

Van Gogh's Starry Night

With Pico

Equipment needed

- ☐ Raspberry Pi Pico
- ☐ Breadboard (not essential but good to have)
- ☐ A collection of yellow and white LEDs
- ☐ A resistor per LED gotten
- ☐ Male to Female Jumper cables (Socket on one end and Spike on the other)
- ☐ Some black card

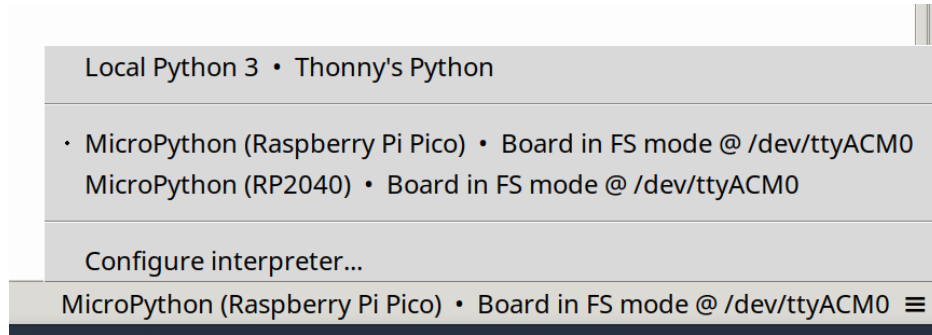
Brief

Isn't it fun to look up into the night sky and see it lit up with different stars, planes, satellites, and (if you're lucky) shooting stars. In this project you are going to create your own night scene that you will light up with LEDs from your Raspberry Pi Pico.



Task 1 - Setting up the Pico

1. Grab a Raspberry Pi Pico and plug it into the USB port of your computer.
2. Open up Thonny
3. In the bottom right corner click “Local Python” and change it to “Micro Python”



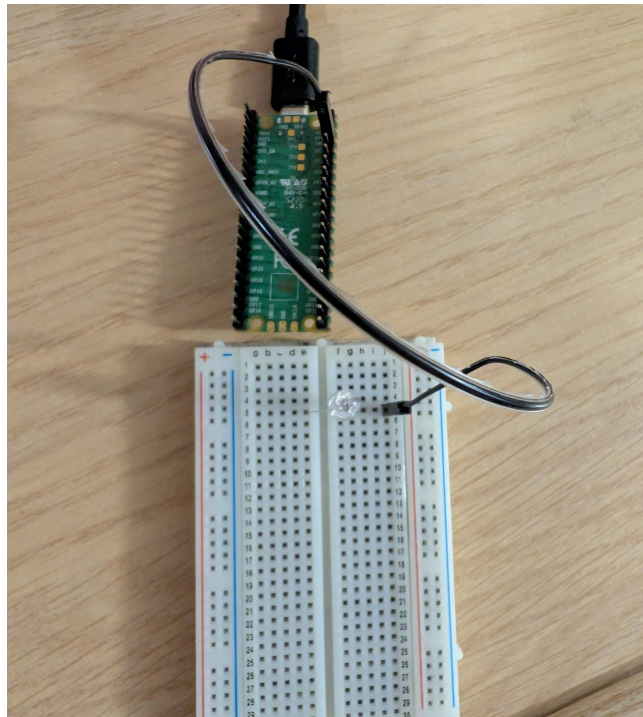
4. Test your code by typing `print("Hello from Pico")` and clicking the green play button. If it works you have connected the Pico Successfully

Task 2 - Lighting an LED

It is time to shine some light on the situation and have a go at lighting some LEDs. We can do this by using a breadboard and some jumper cables. If you find the breadboard difficult then you can use crocodile wires if they are available.

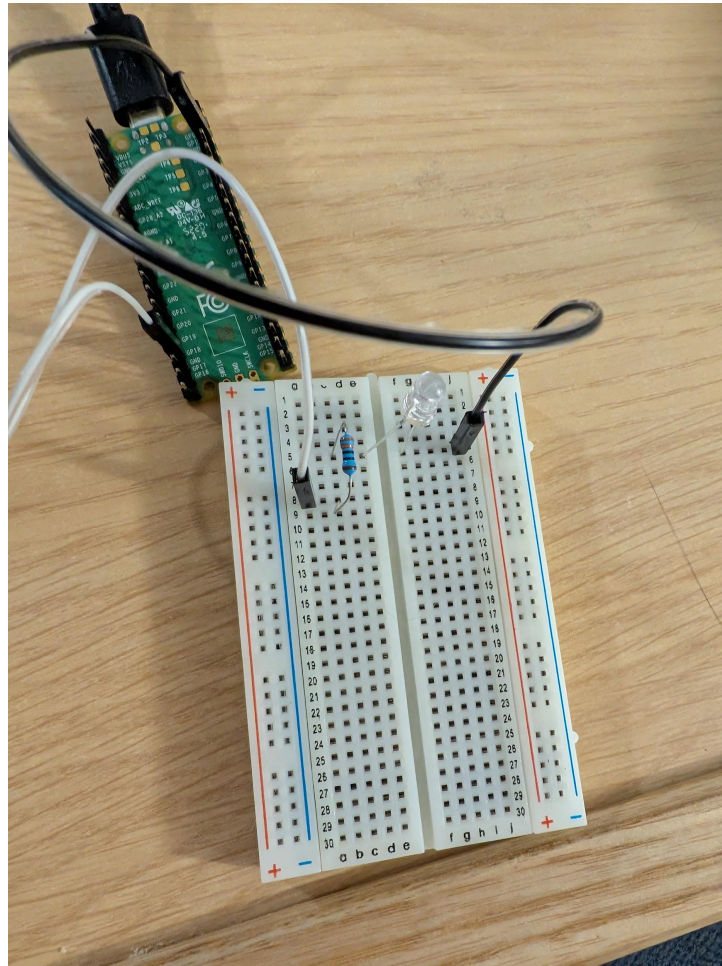
Creating a Circuit

1. Place your breadboard in front of you so that it appears portrait
2. Place an LED on the breadboard
 - a. The LED should straddle the middle gap
 - b. Place the longer leg (+) on the left hand side of the gap
 - c. Place the shorter leg (-) on the right hand side of the gap
3. Get a male to female jumper cable and connect the male end into a hole on the same row as the shorter leg
4. Connect the female end of the jumper cable to any PIN on the Pico labelled GND



Let's take a quick break. A lot has happened there, so far we have added an LED to our circuit and connected the negative side of the LED to ground. What we need to do now is add the positive side.

1. Grab a resistor
2. Place one leg in the same row as the positive leg of the LED (left hand side)
3. Place the other leg into any other empty row on the same side of the gap
4. Get a male to female jumper cable
5. Connect the male end into the same row as the leg of the resistor that is on its own
6. Connect the female end to the Pico on any pin starting GP (I'm going to use GP18)



Coding the LED

In Thonny, we are now going to write the following code. Once you have done it and clicked run, **Try to tell someone on the same table or a Code Club**

Volunteer what the code does

```
1 from machine import Pin
2 from utime import sleep
3 from random import randint
4
5 star = Pin(18, Pin.OUT)
6
7 while True:
8     star.value(1)
9     sleep(2)
10    star.value(0)
11    sleep(2)
```

Challenge

Try and make the star twinkle by randomising how long the LED stays on and off for. To make a random number between 1 and 10, you can use the code

`randint(1,10)`

Task 3 - Creating a Starry Sky

Now you know how to light one star, Try creating more stars. If you want to change the position and have the stars scattered around you can use more than one breadboard.

Task 4 - Creating the night

Now it is time to be creative!

1. Draw a night scene on the piece of paper you have. If you have black paper or card then it is even better.
2. Using a pencil or scissors (being extra careful) create small holes so that you can place your paper over your LEDs
3. Once you are done you should have a night sky with your stars twinkling in the background

Super Challenge!

Try and add all your stars to a list and make them twinkle on and off randomly so that every night sky is different. To learn about lists you can use [W3Schools to help you](https://www.w3schools.com/js/)