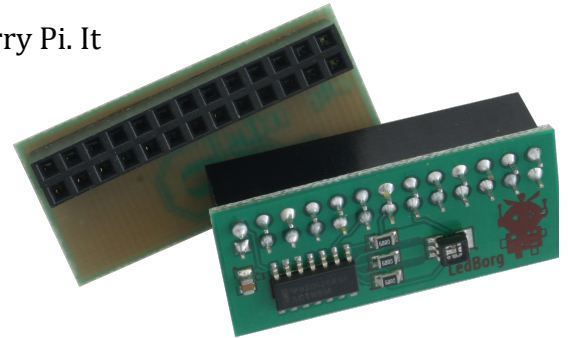


Raspberry Pi GPIO with LEDBorgs

The LEDBorg is a simple add-on board for the Raspberry Pi. It adds an RGB (Red, Green, Blue) LED, which you can control from software on the Raspberry Pi. It is slotted on the GPIO pins of the Raspberry Pi. It uses pin numbers **11, 13 and 15**: One for red, blue and green.



Controlling the LEDBorg

To control the LEDBorg we will use Scratch. Scratch is a really easy beginner-programming environment designed for students with no previous programming experience. We will be using a custom version of Scratch called ScratchGPIO 5.

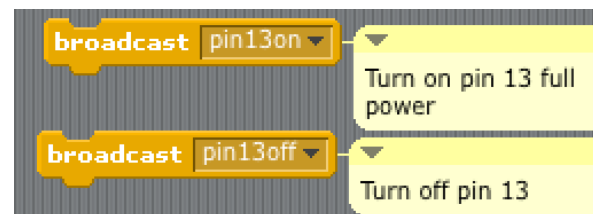
Which version?

There are 2 versions of ScratchGPIO 5 on your desktop. ScratchGPIO5 and ScratchGPIO5 Plus. The plus edition is for special add-on boards. The LEDBorg is only supported though by the standard ScratchGPIO5. Double click it to launch it.



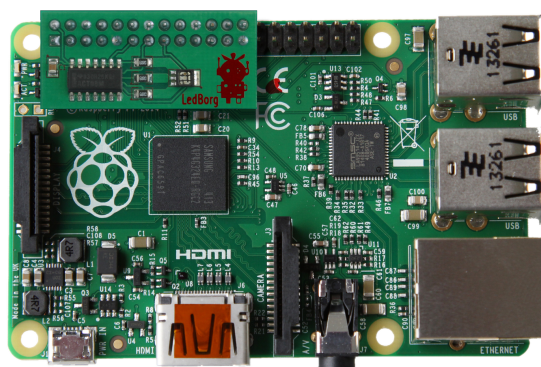
Lets get started

Switch to the control section, grab a broadcast and bring it into programming area. Try creating these 2 blocks by selecting the small black arrow on the block and double click each of them.



Now Try!

1. Now you have pin 13 working, can you do the same with the other 2 colours? (pin11 and pin15).
2. Can you work out which pin number corresponds to which LED colour?



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Adjusting brightness

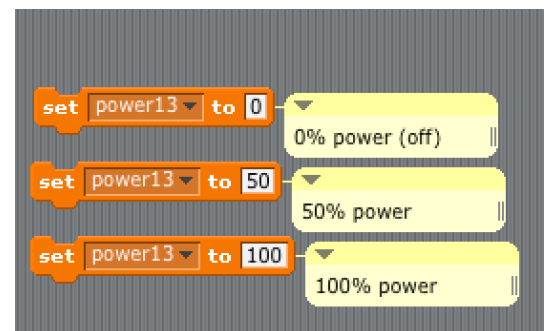
You can also adjust the brightness of the LEDs instead of just turning them on and off. This means you can fade colours into each other and create a lot more than 9 colours! Using brightness allows you to make just under 1 million unique colours!

WARNING!

- You can only use a single pin controlling method at one time! This means you can use broadcasts or variables, not both in the same program!

To adjust the brightness of the LEDs, we will use variables in ScratchGPIO. Variables are just a temporary storage for anything. In our case, a number between 0 and 100 (the brightness percentage).

To get started, create a new variable (for all sprites) called “power13” from the variables submenu in ScratchGPIO. Next use the set block to set it with a value between 0 and 100.



“Set power13 to 0” is the same as “broadcast pin13off” and “Set power13 to 100” is the same as “broadcast pin13on”

Now Try!

- Can you create purple, yellow and white using the LEDBorg?

Scripting

Finally, lets see how we can combine these commands to control the LEDs together to create a **Script**.

A script is simply a collection of commands that run one after each other.

The best way to do this in Scratch is using the “Wait” block from the Control section. It allows you to pause the program for a specified amount of time (in this case 1 second). You can then combine your “Set” or “Broadcast” commands one after each other to create your first computer script!



Now Try!

- Can you bring on the primary colours one after each other with a 1 second pause/wait between each colour change?
- Create a light show!** Make a script that brings on different colours in different sequences. Combine as many colours as you want and make it at least 10 blocks long.