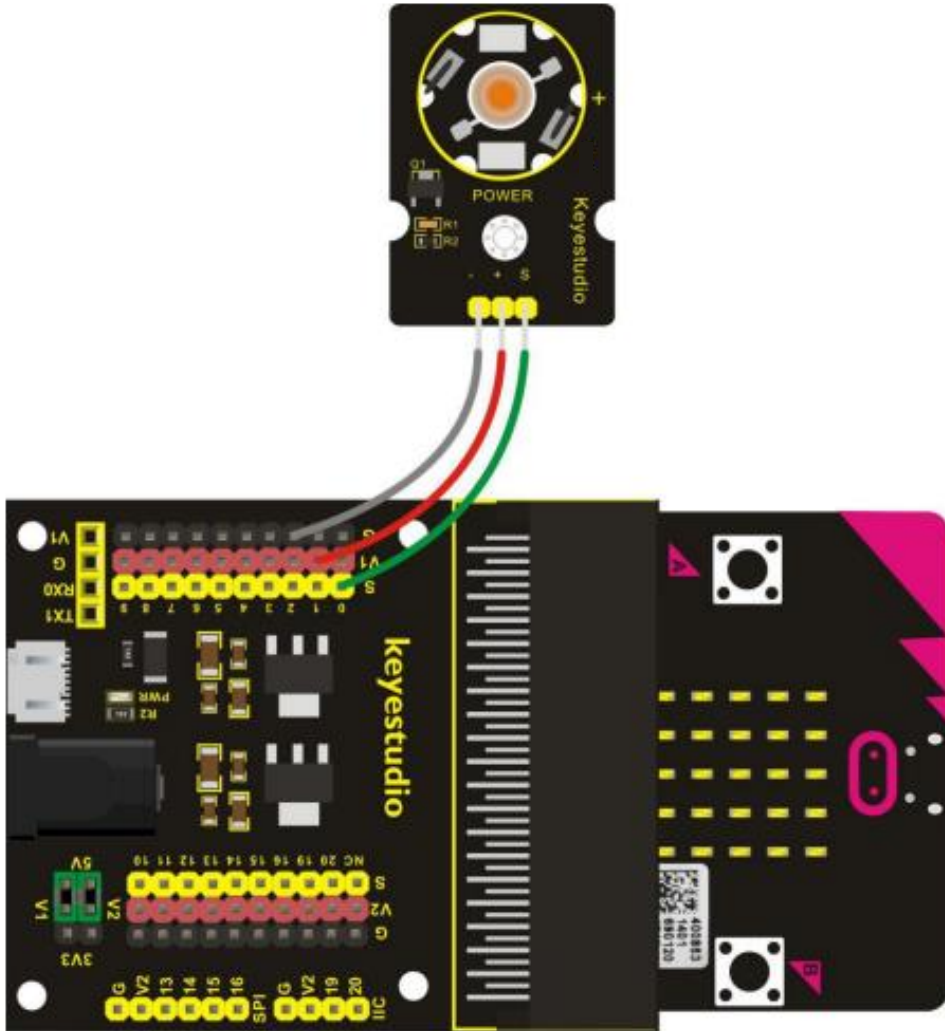
- Detects if it is shaken.
- Test idea: Carefully shake the sensor, then put it down to reset. Repeat to see the readings change.

This is an input.

It can tell if it is shaken or not, only two options, making it a digital component.

Uses the digital input program

7



Group 5



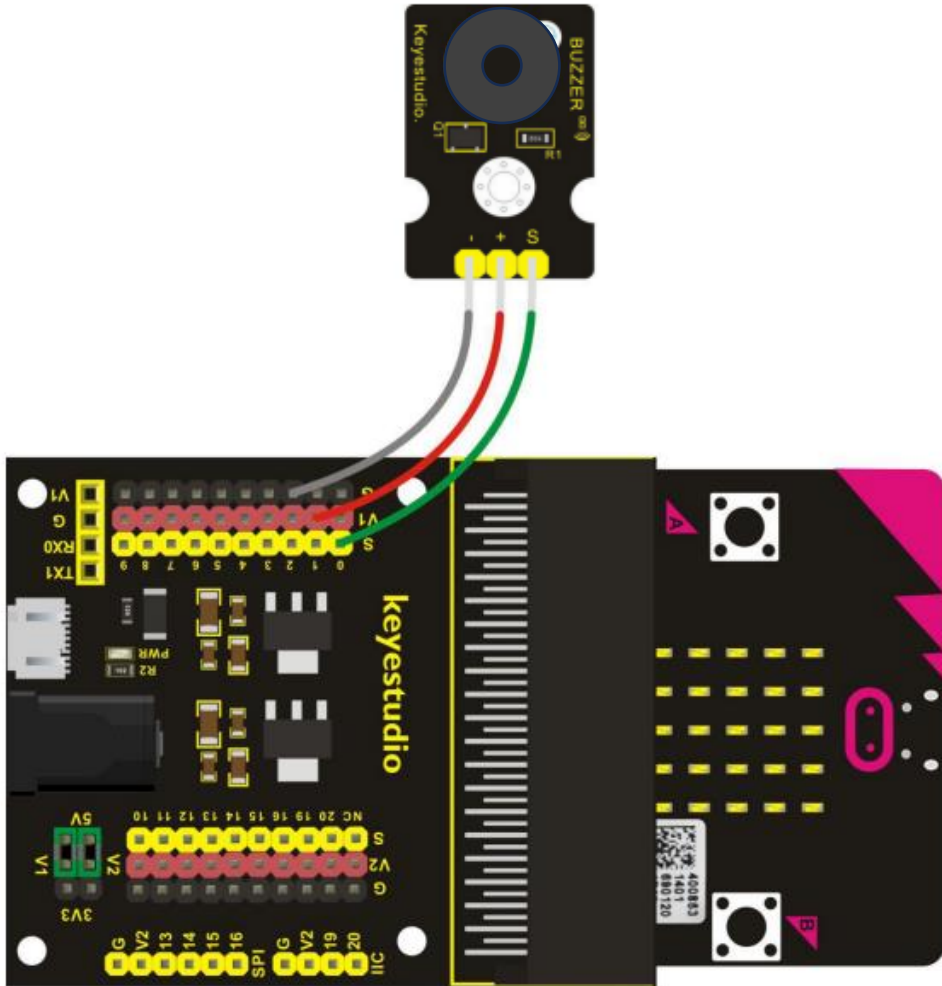
## Super Bright LED

- Can only produce a yellow/white light.

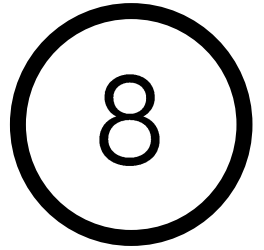
This is an output.

We can turn it on and off, making it a digital component. However, we can also set the brightness level of the LED making it an analog component.

Uses either the digital or analog output programs.



Group 5



## Buzzer

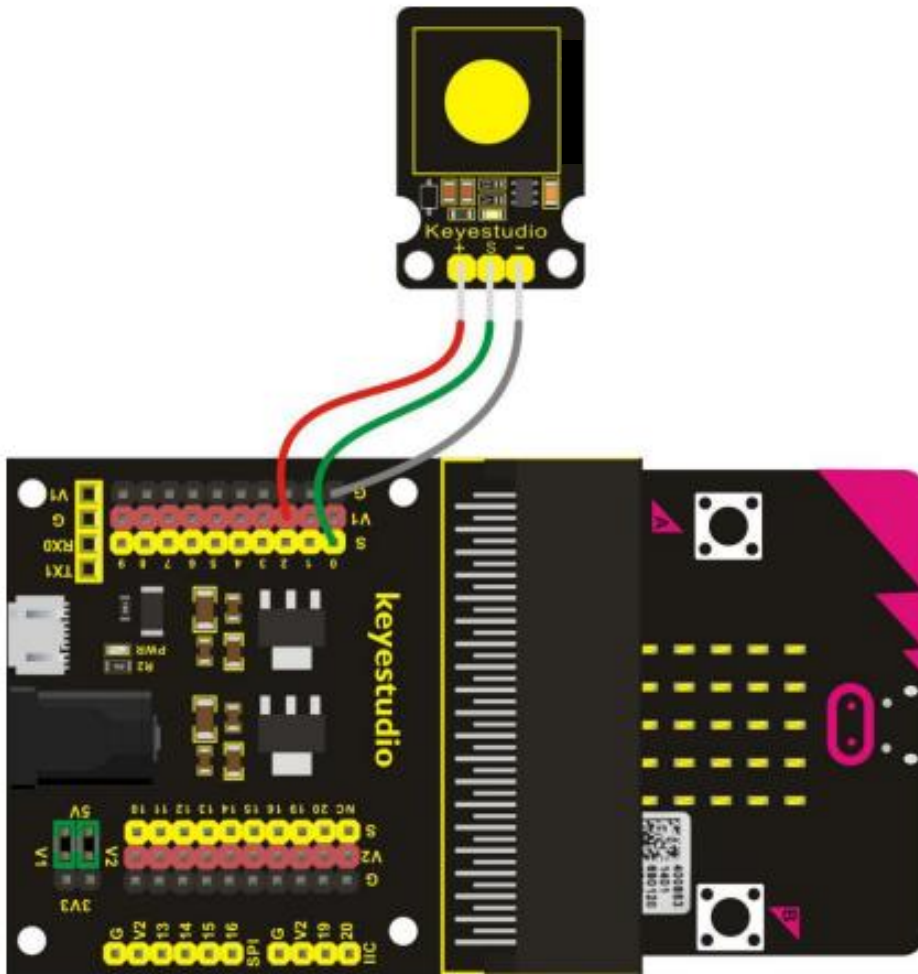
- Can produce sound.

This is an output.

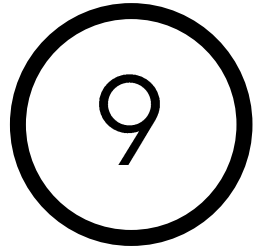
We can turn it on and off, making it a digital component. However, we can also set the tone played by the buzzer, making it an analog component.

Uses either the digital or analog output programs.





Group 3



## Touch Button Sensor

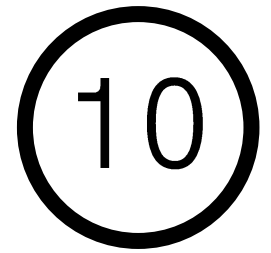
- Detects if the sensor is touched
- Test idea: Press your finger on and off the sensor to see the readings.

This is an input.

It is either pressed or not, only two options, making it a digital component.

Uses the digital input program.





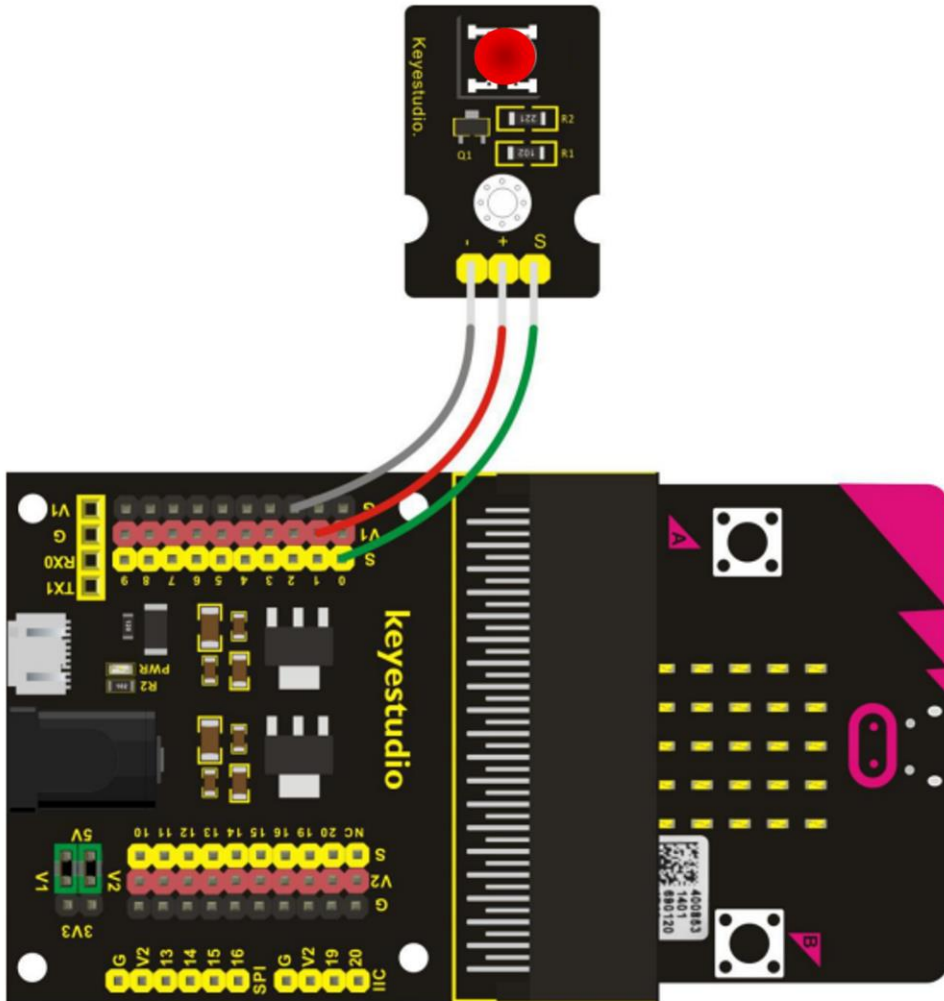
## Temperature Sensor

- Measures temperature
- Test idea: loosely hold the sensor inside your hands to warm it – do not squeeze/crush the sensor.

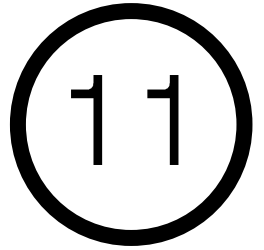
This is an input.

It gives a range of values for the temperature, making it an analog component.

Uses the analog input program



Group 5



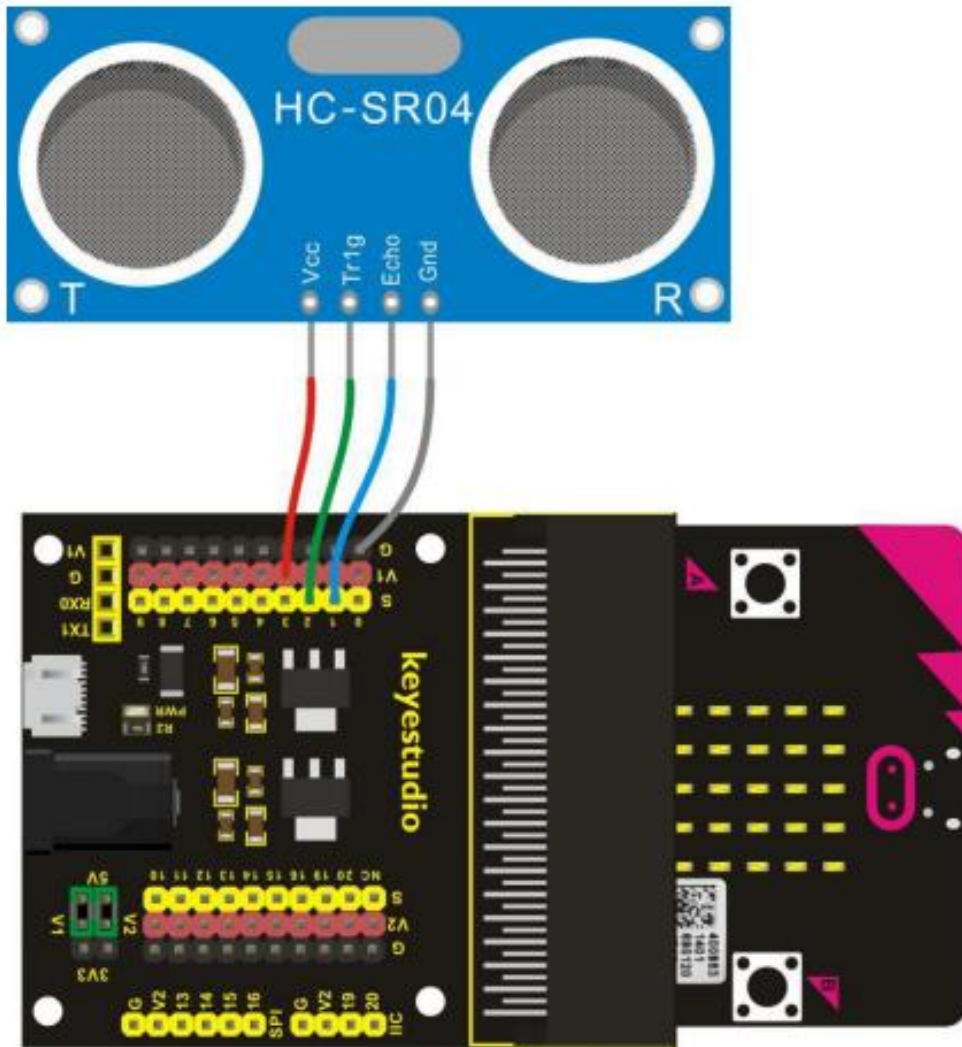
## Red LED

- Can only produce a red light.

This is an output.

We can turn it on and off, making it a digital component. However, we can also set the brightness level of the LED making it an analog component.

Uses either the digital or analog output programs.



Group 2

## Ultrasonic Sensor

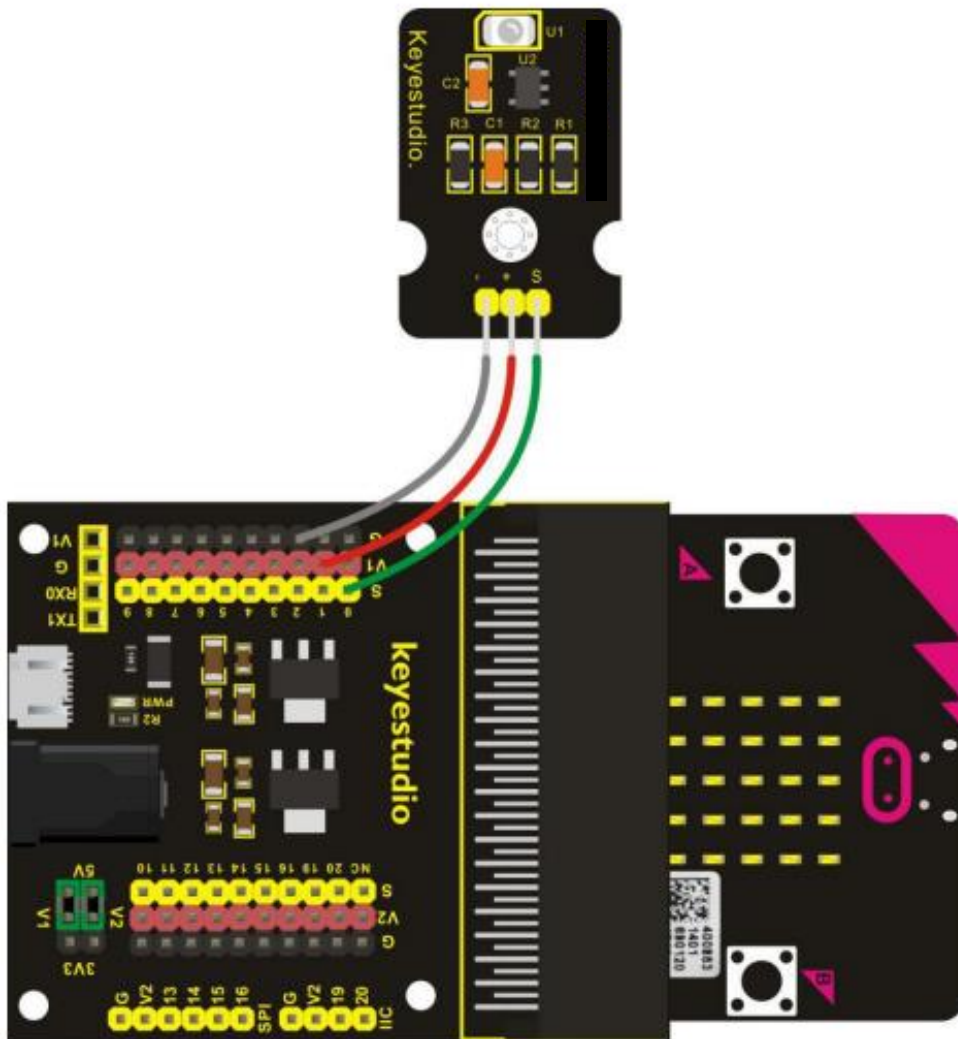
- Uses sound to measure distance to obstacles
- Test idea: Have the sensor facing down at the table at different heights.

This is an input.

It gives us a distance value within a large range, making it an analog component.

Uses the ultrasonic sensor program





Group 1

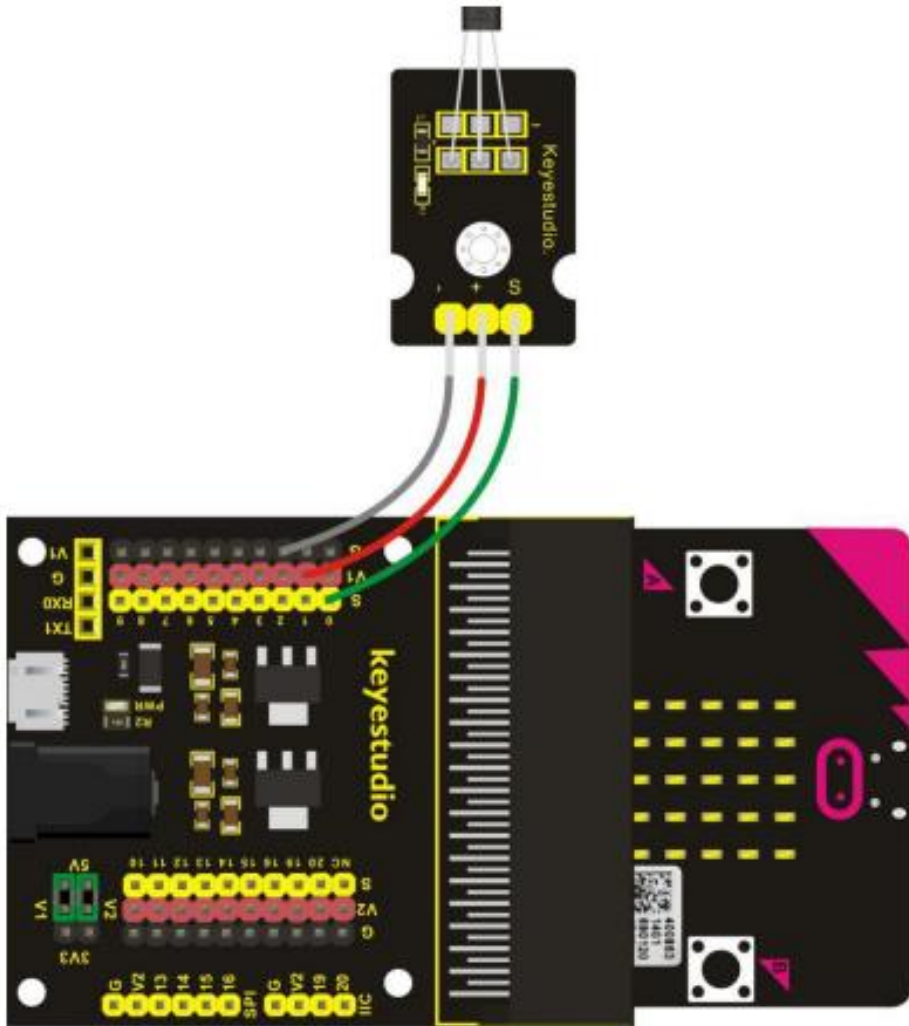
## UV Light Sensor

- Measures the level of UV (Ultra-Violet) light.
- Test idea: Shine a UV torch onto the sensor

This is an input.

It measures the UV light level across a range of values, making it an analog component.

Uses the analog input program



Group 3

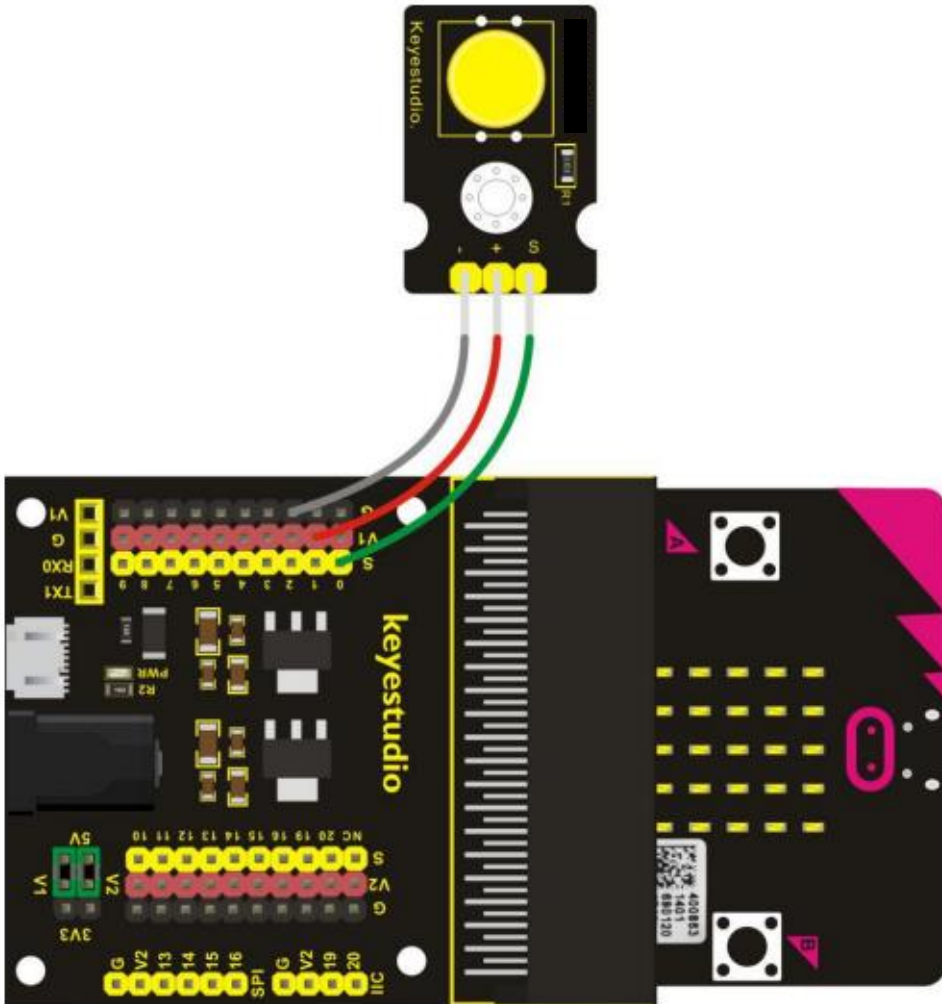
## Magnetic Sensor

- Detects if the sensor is near a magnet
- Test idea: Move the sensor towards the red part of the magnet. You will need to get very close but try not to touch it.

This is an input.

It can tell us if a magnet is near or not, only two options, making it a digital component.

Uses the digital input program.



Group 4

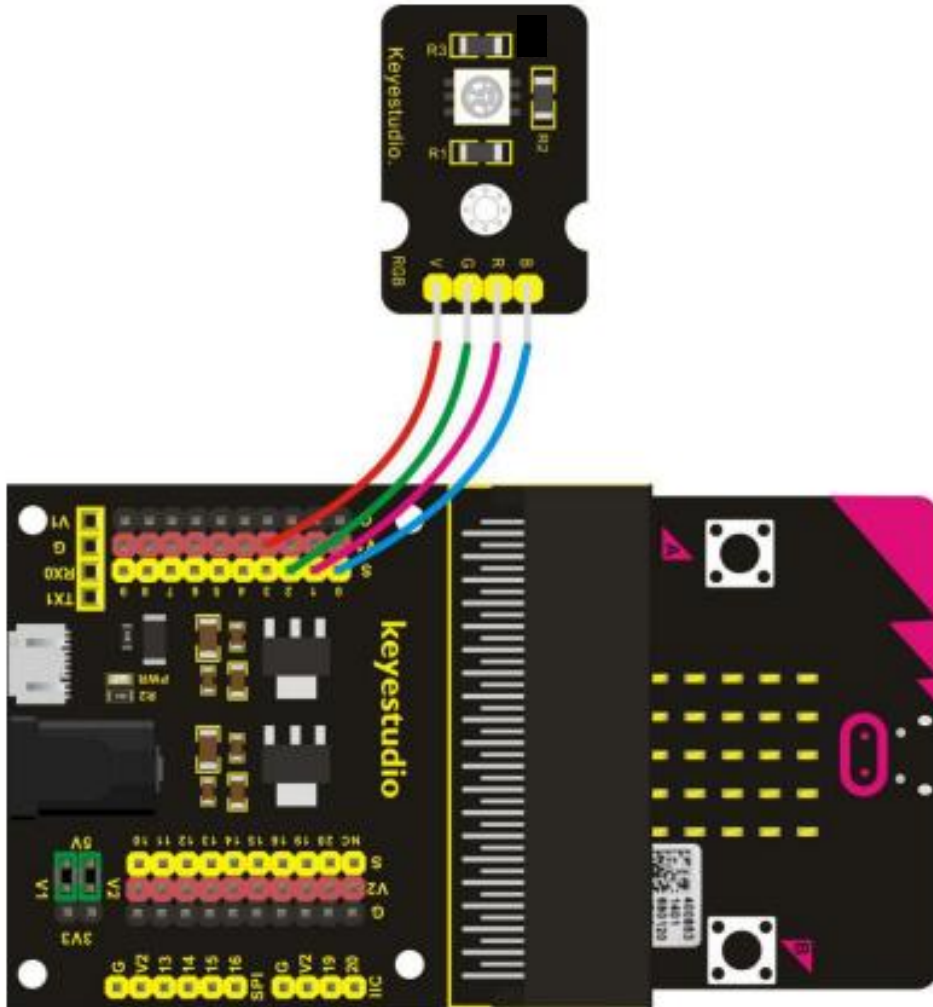
## Button

- Detects if it is pressed down or not.

This is an input.

It can tell if it is pressed or not, only two options, making it a digital component.

Uses the digital input program



Group 5

## RGB LED

- A light that can be set to different colours.

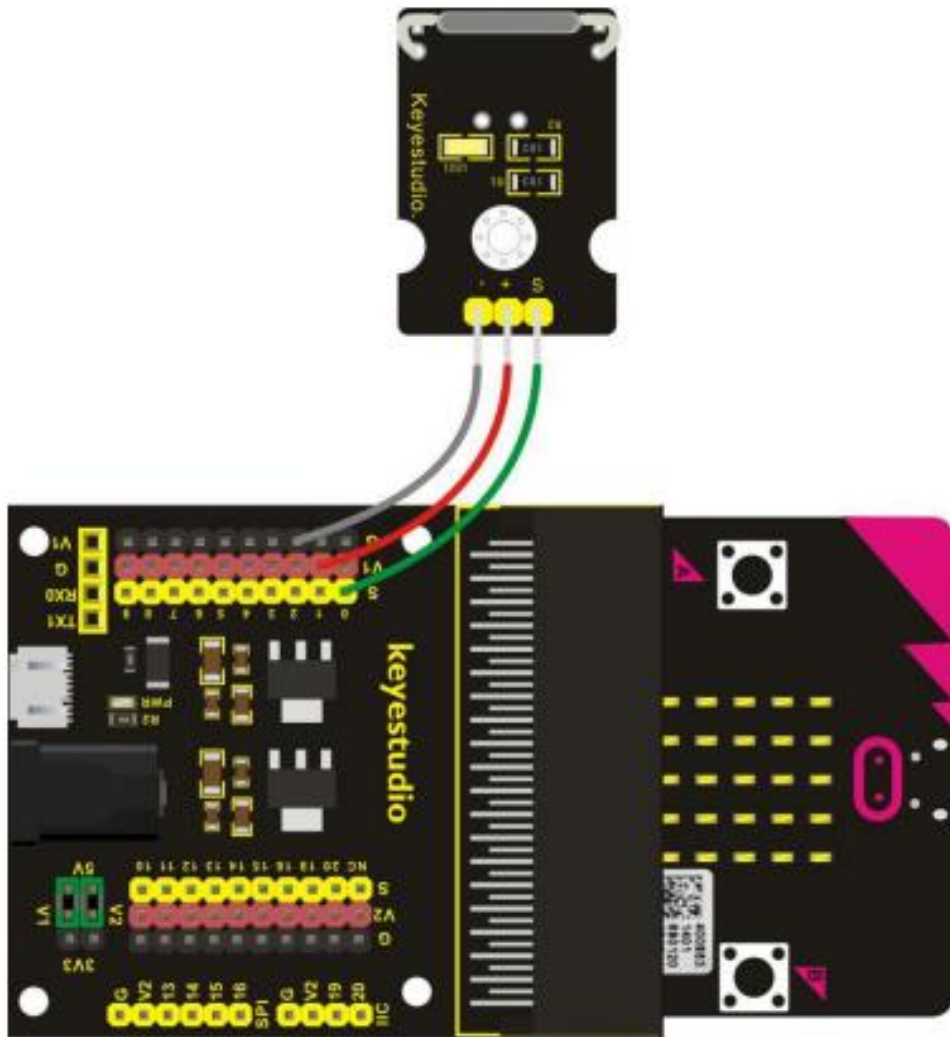
This is an output.

To get the different colours, we need to use a range of values, meaning this is an analog component.

This uses the RGB LED program

Note: RGB stands for Red, Green and Blue





Group 4

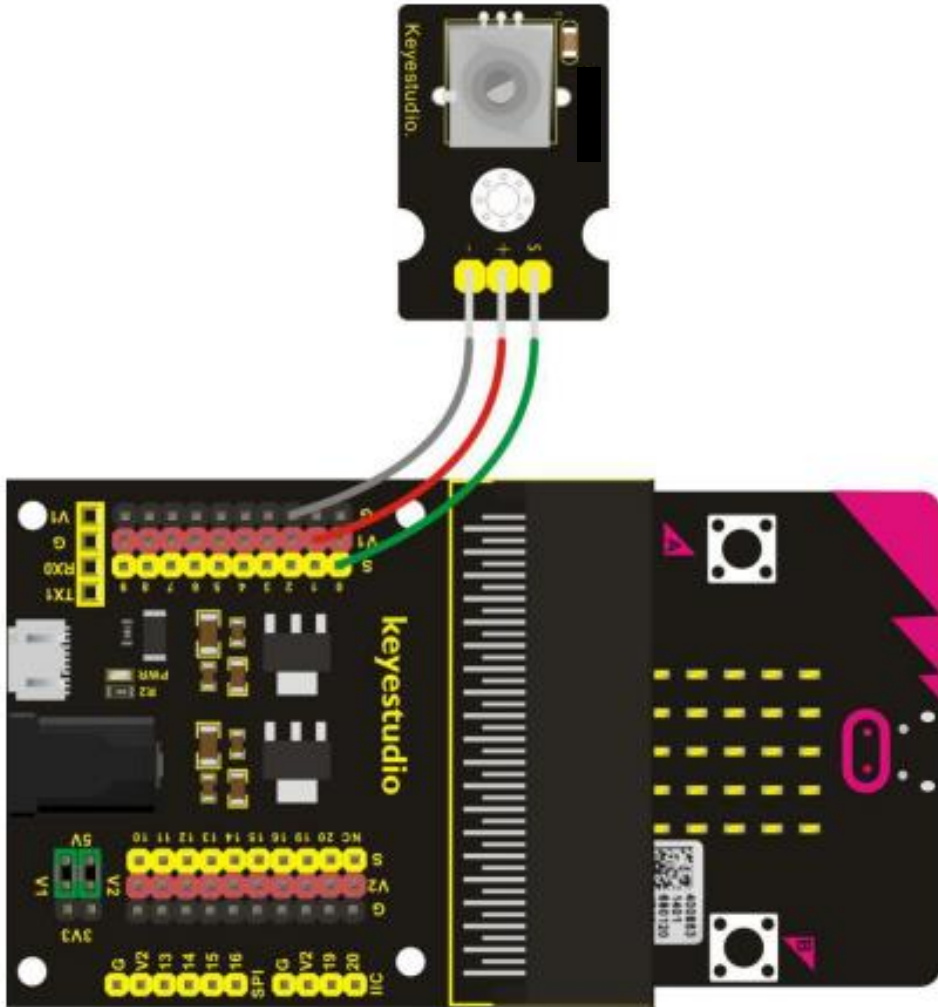
## Reed Sensor / Magnetic Switch

- Detects a magnetic field
- Test idea: Hold either side of the magnet near to the component – remember, they don't need to touch.

This is an input.

Can tell if there's a magnet nearby or not, only two options, meaning this is a digital component.

Uses the digital input program



Group 4

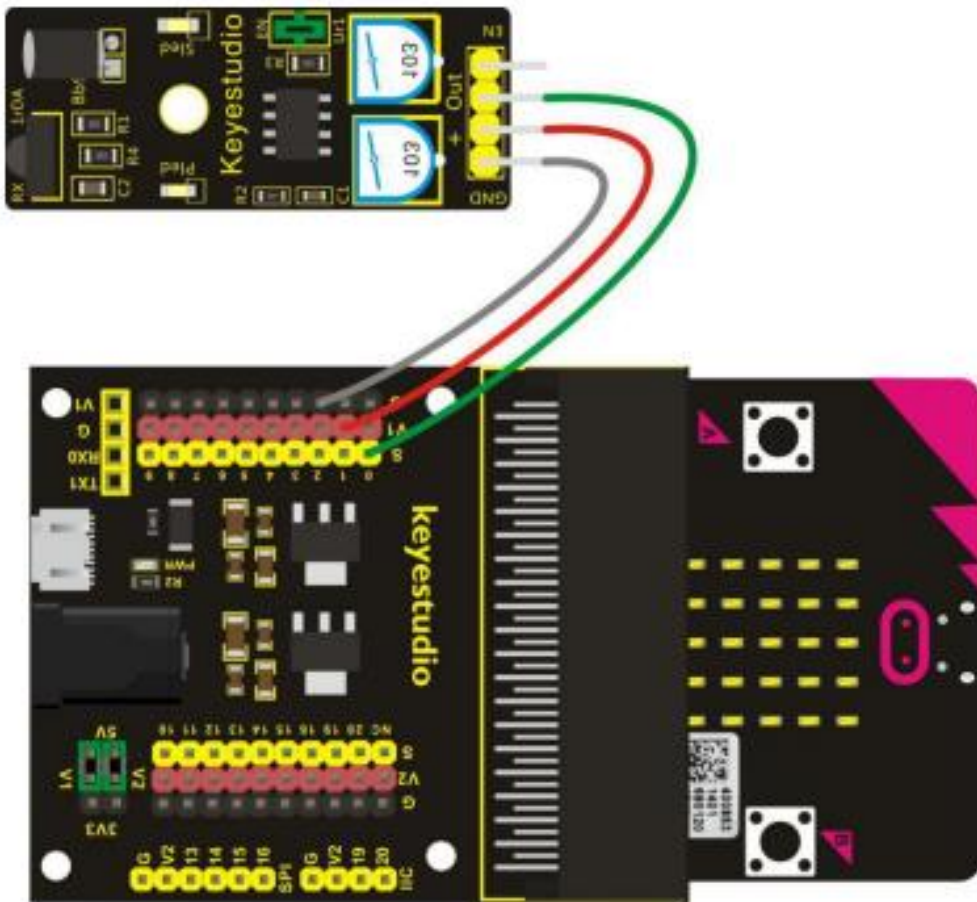
## Rotational Switch/Dial

- Measures how far the dial/switch has been rotated.
- Test idea: Turn the switch to different positions to see the change in readings.

This is an input.

It measures how far it is rotated using a range of values, making it an analog component.

Uses the analog input program.



Group 2

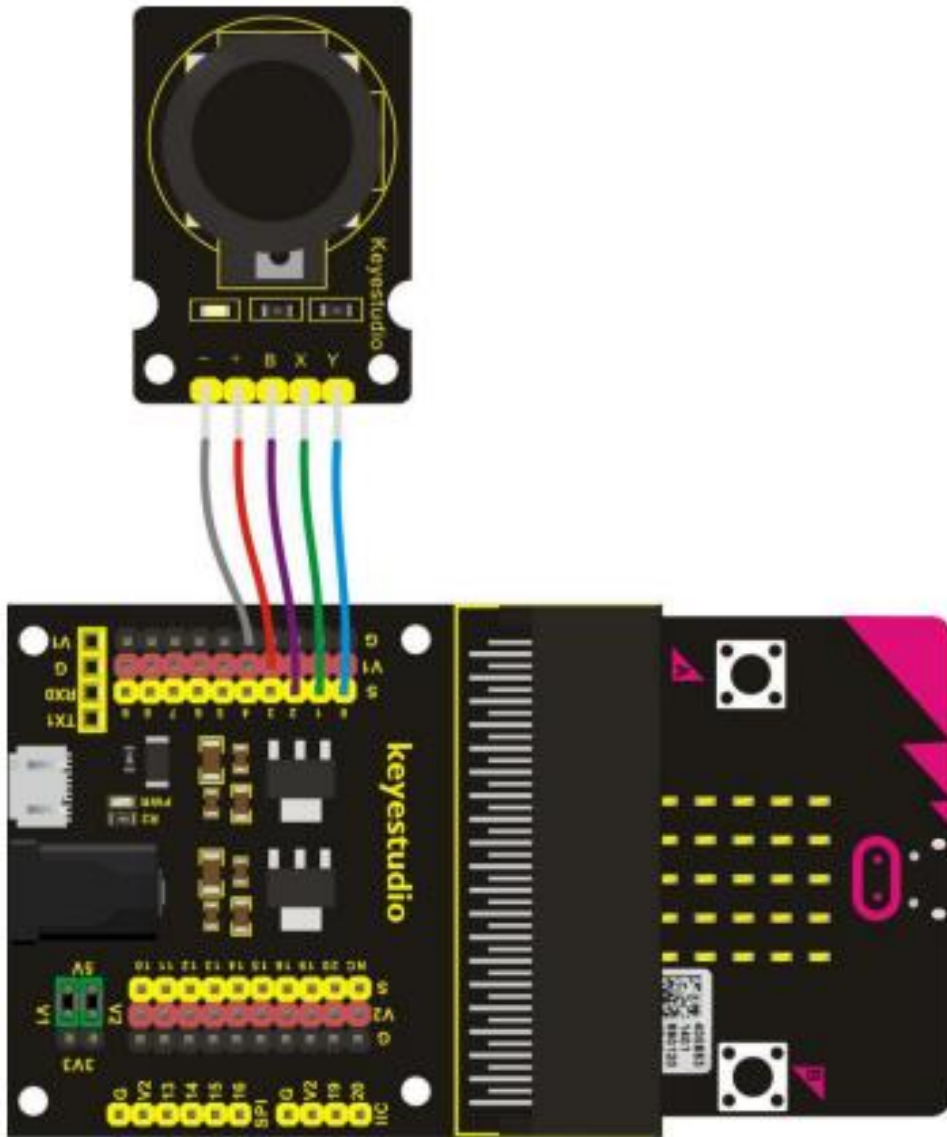
## IR (Infra-Red) Sensor

- Detects if there is an obstacle.
- Test idea: Point the sensor at the table, move it closer and further from the table to see readings change. It is set to see objects closer than approximately 10cm.

This is an input.

It can tell if an object is close or not, only has two options, making it a digital component.

Uses the digital input program.



Group 4

## Joystick

- Measures direction of joystick both up/down and left/right. Can also be pressed like a button.

This is an input.

The joystick gives a range of values for direction, making it an analog component.

However, the press button included is digital.

Uses the joystick program





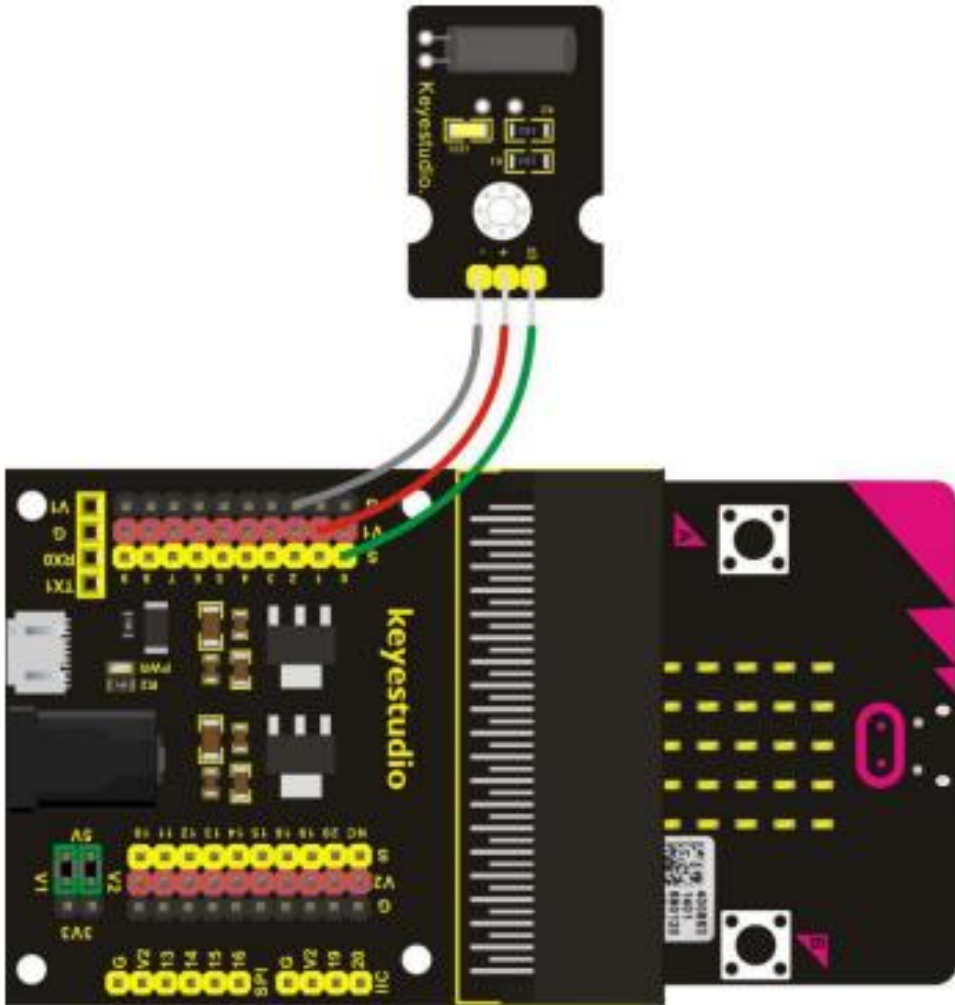
## Pressure Sensor

- Measures how hard you press the sensor
- Test idea: Lay the sensor on the table and watch the graph as you press on it and let go.

This is an input.

Measures the level of pressure on it across a range of values, making it an analog input.

Uses the analog input program



Group 2

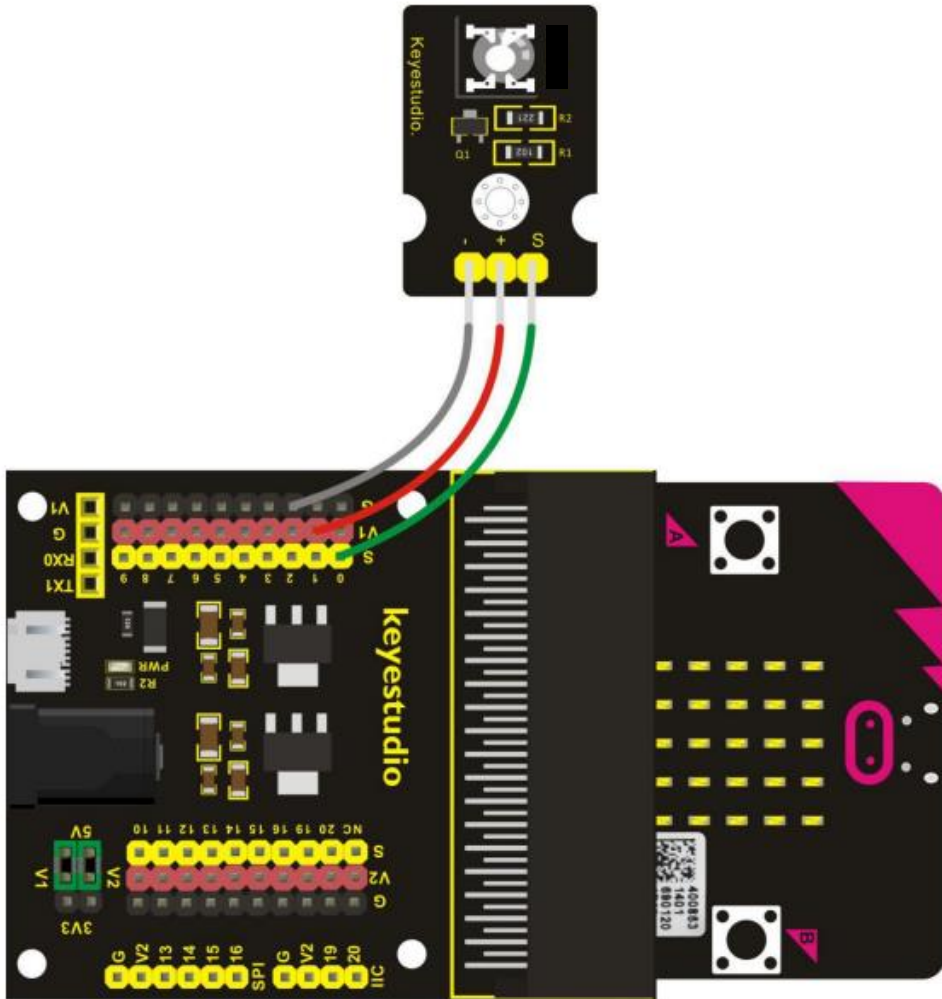
## Tilt Sensor

- Detects if it is tilted in one direction.
- Test idea: Hold the sensor level, then tilt and hold in different positions. The readings will change to show you which way the tilt sensor works.

This is an input.

It detects if it is tilted or not, only two options, making it a digital component.

Uses the digital input program



Group 5

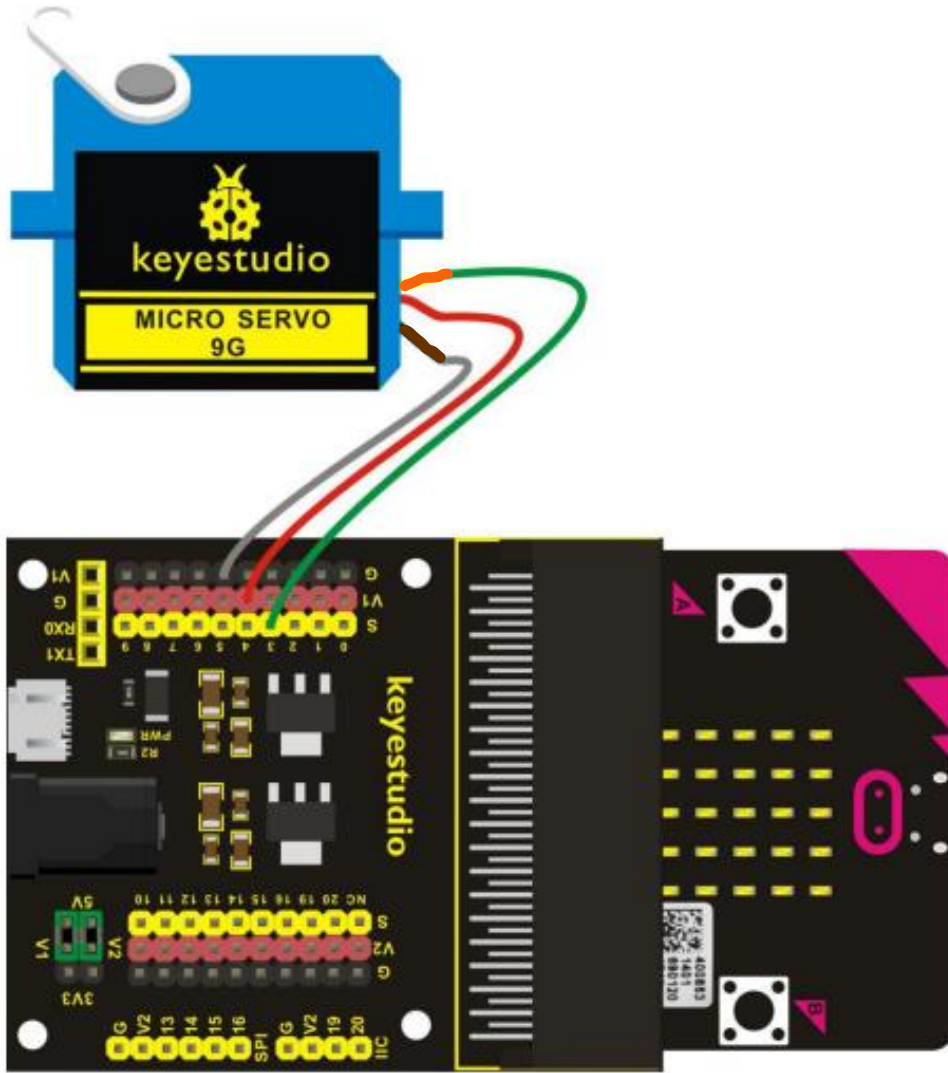
## White LED

- Can only produce a white light.

This is an output.

We can turn it on and off, making it a digital component. However, we can also set the brightness level of the LED making it an analog component.

Uses either the digital or analog output programs.



Group 5

## Servo

- This has a rotating arm
- Most servos can rotate between  $0^\circ$  and  $180^\circ$ .

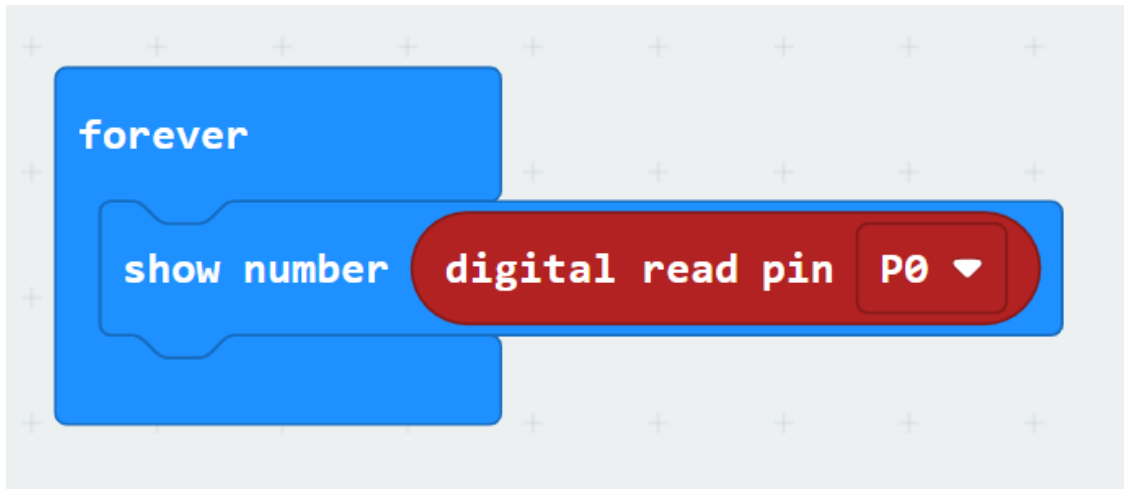
This is an output.

It can be set to a range of different angles, meaning it is an analog component.

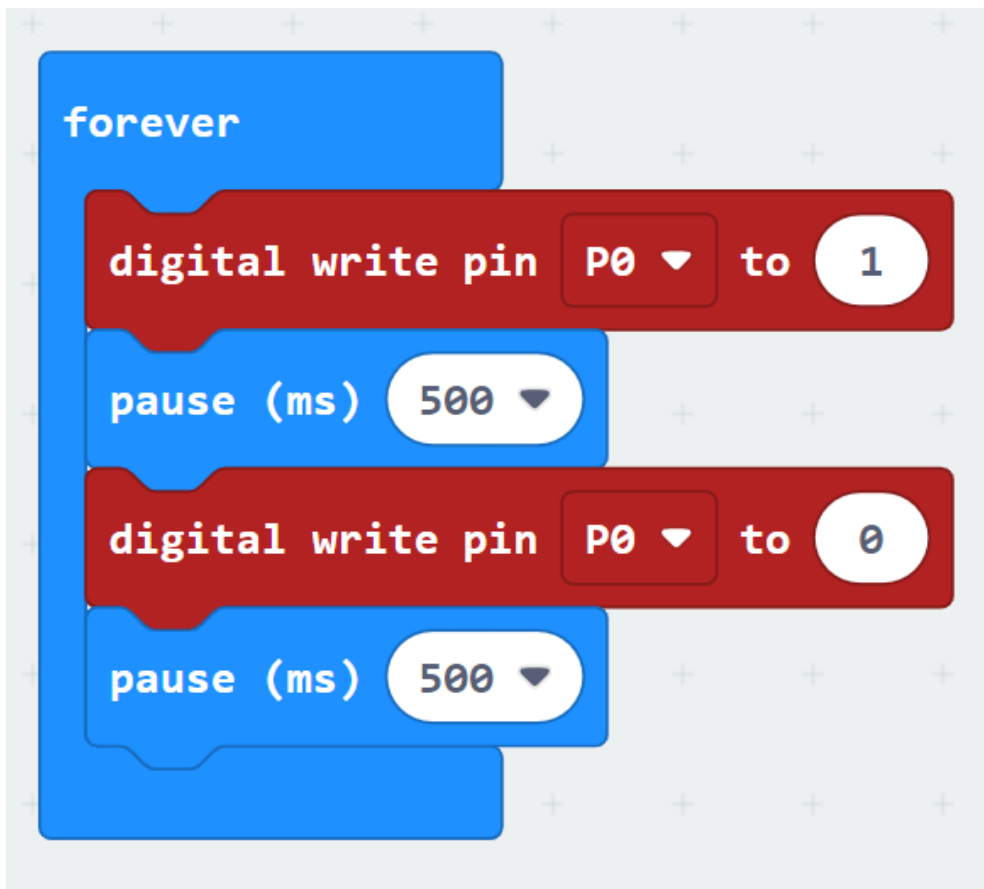
Uses the servo program.



# Digital Input



# Digital Output



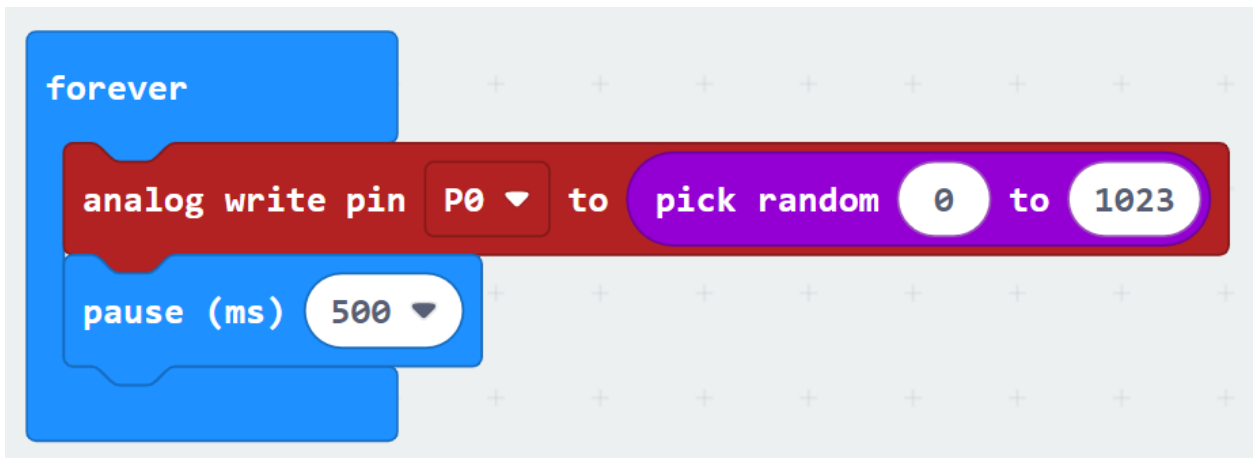
# Analog Input



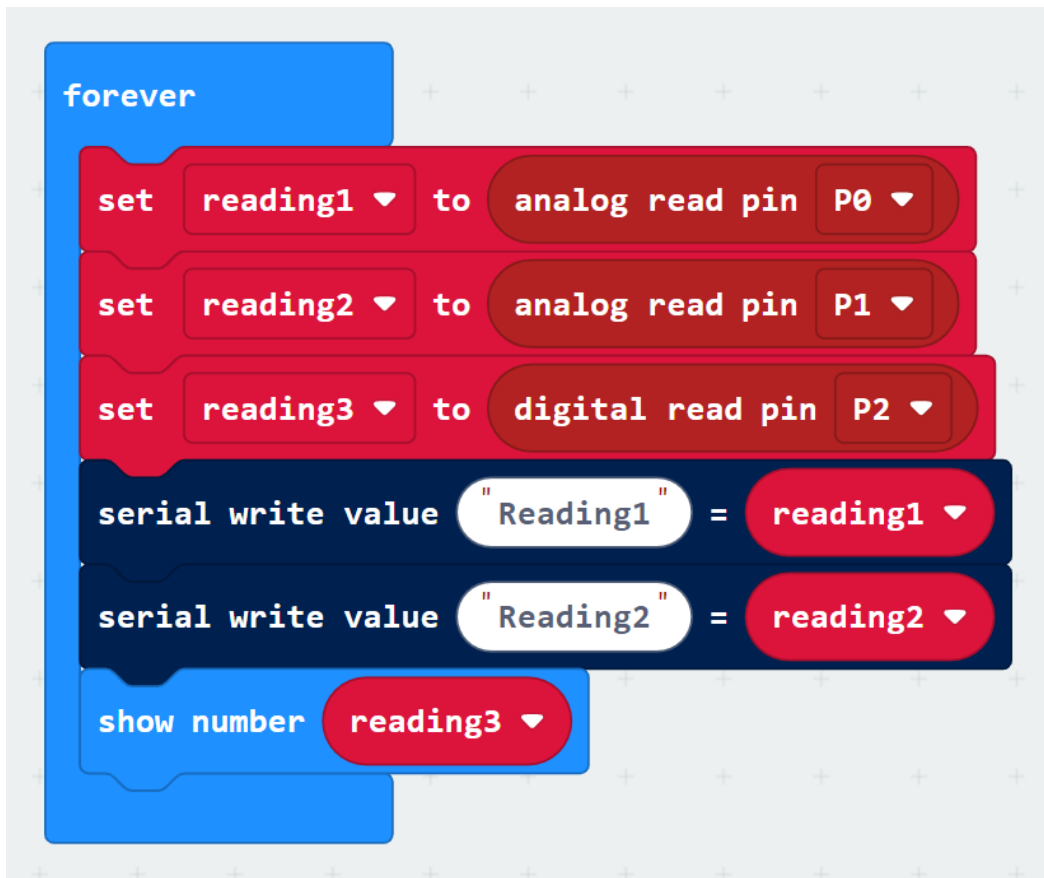
The image shows a Scratch code block for an analog input. It consists of a blue 'forever' loop block containing two blocks: a red 'set reading to analog read pin P0' block and a dark blue 'serial write value "Reading" = reading' block. The 'reading' variable is used in both blocks. The code is set against a light gray background with a grid of small plus signs.

```
forever  
  set reading to analog read pin P0  
  serial write value "Reading" = reading
```

# Analog Output



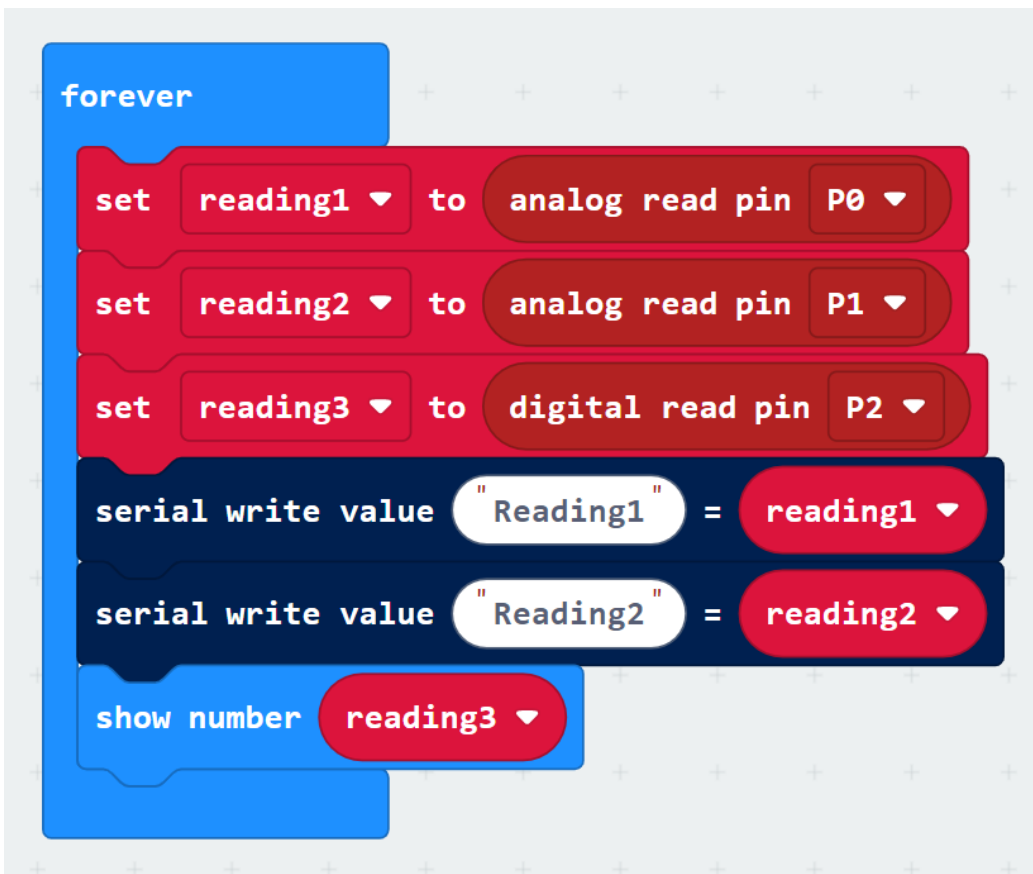
# Joystick



```
forever
  set reading1 to analog read pin P0
  set reading2 to analog read pin P1
  set reading3 to digital read pin P2
  serial write value "Reading1" = reading1
  serial write value "Reading2" = reading2
  show number reading3
```

The image shows a Scratch code block for a joystick. It is a 'forever' loop containing several blocks: three 'set' blocks for variables 'reading1', 'reading2', and 'reading3', two 'serial write value' blocks, and one 'show number' block. The 'set' blocks use 'analog read pin' for P0 and P1, and 'digital read pin' for P2. The 'serial write value' blocks use the variables 'reading1' and 'reading2' as inputs. The 'show number' block uses 'reading3' as input.

# RGB LED



```
forever
  set reading1 to analog read pin P0
  set reading2 to analog read pin P1
  set reading3 to digital read pin P2
  serial write value "Reading1" = reading1
  serial write value "Reading2" = reading2
  show number reading3
```

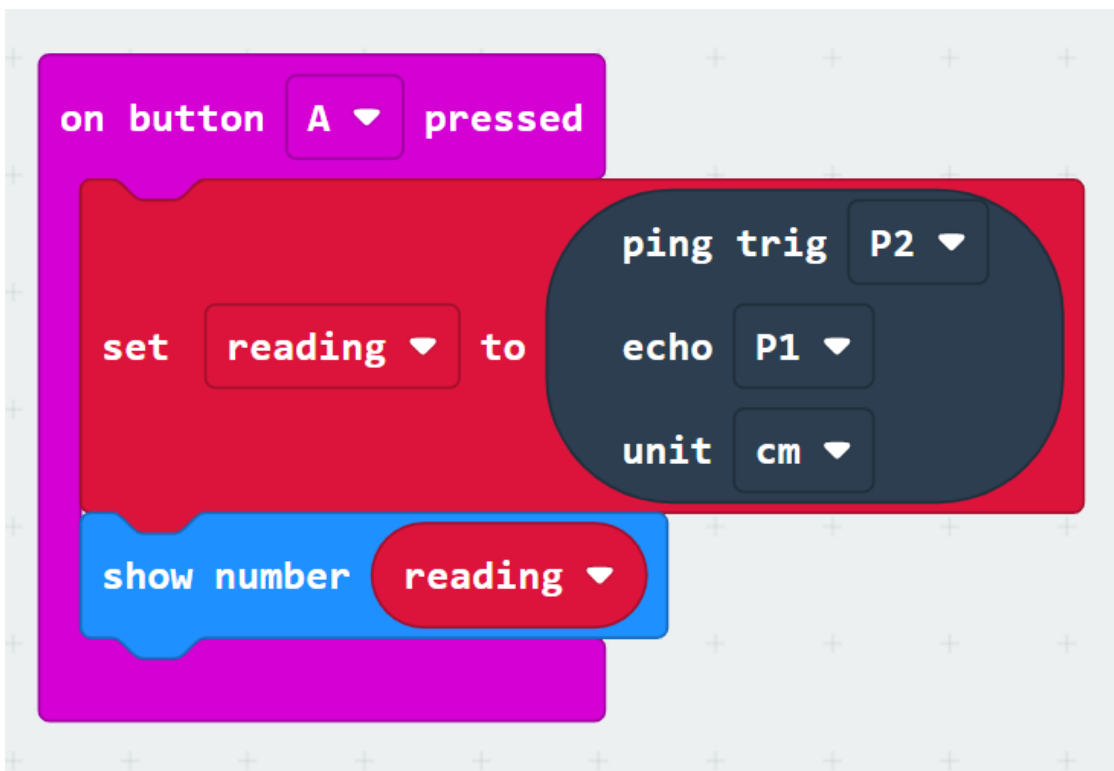
The image shows a Scratch code editor with a blue 'forever' loop block. Inside the loop, there are three red 'set' blocks: 'set reading1 to analog read pin P0', 'set reading2 to analog read pin P1', and 'set reading3 to digital read pin P2'. Below these are two dark blue 'serial write value' blocks: 'serial write value "Reading1" = reading1' and 'serial write value "Reading2" = reading2'. At the bottom of the loop is a blue 'show number' block with 'reading3' as the input.

# Servo



Needs servo extension blocks

# Ultrasonic Sensor



Needs sonar extension blocks



No.	Name	I/O	D/A	What does it do?
1	Crash Sensor	I	D	Knows when it bumps into something
2	Light Sensor	I	A	Measures light level
3	PIR Sensor	I	D	Detects motion
4	Humidity Sensor	I	A	Measures water in the air
5	Sound Sensor	I	A	Measure sound level
6	Shake Sensor	I	D	Detects being shaken
7	Super Bright LED	O	A/D	A light that shines at different levels
8	Buzzer	O	A/D	Plays different tones
9	Touch Button	I	D	Detects being touched
10	Temperature Sensor	I	A	Measures temperature
11	Red LED	O	A/D	A red light that can shine at different levels
12	Ultrasonic Sensor	I	A	Measures distance to an object
13	UV Sensor	I	A	Measures UV light levels
14	Magnetic Sensor	I	D	Detects one side of the magnet (N)
15	Push Button	I	D	Knows when it is pressed
16	RGB LED	O	A	Can produce different colours of light
17	Reed Sensor	I	D	Detects both sides of a magnet
18	Rotational Switch	I	A	Knows how far it's been turned
19	IR Sensor	I	D	Detects if close to an object
20	Joystick	I	A/D	Knows what position the joystick is and if it's pressed
21	Pressure Sensor	I	A	Measures how hard you press on it
22	Tilt Sensor	I	D	Detects when tilted in one direction
23	White LED	O	A/D	A white LED that can shine at different levels
24	Servo	O	A	Has an arm that can turn 180°