



Leeds Trinity
University

A warm welcome from

The School of Computer
Science at Leeds Trinity
University

WHAT'S COVERED...

1. Types of Jobs in Computer Science
2. Our Computer Science Team
3. Course Structure including Placement
4. Why LTU for Computer Science?
5. Basic Python, and Programming Activity



COMPUTER SCIENCE TEAM



Professor
Yanguo Jing



Dr Nicky
Danino



Dr Antesar
Shabut



Mr Jim
Diockou



Dr Aliyu
Lawal Aliyu



Dr Lesley
May



Dr Xin Lu



Dr Yashar
Baradaran
Shokouhi



Dr Nick Mitchell

Examples of research within the school:

- AI in healthcare and Biomedical Signal Processing
- Cyber Security and the future of air commute
- Software Defined Networks (SDN) & 5G
- Opensource research
- Globaliser Mobile App

POTENTIAL JOBS IN COMPUTER SCIENCE

Web Designers, App Developers, Games Designers, Cyber Security, Algorithm Developers, Data Analytics, AI & Machine Learning Lead

Drone Engineers, AI Prompt Engineers, AI Architects, Data Engineers, ...



[Read more ...](#)

Available Courses

Currently available programme:

- BSc Computer Science (BCS Accredited)
 - BSc Computer Science with Game Development
 - BSc Computer Science with Cyber Security
 - *BSc Computer Science with Artificial Intelligence**
-
- MSc Data Science and AI (Scholarships available)
 - MRes and PhD Research

Foundation year available.





COURSE STRUCTURE

BSc Computer Science

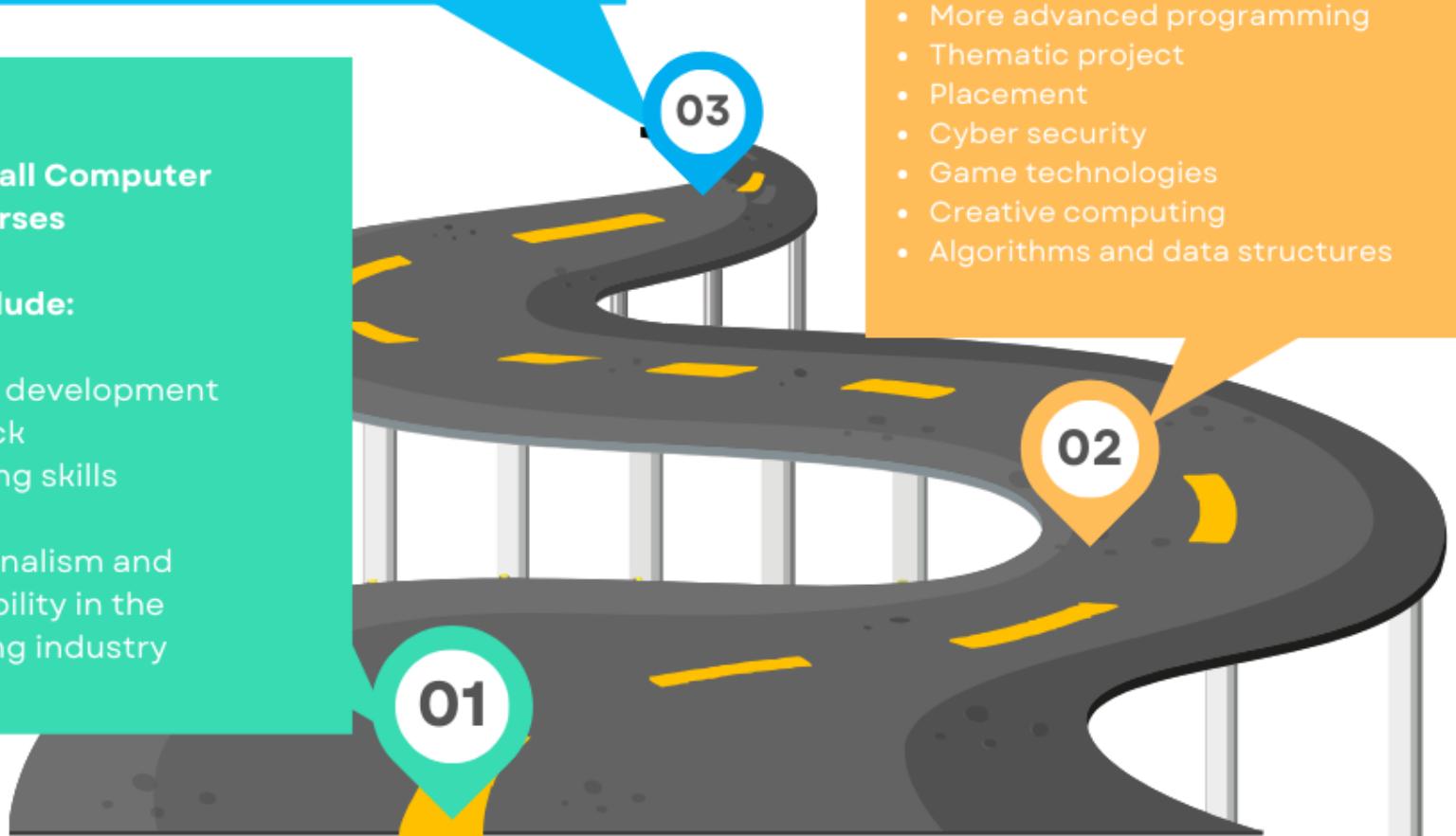


Year 1

Common to all Computer Science courses

Modules include:

- Software development
- Tech stack
- Computing skills
- UX
- Professionalism and employability in the computing industry



How we structure our course:



Foundation Year

Most of our undergraduate degrees can be taken as a four-year course, beginning with the associated Foundation Year for your chosen degree.

- Aims to develop your academic knowledge
- Introduces you to key concepts in computing
- Develop technical skills in preparation for the BSc course
- Has lower entry requirements than our standard
- three-year degree



Typical Weekly Timetable

	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
Monday								
Tuesday					Code Clinic (optional)	Module 1 – Session 1		
Wednesday		Workshop Series (optional)				Robotics Club/Computer Club/Games Club etc.		
Thursday					PAAS	Module 2 – Session 1		
Friday		Module 1 – Session 2				Module 2 – Session 2		



WHY LTU?

Most of our graduates are in employment or further study 15 months after graduating (>93%)

- A supportive university community
- Staff availability
- Small group teaching
- Industry-led teaching and mentoring



WHY LTU?

- Industry & Research Led Teaching
- Visiting Lecturers from
 - Industry
 - Royal Academy of Engineering
- Industry visits, events and placement opportunities





Professional work placements

Partners:

- UST
- Apporto
- Hippo Digital

Example of other companies:

- Legal Tech
- Farnell
- Samsung
- And many others

Leeds Tech City

Examples of the range of tech companies actively recruiting in Leeds and West Yorkshire include:

Media
Health
Fashion
Gaming
Enterprise Software
Marketing
Fintech
Wellness Beauty
Kids
Food

Event Tech
Transportation
Energy
Home living space
Service Provider
Sports
Real Estate
Job Recruitment
Space
Travel

Finance & Banking
Property Sector
Legal Firms
Government
Universities - Academic route
Energy and Renewable Energy
Net Zero Carbon Sustainability
Construction
Big Tech Companies
Automation and self-driving vehicles
Cyber Security Analysts





Study abroad

We partner with universities, institutions, employers and charities across the world to give you amazing opportunities to have an international experience.

This may include:

- Studying abroad for a full academic year
- International volunteering
- Short-term international trips

Contacts

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Thank you for listening

Part 2: Activities

Task 1:

Simulation

Task 2 & 3:

Hands-on Experience with Python and Raspberry Pi

Task 4:

Pitch your app

Task 1: Simulation

Turn on an LED with an Arduino board

Platform: TinkerCAD

Arduino Board & TinkerCAD

[Navigate to Circuits | Tinkercad](#)

The image shows the TinkerCAD homepage. At the top is a green navigation bar with the following items: 'Tinker ^' (highlighted in orange), 'Gallery', 'Projects', 'Classrooms', and 'Resources'. Below the navigation bar are three main sections: '3D Design' (with a blue cube icon), 'Circuits' (with a green circuit board icon), and 'Codeblocks' (with a purple code icon). Each section has a brief description below it. At the bottom of the page are two additional sections: 'iPad App' (with a small TinkerCAD logo icon) and 'Autodesk Fusion 360' (with a red F360 icon).

Tinker ^ **Gallery** **Projects** **Classrooms** **Resources**

3D Design
Start designing in 3D in minutes.

Circuits
Add light and movement to your designs.

Codeblocks
Write programs to bring your designs to life.

iPad App
Design on the go.

Autodesk Fusion 360
Level up your designs.

Blink an LED with Digital Pin

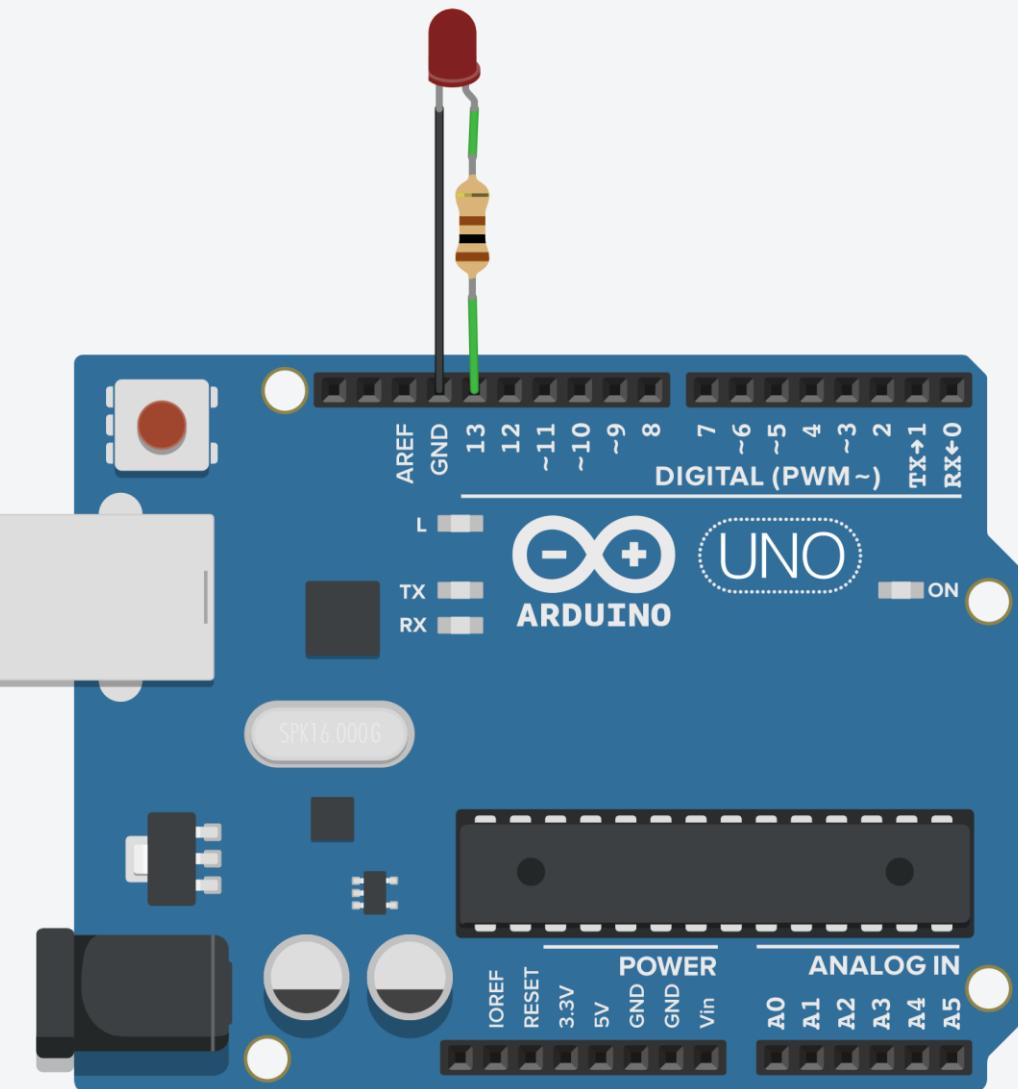
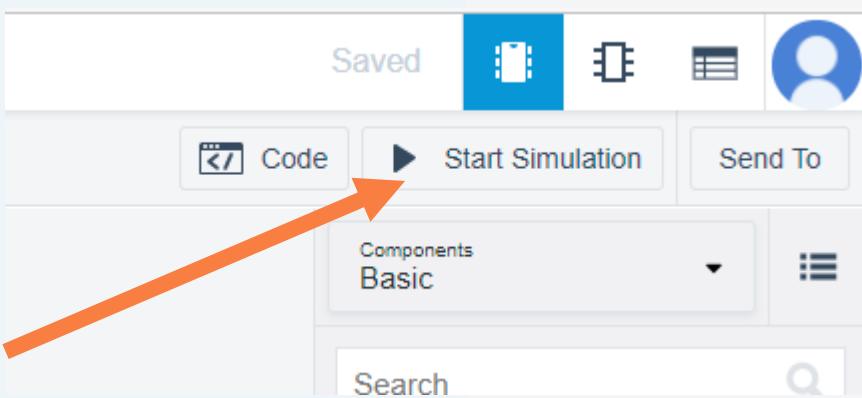
Follow the [link](#) to access the laboratory

GND stands for the Ground pin (Zero – volts)

Pin13 is a digital Pin

Pin13 is set to 5 volts.

Run the simulation





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Task 2:

Let's try it with Raspberry Pi



Setting up the Raspberry Pi

1. Before connecting the power to your Raspberry Pi
2. Connect the keyboard, mouse and the monitor
3. Use the HDMI cable for monitor connection
4. Use the USB Hub to connect both keyboard and mouse to your Raspberry Pi

Power up the Raspberry Pi

- Once you have completed connecting your Raspberry Pi to the mouse, keyboard and the screen, connect the USB power cable
- This will supply power to your Raspberry Pi, and it will turn on.
- Allow few minutes and you should shortly see Raspberry Pi OS starting to load on the screen.
- The next slide shows a sample of Raspberry Pie environment.

- Programming >
 - Education >
 - Office >
 - Internet >
 - Sound & Video >
 - Graphics >
 - Games >
 - Accessories >
 - Help >
- Preferences > [Add / Remove Software](#)
- Run...
- Shutdown...

Configure Raspberry Pi system

Raspberry Pi

Raspberry Pi comes with its own operating system Pi OS previously called as “*Raspbian*”.

By default on Model 3 of Raspberry Pi, you have connectivity options

- WiFi, Bluetooth

I/O Ports:

- HDMI, USB, GPIO Pins

Applications such as

- Thonny: Python IDE
- Web Browser
- Image Viewer
- Terminal



Task 2

Control an LED with Raspberry Pi

List of equipment that you will need or Task

1-3:

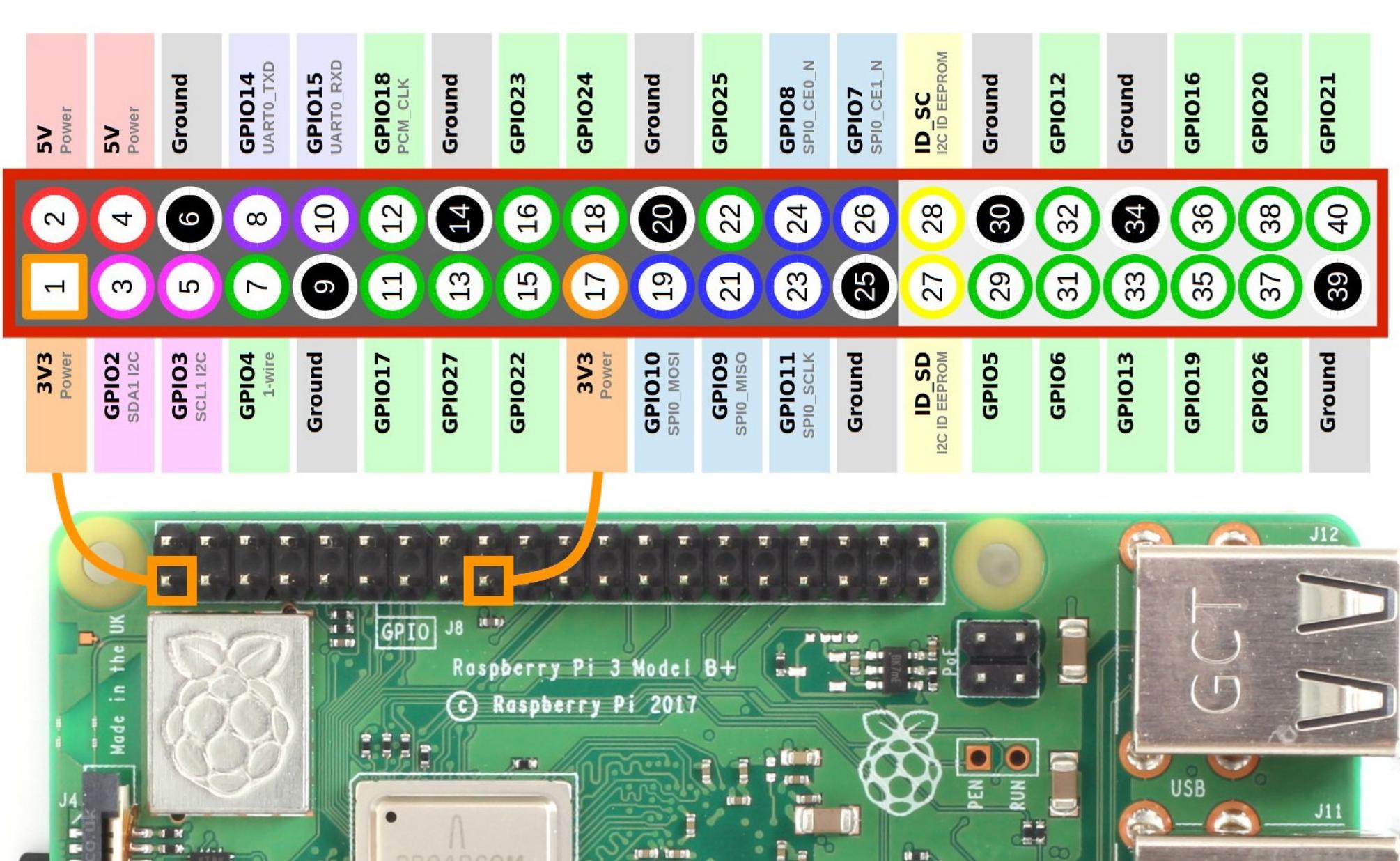
- LED
- Resistor
- Connections (Jumper wires: wires with sockets suitable for pin connections)
- A Raspberry Pi board
- Breadboard

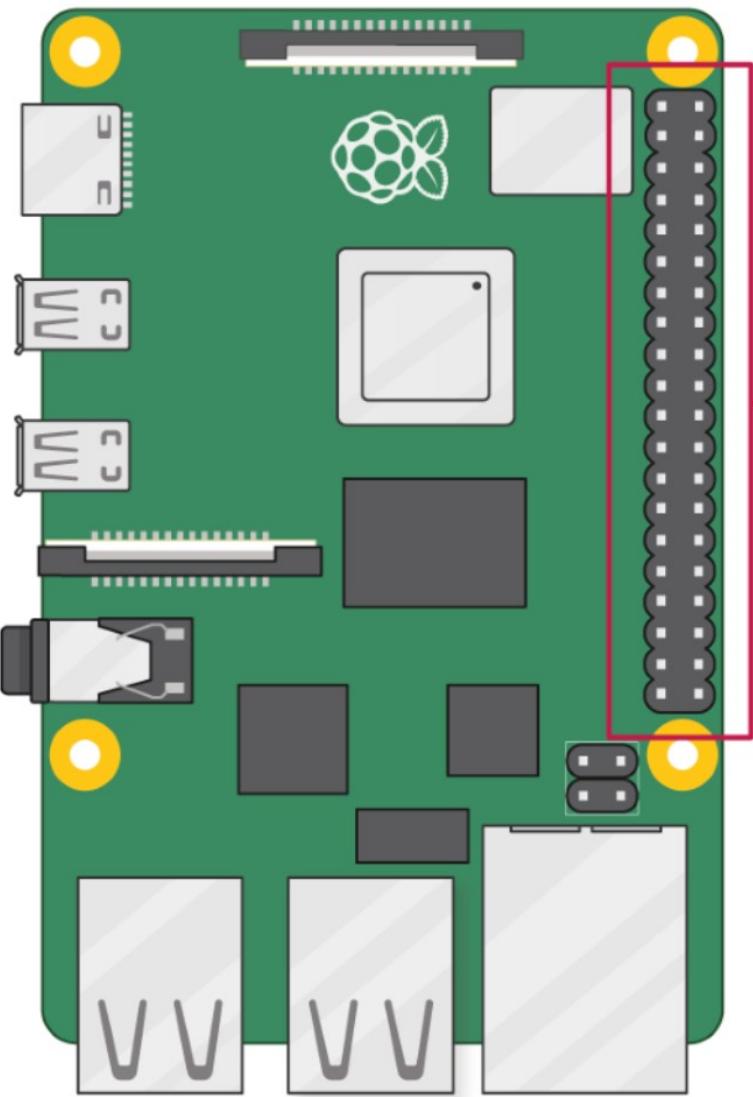
Pay attention to the locations of the Ground pins and Power pins in the image.

Identify the Ground pins and Power pins (5v and 3.3v) in the image and locate them on your Pi board.

If you confuse the GND (Ground pin) and Power pin, it can seriously or permanently damage your board or other components.

Ask for help if not confident.





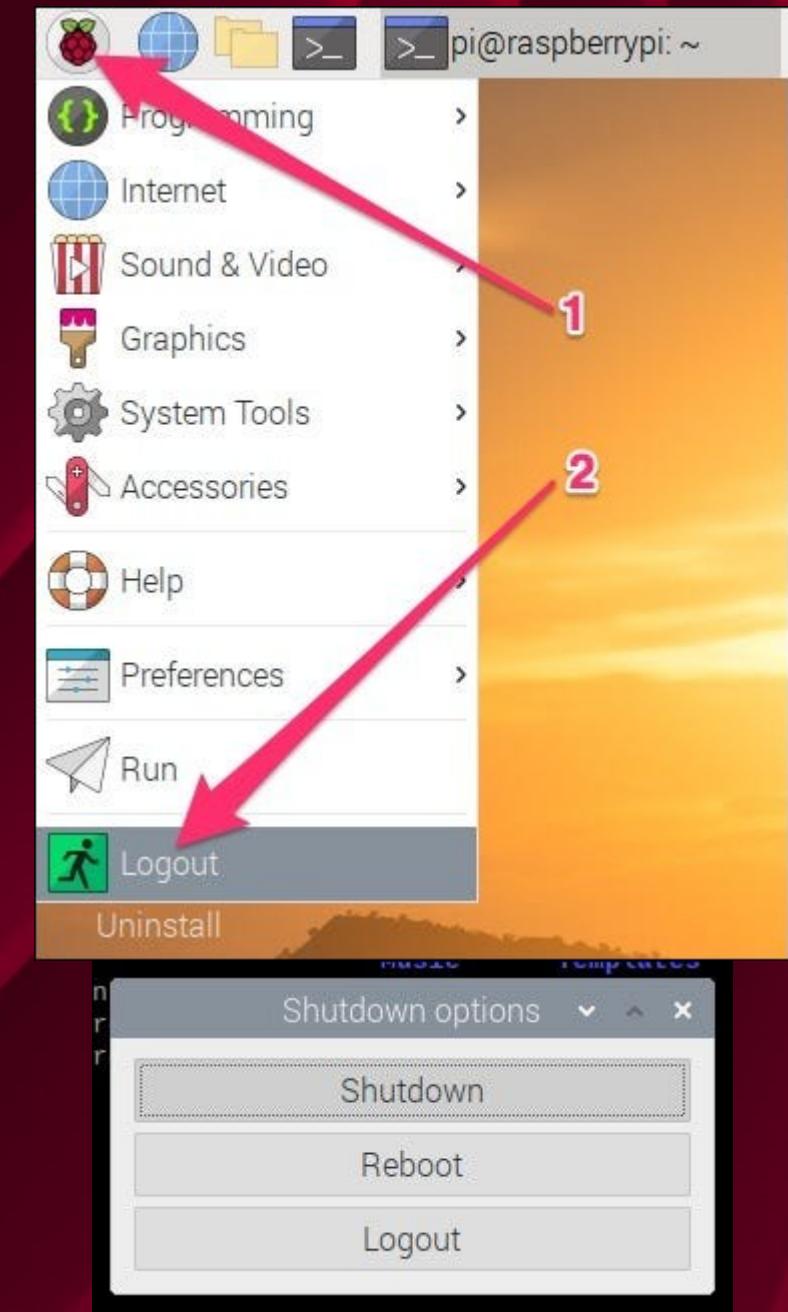
3V3 power	○	1	2	○	5V power
GPIO 2 (SDA)	○	3	4	○	5V power
GPIO 3 (SCL)	○	5	6	○	Ground
GPIO 4 (GPCLK0)	○	7	8	○	GPIO 14 (TXD)
Ground	○	9	10	○	GPIO 15 (RXD)
GPIO 17	○	11	12	○	GPIO 18 (PCM_CLK)
GPIO 27	○	13	14	○	Ground
GPIO 22	○	15	16	○	GPIO 23
3V3 power	○	17	18	○	GPIO 24
GPIO 10 (MOSI)	○	19	20	○	Ground
GPIO 9 (MISO)	○	21	22	○	GPIO 25
GPIO 11 (SCLK)	○	23	24	○	GPIO 8 (CE0)
Ground	○	25	26	○	GPIO 7 (CE1)
GPIO 0 (ID_SD)	○	27	28	○	GPIO 1 (ID_SC)
GPIO 5	○	29	30	○	Ground
GPIO 6	○	31	32	○	GPIO 12 (PWM0)
GPIO 13 (PWM1)	○	33	34	○	Ground
GPIO 19 (PCM_FS)	○	35	36	○	GPIO 16
GPIO 26	○	37	38	○	GPIO 20 (PCM_DIN)
Ground	○	39	40	○	GPIO 21 (PCM_DOUT)

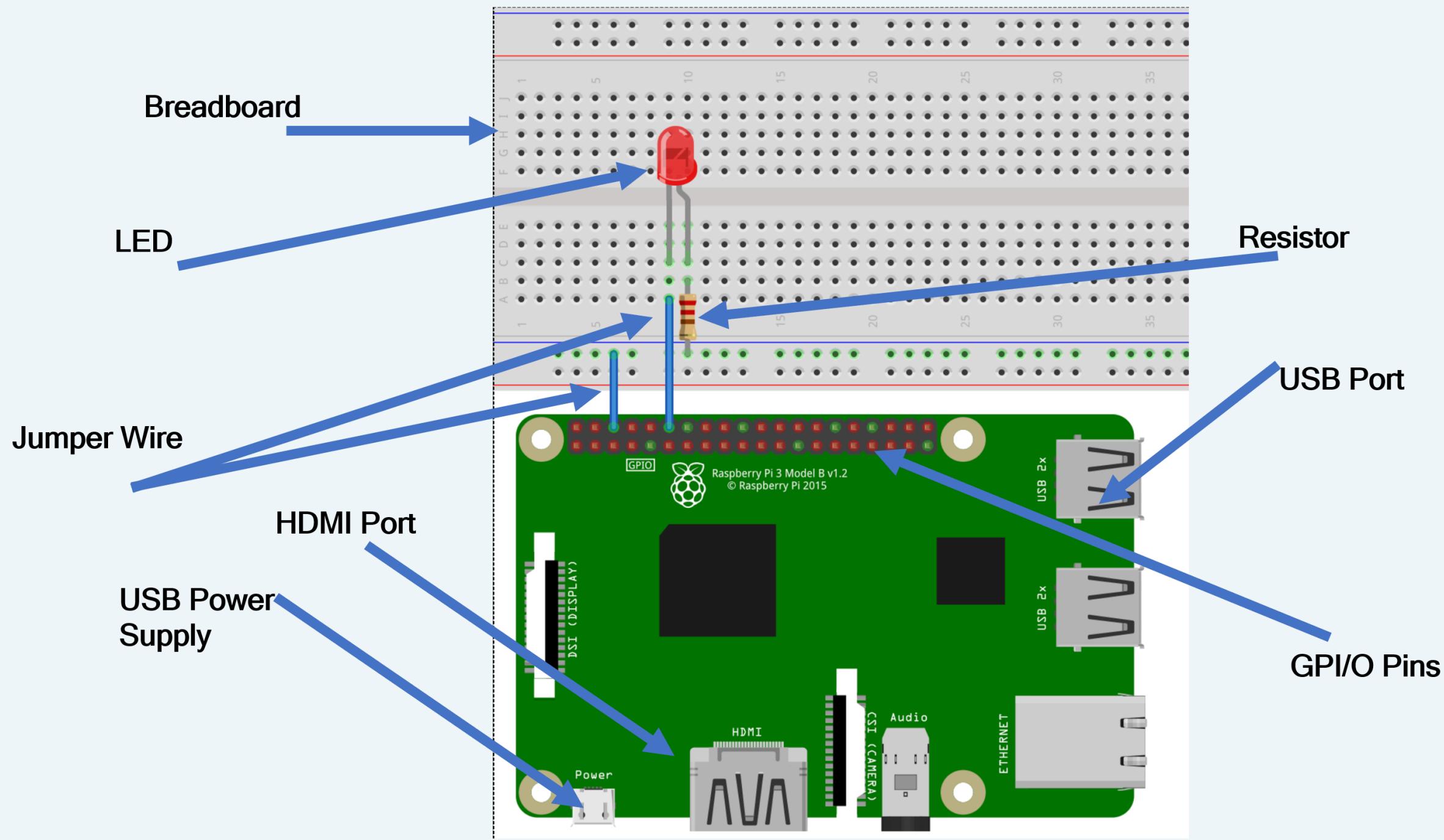


TURN OFF the POWER

1. Shut down the Raspberry Pi as demonstrated here.
 2. Wait for a good minute.

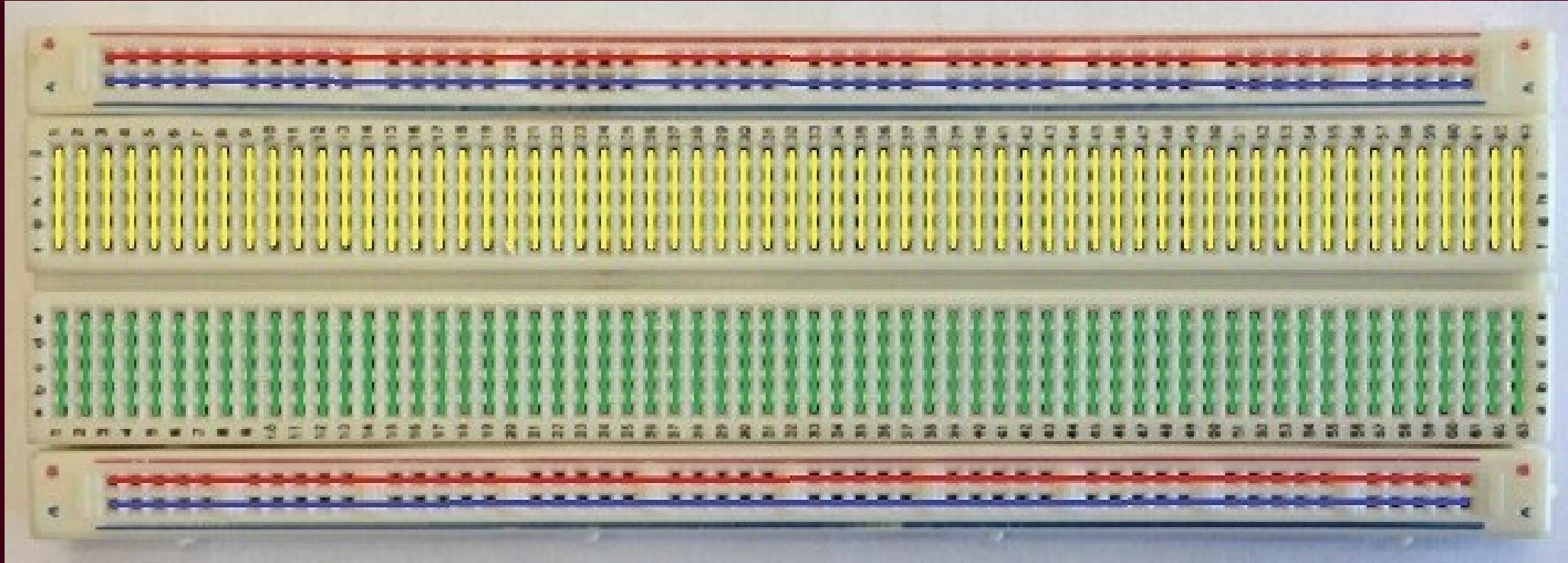
 3. Remove the USB Power Cable from Pi Board.
- This is always needed before assembling the circuit and making connections.







Breadboard Connectivity



- There are 4 blocks of pins demonstrated in the image of a breadboard above. All pins in each block are disconnected from other blocks.
- Pins highlighted with the same colour in each block is connected through out the board as demonstrated in the image.

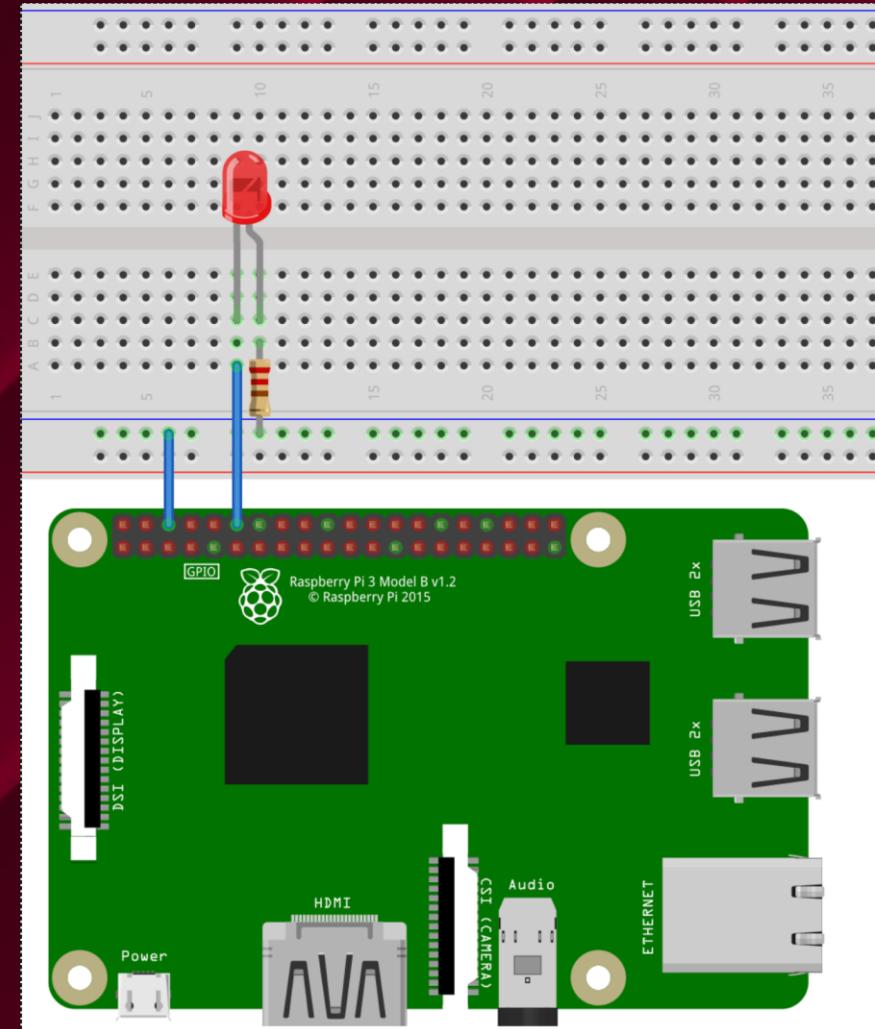


Circuit Assembly

- Make sure that there is no power supply connected to the Raspberry Pi

NO LED LIGHTS SHOULD BE ON/BLINKING

- Use one of the jumper wires to connect a Ground pin to the rail, marked with blue, on the breadboard. The female end goes into the Raspberry Pi's pin, and the male end goes into a hole on the breadboard.
- Then connect the resistor from the same row on the breadboard to a column on the breadboard, as shown here (also available in detailed steps in next slides)
- Next, push the LED Legs into the breadboard, you may need to switch the position of the long leg later on.
- Connect the pin18 to the right leg of the LED.

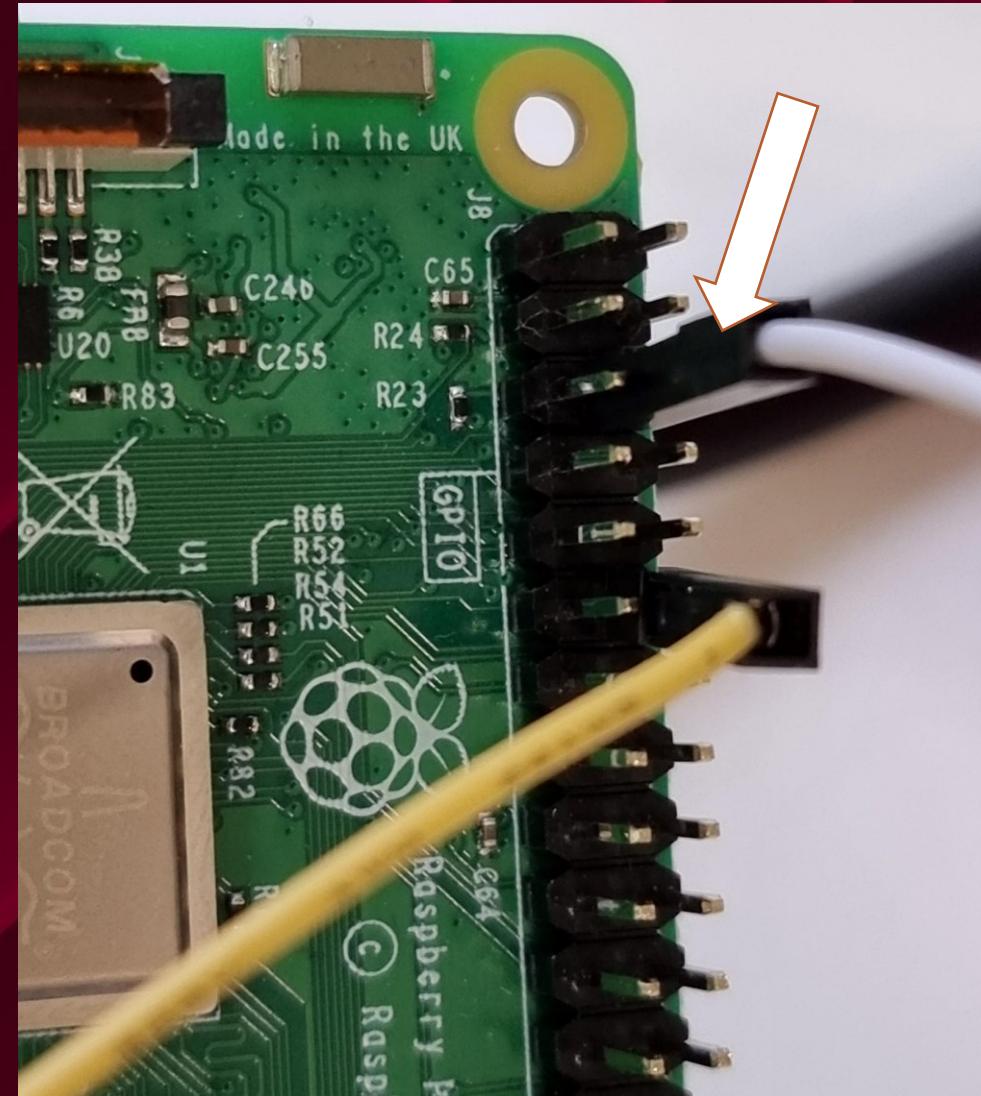
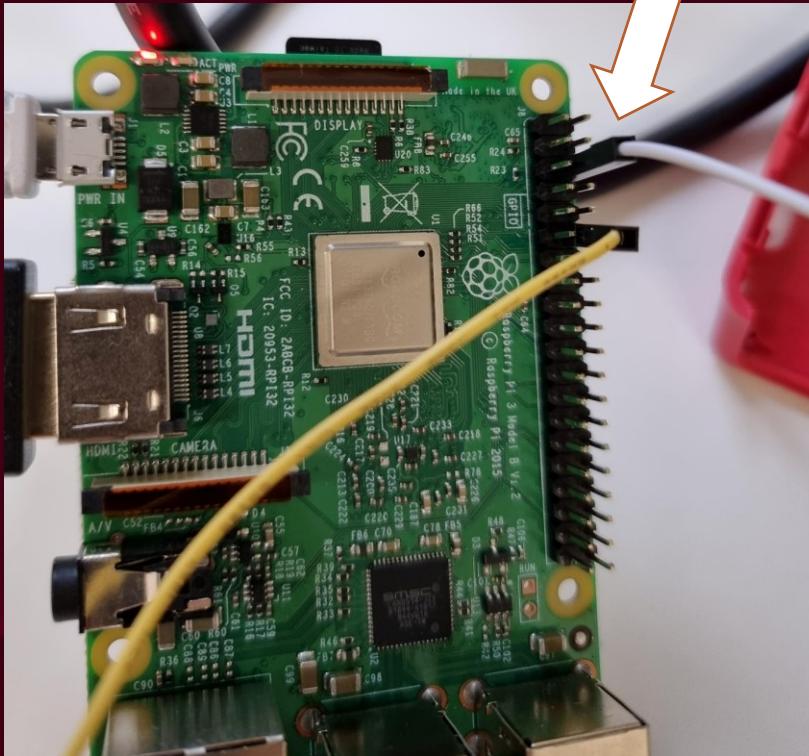
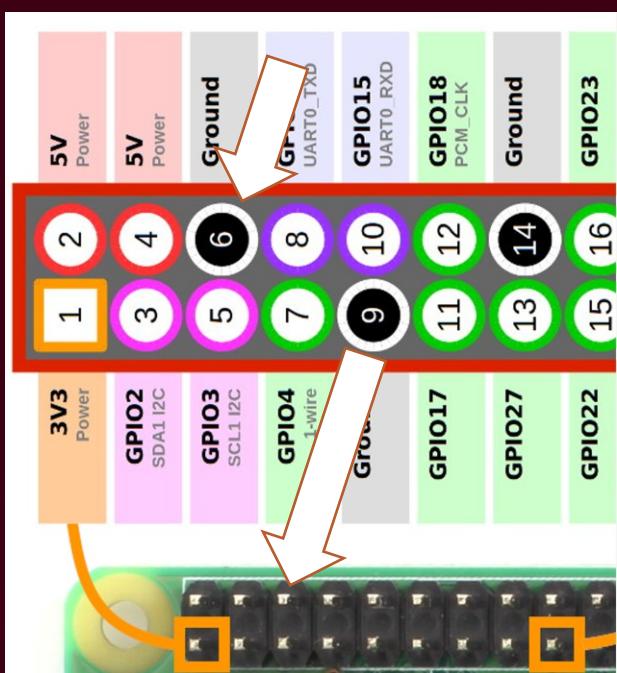




Circuit Assembly: Connect the GND

Go back to the Pin config of the Raspberry Pi,
and find one of the GND pins.

We have used pin 6.

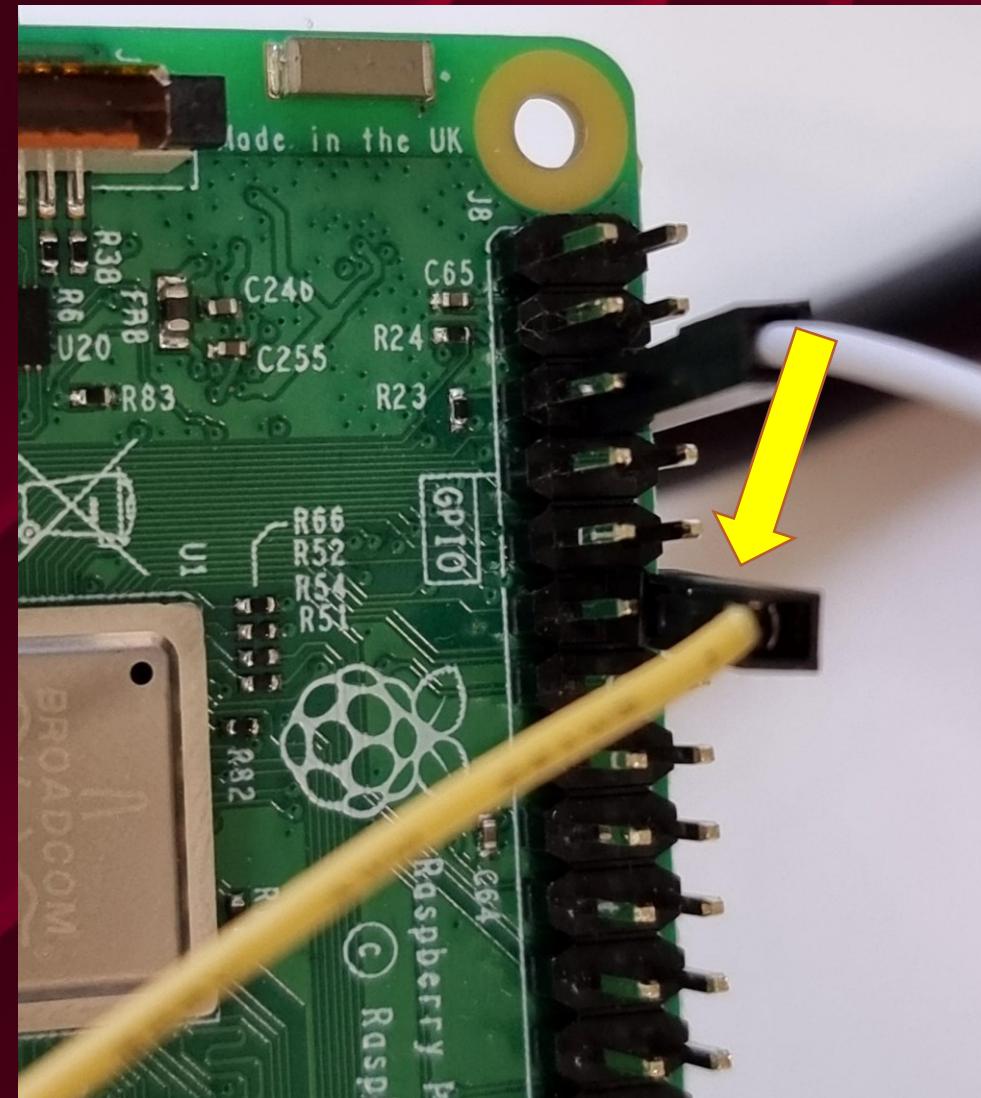
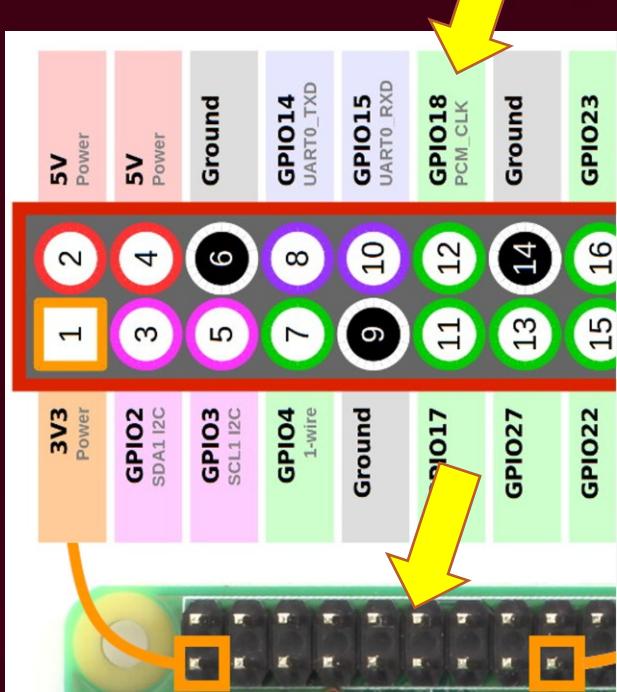




Circuit Assembly: Connect the GPIO 18

Go back to the Pin config of the Raspberry Pi and find GPIO 18.

Add a connector to the GPIO 18.

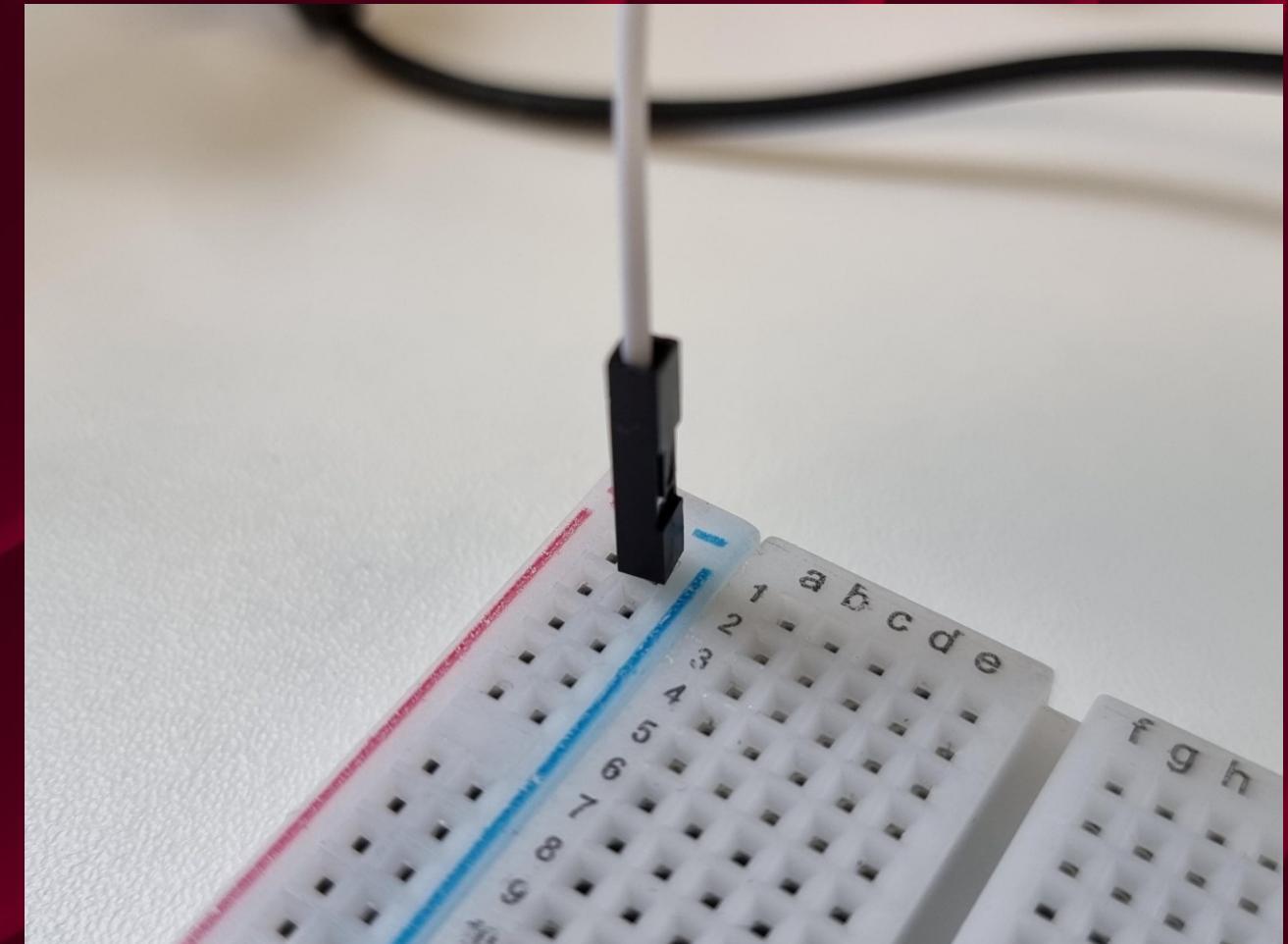




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Breadboard Connections: Step 1

Connect the GND to the blue line
(-ve) on the breadboard.



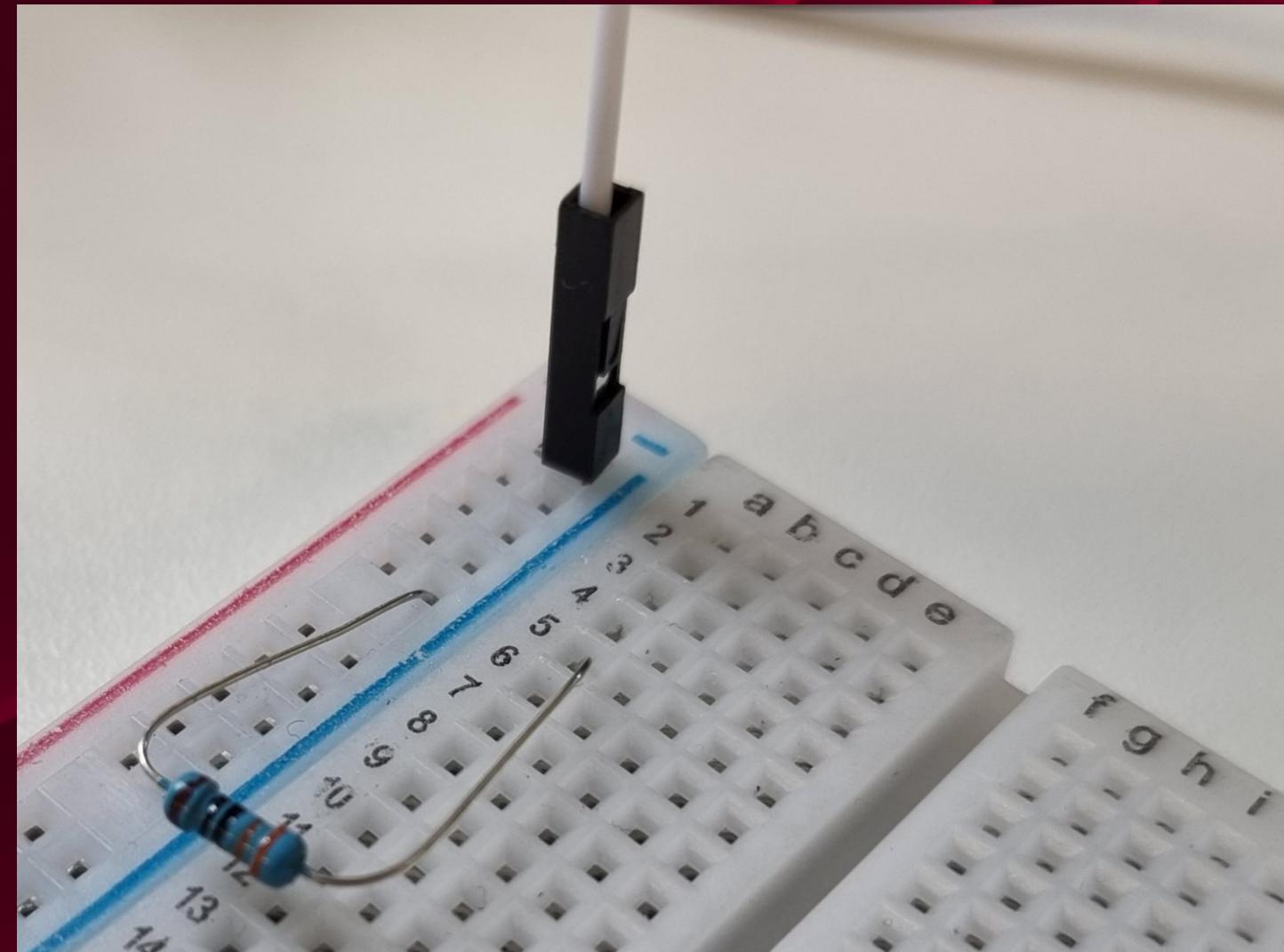


Breadboard Connections: Step 2

Add the resistor

It should go from any of the pins on the blue line to any of the pins on the block [a,b,c,d,e].

We have used a5.

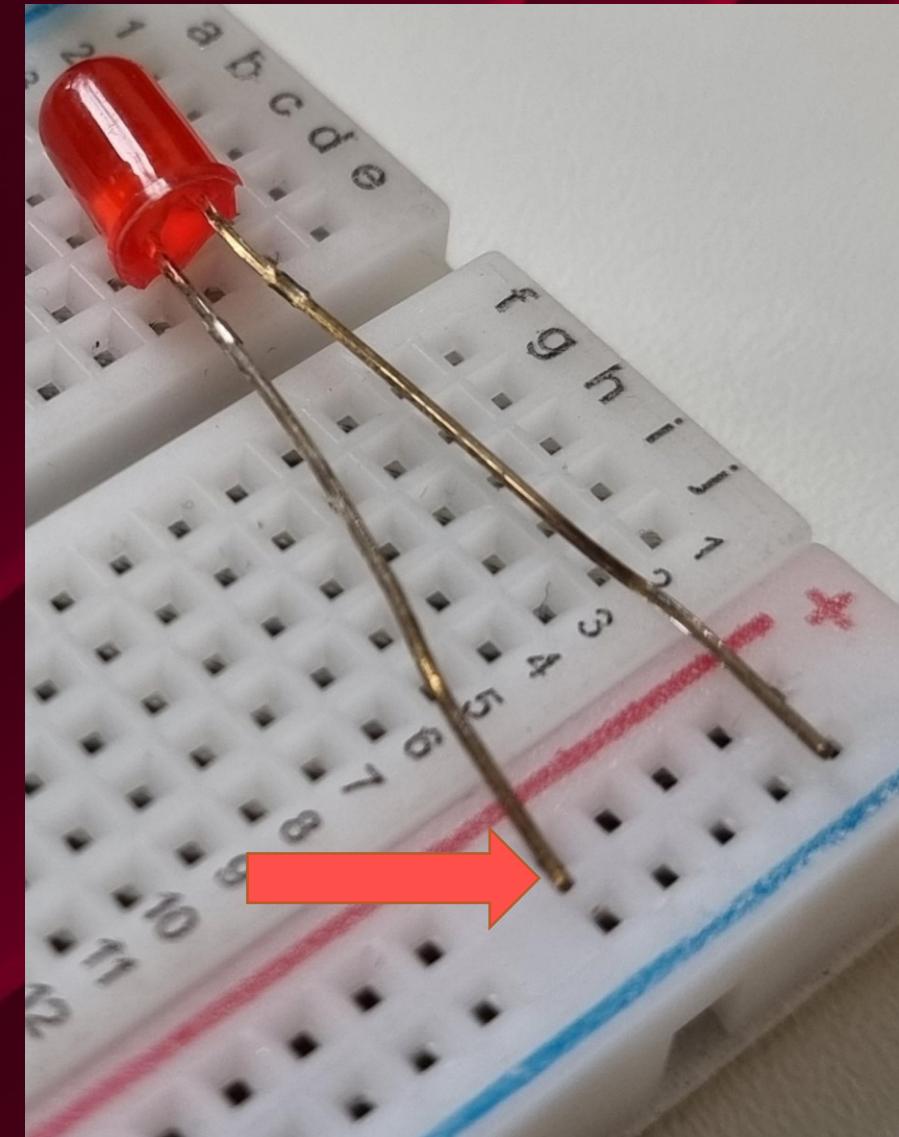
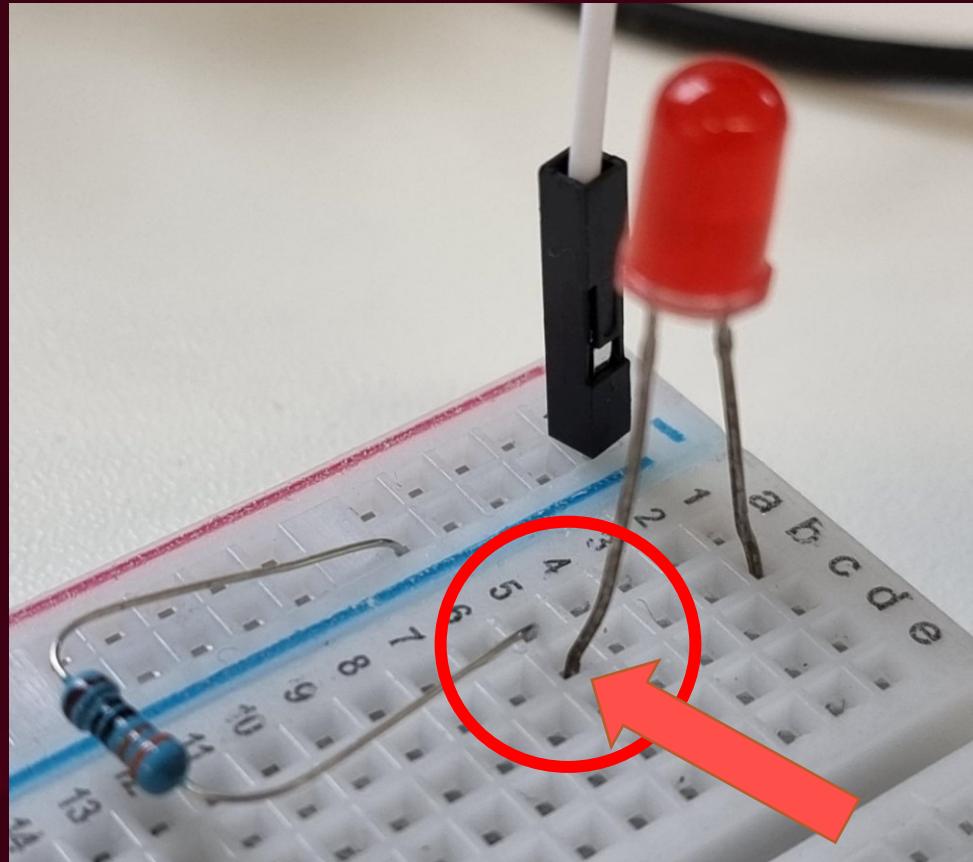




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Breadboard Connections: Step 3

Make sure that the short pin of the LED is connected to the same column as the resistor.



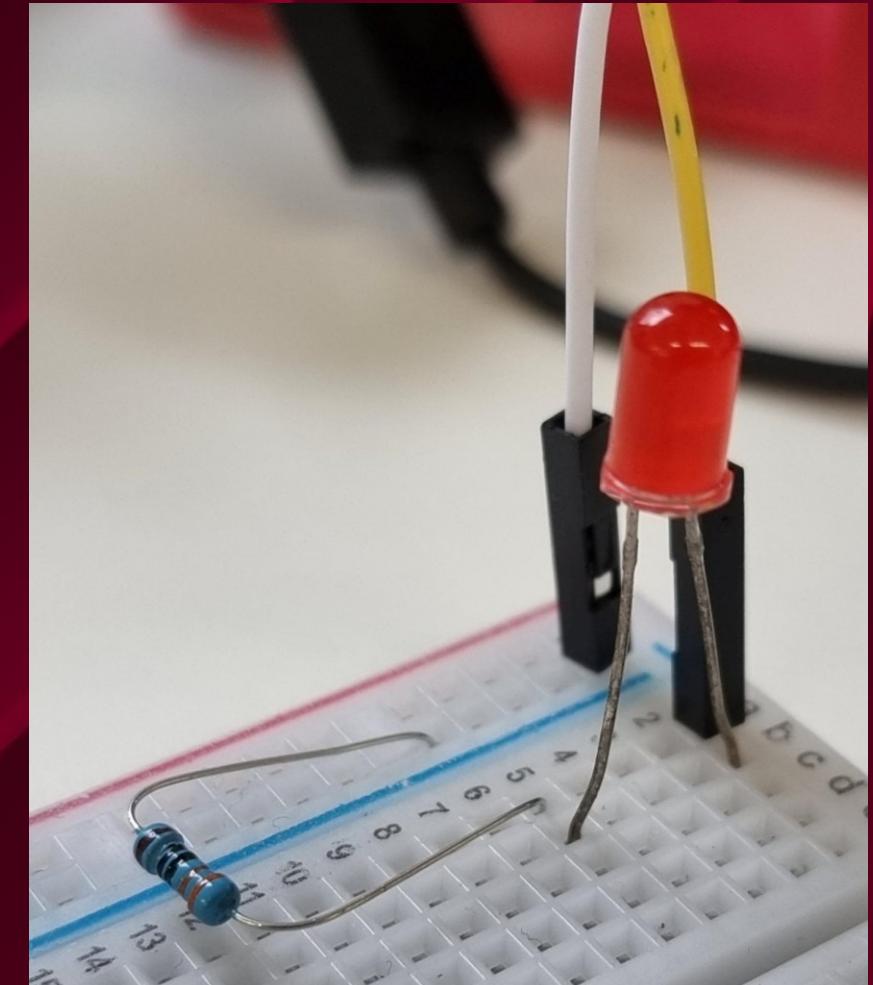


Breadboard Connections: Step 4

As the final step, connect the GPIO 18 to the same column as the LED.

We have gone with column 1.

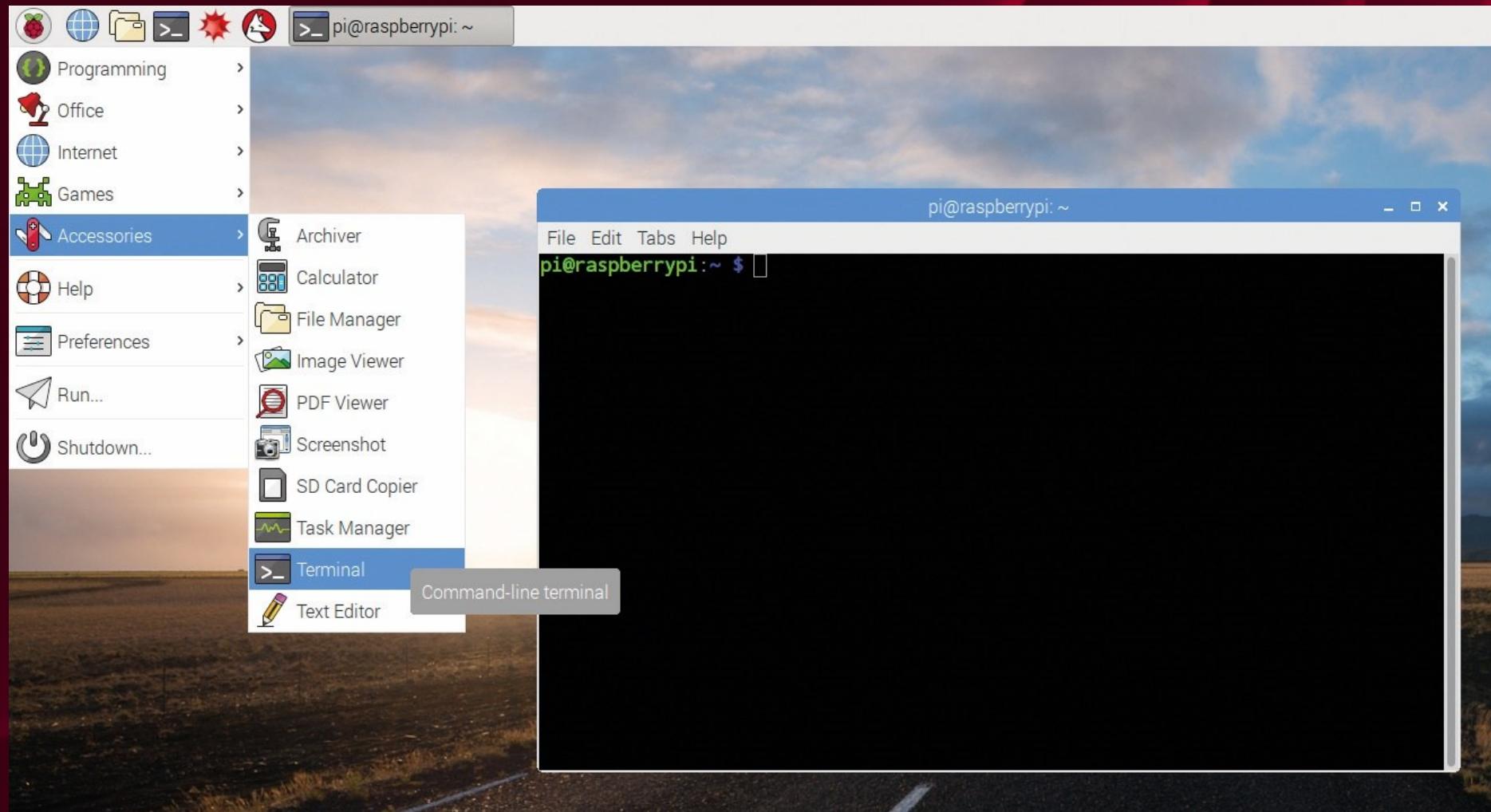
At this stage, wait for your lecturer to check your circuit.





Turn on the Raspberry Pi

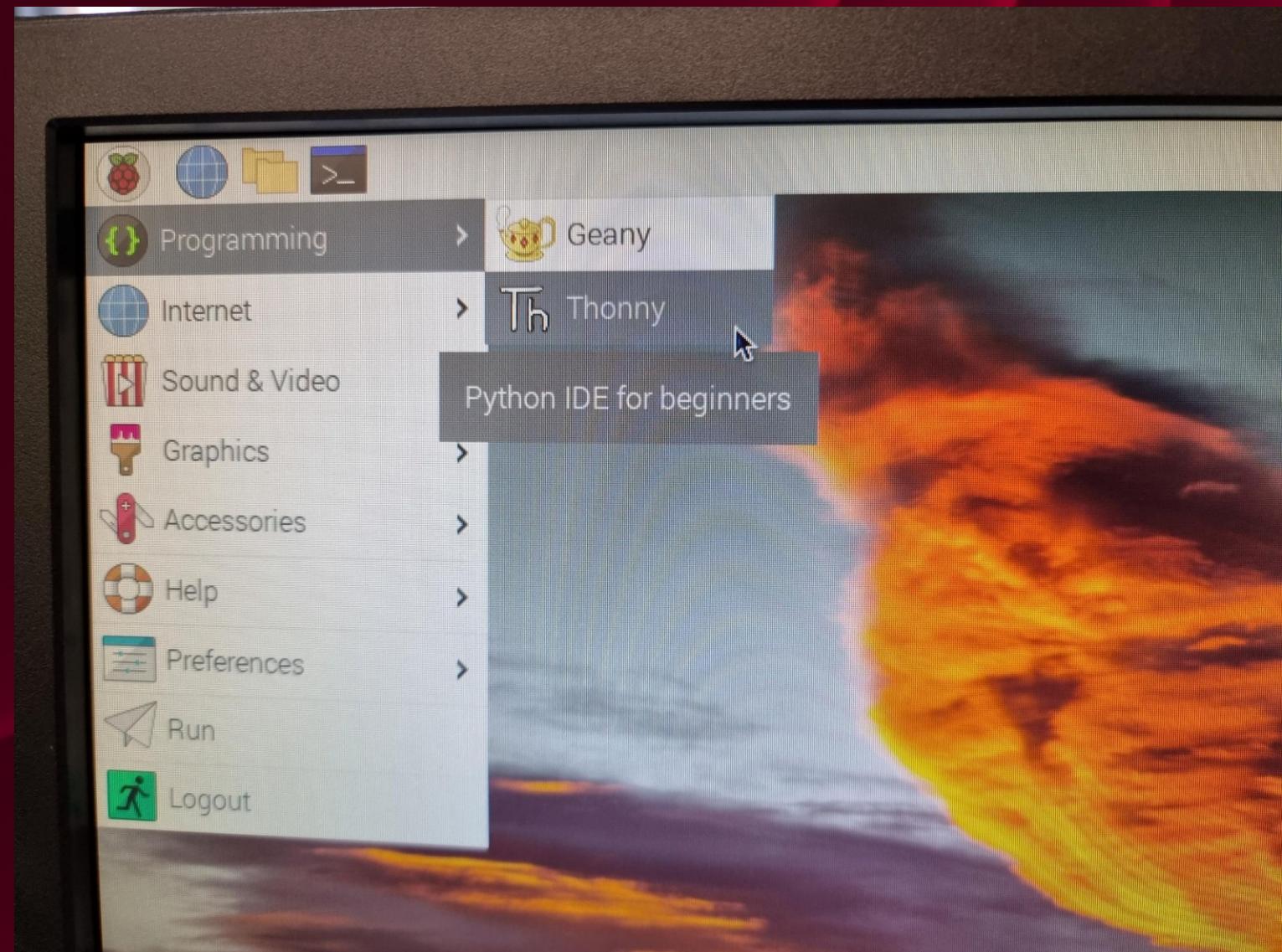
1. Connect the USB cable and turn on the Raspberry Pi
2. Open a Terminal Connection





Open and Run Thonny

1. Thonny is a Python IDE
2. It should be installed by default in your Raspberry Pi (if not you can install it from accessories)





GPIO Pins

- General Purpose Input Output (GPIO) pins provide a way for Raspberry Pi to interface with the outside world by connection to external electric circuits.
- The picture below shows the arrangement of the GPIO pins on the model of Raspberry Pi model 3B.
- Pins marked GND are ground pins (zero-volts).



Sample Code 1: Turn On/off an LED

- Create a text file and replicate the following snippet
- Save it as LED.py (.py is the extension for Python files)

Or check the code within the documents folder.

Make an attempt to read the code and guess how it works.

Write down your answer in a word document and submit a screenshot to Padlet.

<https://bit.ly/ohdpdlet>

```
1 import RPi.GPIO as GPIO
2 import time
3 GPIO.setmode(GPIO.BCM)
4 GPIO.setwarnings(False)
5 GPIO.setup(18,GPIO.OUT)
6 print("Light on")
7 GPIO.output(18,GPIO.HIGH)
8 time.sleep(1)
9 print("Light off")
10 GPIO.output(18,GPIO.LOW)
```



Sample Code 2: Blink an LED

- Create a text file and replicate the following snippet
- Save it as LED_Blink.py (.py is the extension for Python files)

Or check the code within the documents folder.

Make an attempt to read the code and guess how it works.

Write down your answer in a word document and submit a screenshot to Padlet.

<https://bit.ly/ohdpdlet>

```
1 import RPi.GPIO as GPIO
2 import time
3 GPIO.setmode(GPIO.BCM)
4 GPIO.setwarnings(False)
5 GPIO.setup(18,GPIO.OUT)
6 for i in range(6):
7     print("Light on")
8     GPIO.output(18,GPIO.HIGH)
9     time.sleep(1)
10    print("Light off")
11    GPIO.output(18,GPIO.LOW)
12    time.sleep(1)
```



Task 3

Control the LED Light from a WebApp

We will develop a web app using Flask and Python in this task.



- Create a text file and replicate the following snippet
- Save it as route.py (.py is the extension for Python files)

```
1 # import some functions and classes from external packages
2 from flask import Flask, render_template
3 import RPi.GPIO as GPIO
4 import time
5
6 # tell program what naming convention to use to identify I/O pins
7 GPIO.setmode(GPIO.BCM)
8 # suppress GPIO warnings
9 GPIO.setwarnings(False)
10 # tell Python that pin 18 will be used to output information
11 GPIO.setup(18,GPIO.OUT)
12
13 # initialise the web app
14 app = Flask(__name__)
15
```

```
16 # define some 'routes' or 'views' in the app
17 @app.route('/')
18 def home():
19     return render_template('index.html', status='off')
20
21 @app.route('/on')
22 def on():
23     # Task 1b: put code here to turn light ON
24     GPIO.output(18,GPIO.HIGH)
25     return render_template('index.html', status='on')
26
27 @app.route('/off')
28 def off():
29     # Task 1b: put code here to turn light OFF
30     GPIO.output(18,GPIO.LOW)
31     return render_template('index.html', status='off')
32
33 if __name__ == "__main__":
34     app.run()
```

HTML & CSS

HTML: Hypertext Markup Language

Create a text editor and replicate the HTML and CSS code in the next slides.

The code is also available from the GitHub Classroom/Google Drive.

The HTML file (index.html) should be placed within the “templates” folder next to the python file developed earlier.

The CSS file should be placed in a folder named “static”.

Name	Date modified	Type	Size
static	03/03/2023 14:28	File folder	
templates	03/03/2023 14:28	File folder	
routes.py	12/02/2020 13:43	Python Source File	1 KB



HTML: Web Page

- Create a text file and replicate the following snippet
- Save it as index.html (.html is the extension for HTML files)

```
1 <!DOCTYPE html>
2 <html lang="en">
3     <head>
4         <meta charset="UTF-8">
5         <link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}>
6         <title>MyHome Dashboard</title>
7     </head>
8     <body>
9         <div id="outer">
10            <h1>MyHome Dashboard</h1>
11            <!-- Task 2: you can edit the Link text if you like! -->
12            {% if status=='on' %}
13            <a href="{{ url_for('off') }}" id="lightOff" class="button">Light Off</a>
14            {% else %}
15            <a href="{{ url_for('on') }}" id="lightOn" class="button">Light On</a>
16            {% endif %}
17        </div>
18    </body>
19 </html>
```



CSS Snippet

- Create a text file and replicate the following snippet
- Save it as style.css
- The css file should be saved within the folder static/css/style.css
- Follow the line numbers
- Code available from Google Drive and GitHub Classroom as well

```
1 #outer {  
2     text-align: center;  
3     padding: 20px;  
4 }  
5  
6 h1 {  
7     font-family: helvetica, sans-serif;  
8     font-size: 24px;  
9     margin: 1em 0;  
10 }
```

```
11  
12 a.button {  
13     display: block;  
14     width: 100px;  
15     height: 60px;  
16     margin: 0 auto;  
17     padding-top: 40px;  
18     border: 1px solid rgb(10, 10, 200);  
19 }  
20  
21 a#lightOff {  
22     color: black  
23     background-color: IndianRed;  
24 }  
25  
26  
27 a#lightOn {  
28     color: black;  
29     background-color: green;  
30 }
```

Task 4: Plan a pitch

For this final task, plan a 2-minute pitch to answer the following questions:

Pitch to

- What will your app do?
- Who may use the app? Who is it useful for?
- How will they benefit from using it?
- Can you think of applications of the app in real world?





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A Gift from LTU

It was nice meeting you in the Offer Holders Day today.

Here is a small gift to take away with you and you can continue to experiment and enjoy working with a Raspberry Pi.

There are loads of projects available from Raspberry Pi Foundation

[Projects](#) | Computer coding for kids and teens | [Raspberry Pi](#)



Make More Happen

Thank you.

Any questions?

Contact details:

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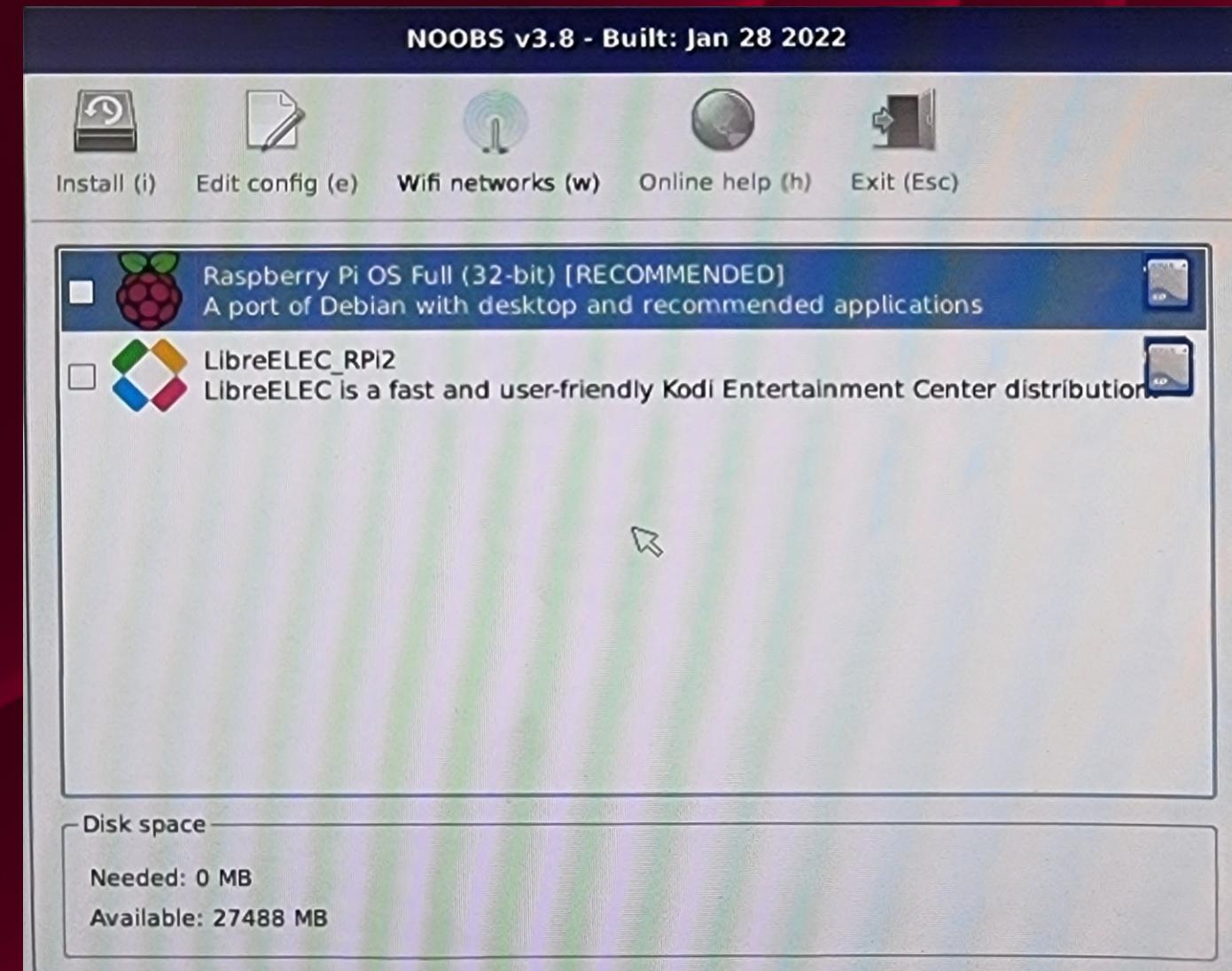


Pi OS Installation

When you connect your R Pi for the first time

- You will need to select Raspberry Pi OS Full (32-bit) [Recommended]
- Then click on install.

You can also connect to WiFi and additional options will be available for installation (including a 64-bit Pi OS).





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Pi OS Installation

Installation should take up to 30 minutes,
and then you can log-in to your
Raspberry Pi OS and start working with it.

