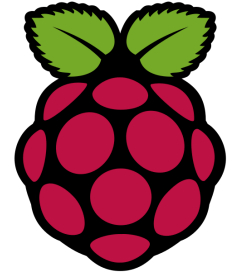


# Scratch-ing the Surface



## *An introduction to using Scratch with the GPIO pins on a Raspberry Pi*

GPIO stands for General Purpose Input/Output and some pins can be either an input or an output, but do you know which is which?

Discuss with a partner or someone sat near your, which of these are inputs or outputs:

A button, an LED, a buzzer, a motion sensor, speakers, pressure pads, the letter 'k' on your keyboard, the cat moving in Scratch, a speech bubble in your animation.

Input	Output

A PiStop is an output – it has three LEDs which you can control using Scratch GPIO on a Raspberry Pi.

**IMPORTANT** Get an adult to check you have the PiStop in the right place

Can you make a single light turn on?

Try this:



What happens?

Can you make the light blink ten times in a row? Does it blink smoothly or flicker? Check your code carefully.

Can you make the other two lights come on?

### \*\*\* \*\* Challenge \*\*\* \*\*

Can you make the lights turn on as though they were traffic lights? The order is red, red and amber together, green, amber, red and then repeat.

The red and green lights need to be on for longer as these are the stop & start lights.

Work with a partner to make your traffic lights work in opposition so that while one PiStop is showing red, the other is showing green?

### \*\*\* \*\* Challenge 2 \*\*\* \*\*

Can you make a disco dancing set of lights using some of the sound files available in Scratch?

**\*Hint\*** try using “play drum 35 for 0.5 beats” with “play drum 39 for 0.5 beats” as a start point

## Part Two

In real life, traffic lights wait on red until they sense an approaching car and then run their sequence from red, through to green and back to red again. Can you make your lights wait on red until they sense an approaching vehicle? You will need to fit a PIR (infra-red motion) sensor to your Raspberry Pi.

First, find LXTerminal and type in

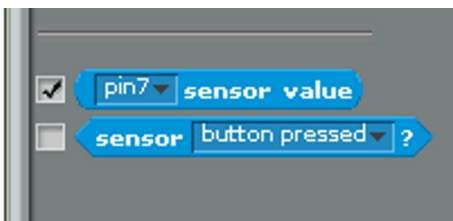
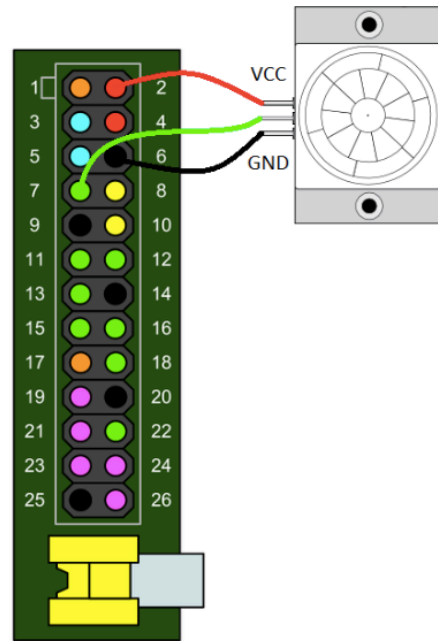
```
sudo halt
```

This will shut down your Pi so that you can plug in your sensor as shown in the diagram on the right (remember to check with an adult before you turn your Pi back on).

A PIR sensor is an 'input' and so can either be on or off – we use simple BINARY to represent this:

1 = on  
0 = off

If the sensor detects movement, it will become *on*, otherwise it is *off*.



To get the PIR sensor working, we need to click on the blue sensing blocks in Scratch GPIO.

You're also going to need to use a green 'equals' operator and an 'if/else' loop to create a statement which

makes your lights change from red to green when a car approaches.



### \*\*\* \*\* Challenge \*\*\* \*\*

Can you create a Scratch animation that starts when your traffic lights are activated by the PIR sensor? Add some sound effects to make it really interesting.

### \*\*\* \*\* Challenge 2 \*\*\* \*\*

Can you make a game where you need to click the sprite when the red light comes on?