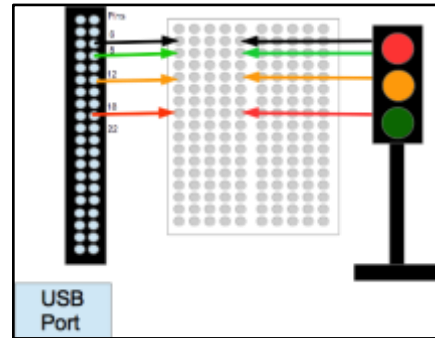


SCRATCH 1.4 – GPIO Exercise Part 1 – Switching Traffic Lights

Components:

R1 – Resistor 10K ohms
 Set Traffic Lights (pre wired with 3 LED's)
 Breadboard
 Connecting wires

Pin 6 = Gnd
 Pin 8 = GPIO14
 Pin 12 = GPIO18
 Pin 18 = GPIO24


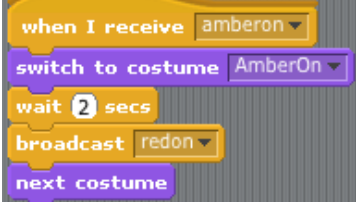

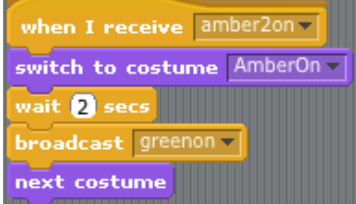





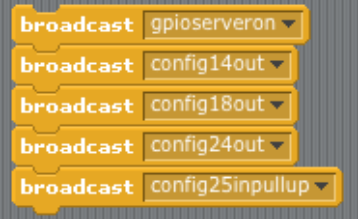


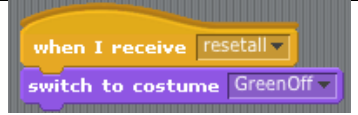

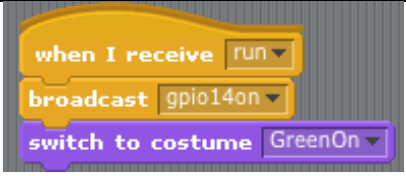
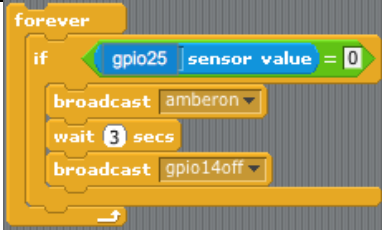
Introduction:

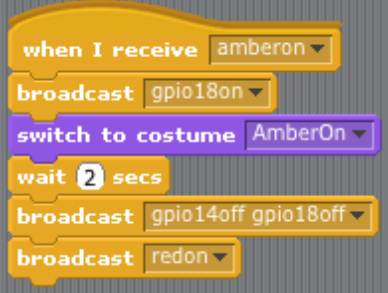



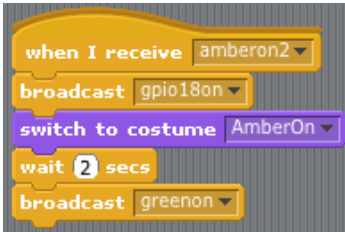
This part of the exercise is to create a visual display of the traffic lights sequence. Green – Amber – Red – Red and Amber returning to Green and then repeat.

Coding: – Open SCRATCH 1.4 on the Raspberry Pi

<ol style="list-style-type: none"> 1. Delete the Cat sprite 2. Set up a new sprite called Green, create two costumes GreenOff and GreenOn. 3. Duplicate the Green sprite and rename it Amber, create two costumes AmberOff and AmberOn. 4. Duplicate the Green sprite and rename it Red, create two costumes RedOff and RedOn. 	
<ol style="list-style-type: none"> 5. Move the sprites on the stage so they form a vertical line as shown. The first column shows all sprite Off, the second column shows all sprites ON. The Stage is now complete. 	
<ol style="list-style-type: none"> 6. Reset all sprites to Off state (black). Enter this script into to the Green sprite script. This will trigger each sprite to reset to the Off state. 	
<ol style="list-style-type: none"> 7. Enter this script into the Green Sprite Scripts. This will turn off the Green light. 	
<ol style="list-style-type: none"> 8. Enter this script into the Amber Sprite Scripts. This will turn off the Amber light. 	
<ol style="list-style-type: none"> 9. Enter this script into the Red Sprite Scripts. This will turn off the Red light. All lights should be in the Off state. 	

<p>10. Open the Green Sprite Scripts and enter the code that will start the TFC light sequence. The trigger “run” will be added after a few more steps. The script reads on receipt of command “run”, switch on Green light, wait 5 seconds and broadcast “amberon” to trigger the amber light sequence. Then switch off the Green light.</p>	
<p>11. Open the Amber Sprite Scripts and enter the code that will trigger the Amber Light sequence. The script reads, on receipt of command “amberon”, switch on Amber light, wait 2 seconds the broadcast “redon” to trigger the red light sequence. Then switch off the Amber light.</p>	
<p>12. Open the Red Sprite Scripts and enter the code that will trigger the Red light sequence. The script reads, on receipt of command “redon”, switch on Red light, wait 5 seconds and broadcast “amber2on” to trigger the Amber light sequence. Then wait 2 seconds and switch off the Red light. [Note you must have a new “amber2on” sequence as “amberon” would switch on the Red light].</p>	
<p>13. Open the Amber Sprite Scripts and add additional code that will trigger the Amber light sequence. The script reads, on receipt of command “amber2on”, switch on the Amber light, wait 2 seconds and broadcast “greenon” to trigger the Green light sequence. Then switch off the Amber light.</p>	
<p>14. Open the Green Sprite Scripts and add additional code that will trigger the Green light sequence. The script reads, on receipt of the command “greenon”, switch on the green light, wait 5 seconds and broadcast “amberon” to trigger the Amber light sequence. Then switch off the Green light.</p>	
<p>15. Change the code in step 6 to trigger the “run” command. The scripts are now in a loop 10, 11, 12, 13 and 14 and will work this sequence until they are halted. Select the green flag to test the light sequence; select the red circle to stop the sequence.</p> 	
<p>16. This is a standard Traffic light sequence and would normally work with two (or more) sets traffic light units. Part 2 of this exercise with add the traffic light unit to the script. Save the script as “Traffic Lights Part 1”</p>	

<p>17. The code blocks used for controlling the GPIO are all actioned using the Control broadcast block. Programme the Green Sprite with this script. The GPIO ports 14, 18 & 20 are configured as output controls and 25 as an input control. The later will be discussed later.</p>	
<p>18. These controls will only do something when instructed by these actions, turn off 14, 18 and 24. All Traffic lights are now switched off.</p>	
<p>19. Use this control to turn off the sprites on the stage as well.</p>	
<p>20. Place this control in each sprite to change the costumes to off.</p>	
<p>21. The completed script should look like this:</p> <p>When clicked the program is initialised:</p> <ul style="list-style-type: none"> • GPIO Server Switched On • GPIO 14,18 and 24 set as outputs • GPIO 25 set as an input • GPIO 14,18 and 24 LED's turned off • 'resetall' used to instruct all sprites to switch costumes off • 'run' used to start the main program <p>Press the switch to start the Traffic Light Sequence.</p>	
<p>22. The 'run' command, turn on the Green LED and the Green Costume On. This is the default condition waiting for the switch to start the traffic light sequence.</p>	
<p>23. The forever block will cycle continiously until the sensor switch is pressed. When pressed will broadcast amberon sequence.</p>	

<p>24. Enter the blocks into the Amber script. On receipt of amberon broadcast turn on the Amber LED and the Amber Costume On.</p> <p>As a safety feature turn off the Green and Amber LED's before broadcasting redon.</p>	
<p>25. Add this block to the Amber script. Also add this block to the Green script.</p>	
<p>26. Add this block to the Green script.</p>	
<p>27. The next stage will adapt the code to make a Puffin Crossing. A Puffin crossing is a pedestrian controlled crossing without a flashing amber.</p>	
<p>28. On receipt of redon, broadcast Red LED on, wait 3 seconds, broadcast amberon2.</p> <p>Broadcast Red LED Off and Red costume Off</p>	
<p>29.</p>	
<p>30.</p>	