Traffic Lights

Overview

Within this tutorial we are going to create a simple circuit using 3 LEDs 1 x red, 1 x yellow and 1 x green. We are going to use EduBlocks and a Raspberry Pi to code and control the LEDs to simulate traffic lights.

Installing EduBlocks

1. Open a Terminal window by clicking on 
2. If you have used EduBlocks before you will need to delete the old version by typing the following into the Terminal

```
edublocks-uninstall
```

3. Now we need to install the new version of EduBlocks by typing the following into the Terminal

```
curl -sSL connect.edublocks.org | bash
```

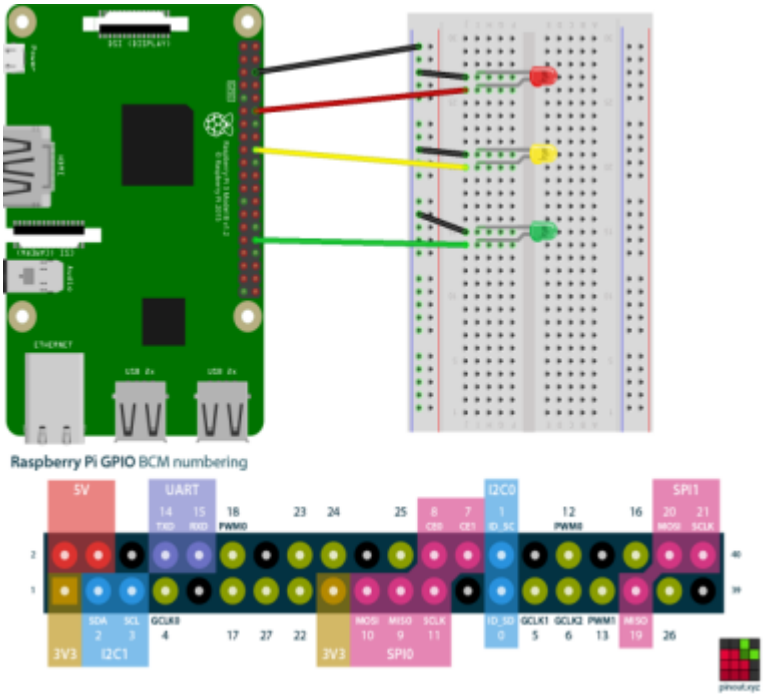
NOTE: *If you want EduBlocks to start when your Raspberry Pi starts up type:*

```
edublocks-startup-enable
```

What you will need

- 1 x breadboard
- 1 x Red LED
- 1 x Yellow LED
- 1 x Green LED
- 3 x male to male jumper wires
- 4 x male to female jumper wires
- 1 x Raspberry Pi setup

Creating the circuit



- Red LED = pin18
- Yellow LED = pin24
- Green LED = pin12

NOTE: *Each LED has 1 x long leg, which is the positive leg. This connects to the pins on the Raspberry Pi and 1 x short leg which connects to ground/negative. Within this tutorial the short legs connect to a common ground by connecting to the negative rail on the breadboard then one wire going from there to ground on the Raspberry Pi*.

Once your circuit looks like the diagram above it's time to code.

Starting EduBlocks

NOTE: *If you have EduBlocks starting when the Raspberry Pi starts up, you can skip this section*

1. Click on the Raspberry icon in the top left corner
2. Click on Programming
3. Click on EduBlocks Connect. This will open a Terminal window.
4. Click on the globe icon next to the Raspberry to open a web browser.
5. Type `app.edublocks.org` into the search bar. this will open up the mode selector.
6. Click on Raspberry Pi

Lets get coding!

Code

Setting up libraries

1. Click on **gpiozero**
2. Click on **General**
3. Click and drag **from gpiozero import *** to the coding are and drop it there.

4. Click on **Basic**
5. Click and drag an **import time** block and attach it under **from gpiozero import ***

Your code should look like this:

This imports Python Libraries. gpiozero helps us communicate with the GPIO pins on the Raspberry Pi and the time library lets us control pauses within the code.

Setting up pin numbers

1. Within the **gpiozero** menu click on **Outputs**
2. Click on **LED**
3. Click and drag an **led=LED()** to the code area and attach it under **from gpiozero import ***
4. Click on the arrow next to **led** and click on **Reanme variable** type **red** into the text box and click on OK.
5. Within the blank space between the **()** type **18** (this refers to the pin number that the red LED is connected to on the Raspberry Pi)
6. Click on **LED**
7. Click and drag an **led=LED()** block to the coding area and attach it under the **red=LED(18)** block.
8. Click on the small arrow next to **led** and click on **Rename variable** in the text box type **yellow** and click OK.
9. Within the blank space between **()** type **24** (this corresponds to the pin on the Raspberry Pi that the yellow LED is connected to)
10. Click on **LED**
11. Click and drag an **led=LED()** block to the code area and attach it under the **yellow=LED(24)**
12. Click on the small arrow next to **led** and click on **Rename variable** and type **green** into the text box and click OK.
13. Click within the blank space between **()** and type **12** (this refers to the pin on the Raspberry Pi where the green LED connects to)

Your code should now look like this:

Setting up a loop

1. Click on Basic
2. Click and drag a **while True:** block to the code area and attach it under the **green=LED(12)** block.

Your code should now look like this:

All code from now on will go inside the **while True:**. This will keep our code running forever simulating traffic lights.

Turning the red LED on

1. Click on **LED**
2. Click on an **led.on()** block to the coding area and attach it within the **while True:** block
3. Click on the small arrow next to **led** and click on **red**
4. Click on **Basic**
5. Click and drag a **time.sleep(1)** block to the code area and attach it under the **red.on()** block
6. Change the 1 to a 3

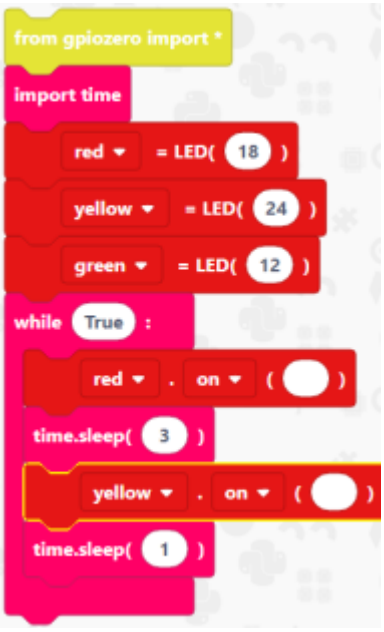
Your code should look like this:

This will turn the red LED on for 3 seconds.

Turning the yellow LED on

1. Click on **LED**
2. Click and drag an **led.on()** block to the code area and attach it under the **time.sleep(3)**
3. Click on the small arrow next to **led** and click on **yellow**
4. Click on **Basic**
5. Click and drag a **time.sleep(1)** block to the coding area and attach it under the **yellow.on()** block

Your code should now look like this:

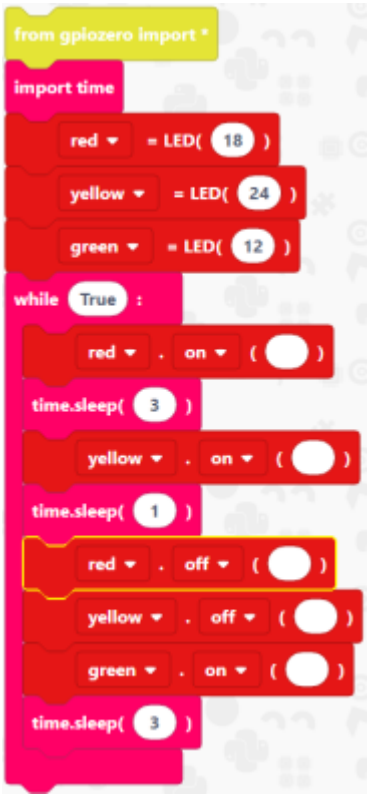


The red LED is still on and the Yellow LED turns on for 1 second.

Turning the red and yellow LEDs off and the green LED on

1. Click on **LED**
2. Click and drag an **led.on()** block to the code area and attach it under the **time.sleep(1)** block
3. Click on the small arrow next to **led** and click on **red**
4. Click on the small arrow next to **on** and click on **off**
5. Click on **LED**
6. Click and drag an **led.on()** block to the code area and attach it under the **red.off()** block
7. Click on the small arrow next to **led** and click on **yellow**
8. Click on the small arrow next to **on** and click **off**
9. Click on **LED**
10. Click and drag an **led.on()** block to the code area and attach it under the **yellow.off()** block
11. Click on the small arrow next to **led** and click on **green**
12. Click on **Basic**
13. Click and drag a **time.sleep(1)** block to the code area and attach it under the **green.on()** block.
14. Change the 1 to a 3.

Your code should now look like this:

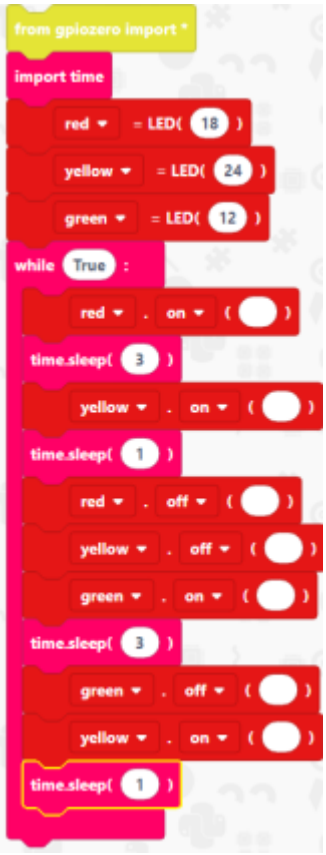


This turns the Red and Yellow LEDs off and turns the Green LED on for 3 seconds.

Turning the yellow LED back on

1. Click on **LED**
2. click and drag an **led.on()** block to the code area and attach it under **time.sleep(3)** block
3. Click on the small arrow next to **led** and click on **green**
4. Click on the small arrow next to **on** and click on **off**
5. Click on **LED**
6. Click and drag an **led.on()** block to the code area and attach it under **green.off()**
7. Click on the small arrow next to **led** and click on **yellow**
8. Click on **Basic**
9. Click and drag a **time.sleep(1)** block to the code area and attach it under **yellow.on()**

Your code should now look like this:



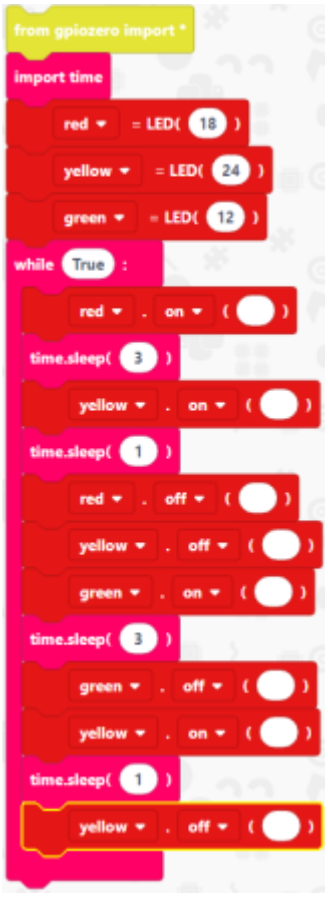
This turns the green LED off and the yellow LED back on for 1 second.

Turning the yellow LED off

1. Click on **LED**
2. Click and drag an **led.on()** block to the code area and attach it under the **time.sleep(1)** block
3. click on the small arrow next to **led** and click on **yellow**
4. Click on the small arrow next to **on** and click on **off**

Your code is now complete!

Completed Code



Running the Code

1. click on this icon 
2. Click on **Run**

You should now see your LEDs running in the sequence of traffic lights.