

# Getting Started with Raspberry Pi and Robotics Basics

An introduction to Embedded Systems, IoT and ROS2

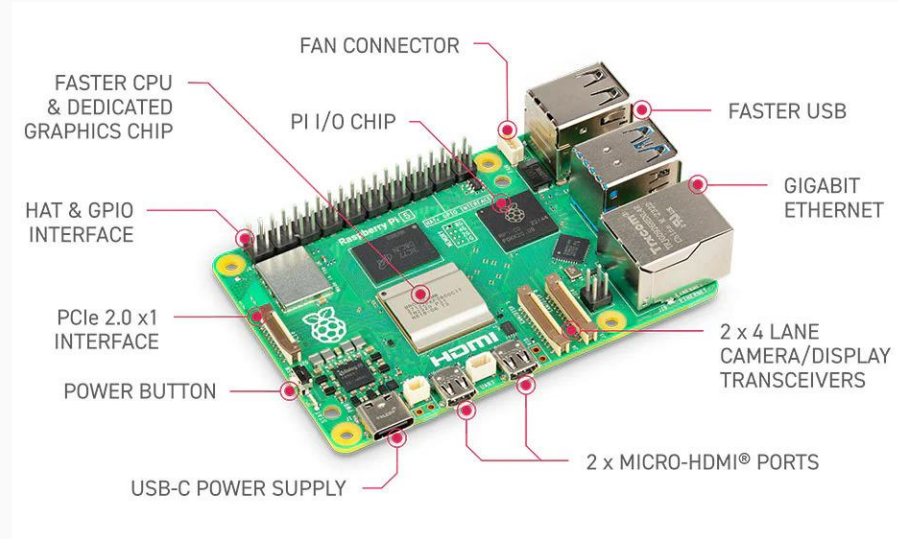


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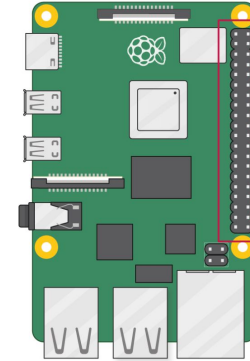
# What is Raspberry Pi

- A small, affordable single-board computer (SBC) developed by the Raspberry Pi Foundation
- GPIO pins for connecting sensors, motors and electronics
- Supports programming and robotics projects



# GPIO Pinout Overview

- Pi pins uses 3.3v
- Supports I2C, SPI, UART, PWM, and standard digital I/O
- GPIO are controlled via python libraries (RPi.GPIO, gpiozero) or other languages



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)

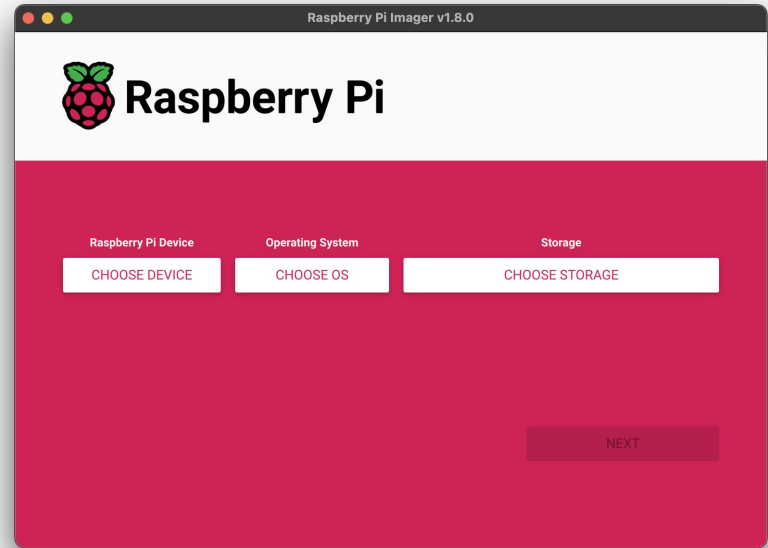
# Raspberry Pi OS

- Official Linux-based OS optimized for Raspberry Pi (formerly Raspbian)
- Comes with pre-installed software for programming, robotics, and education
- Supports both desktop GUI and headless operation via SSH



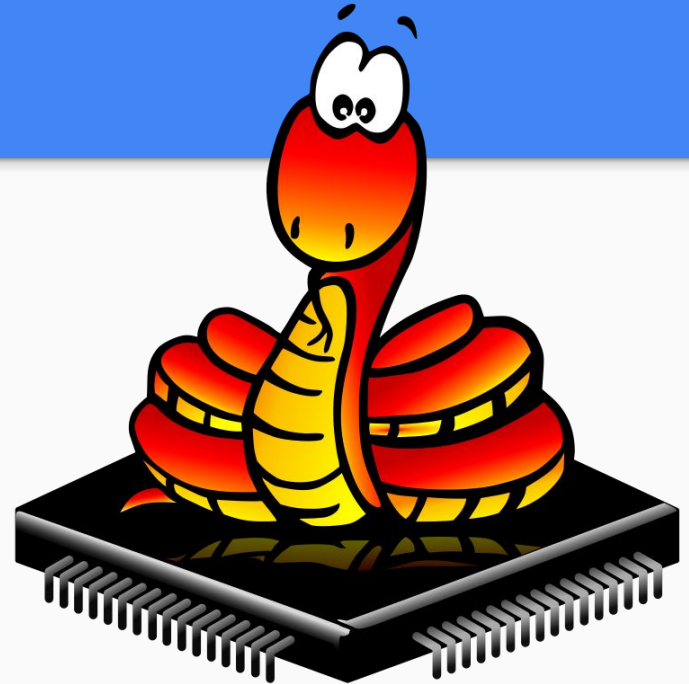
# How to Boot The Raspberry Pi OS

- Download Raspberry Pi OS
- Flash OS to microSD Card
- Insert microSD & Power On
- Pi Boots Up



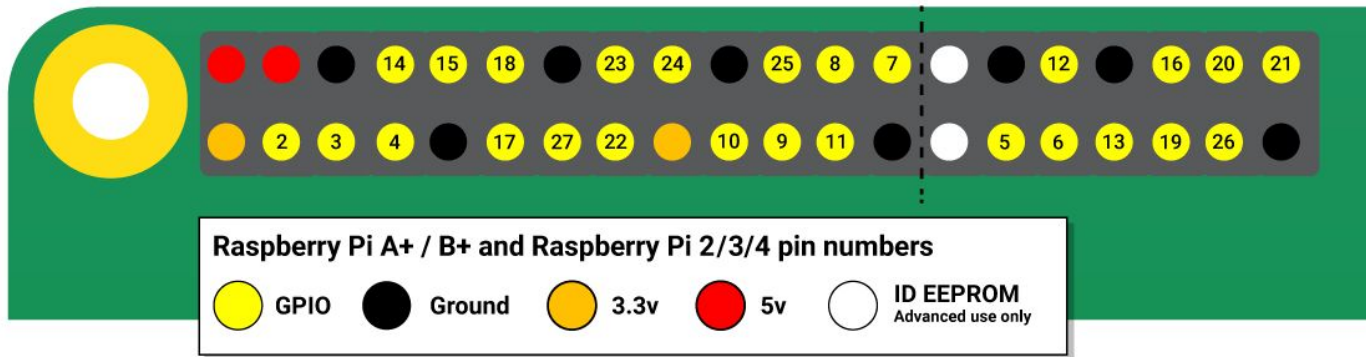
# Python Basics

- Easy to learn and widely used for various projects
- Works seamlessly with RPi.GPIO and gpiozero libraries
- Ideal for robotics, IoT, and automation projects



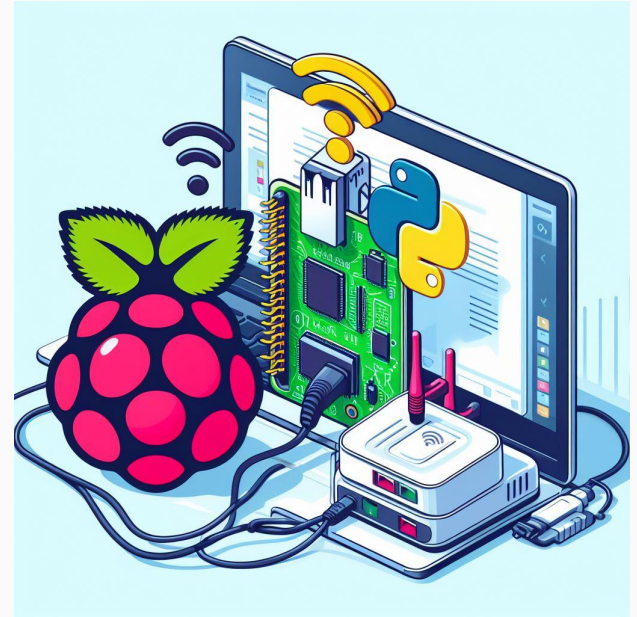
# LED Blink & Sensor Testing

- Learn to turn LEDs on/off using Raspberry Pi GPIO pins.
- Measure temperature or humidity from a sensor
- Combine coding in Python with hardware control to see real-time results.



# LED & Sensor Controlling Via Web Page

- Control Raspberry Pi GPIO using a web page
- Turn LEDs ON/OFF from browser without touching hardware
- Use Python Flask to handle GPIO commands from the web page





# ROS - Robot Operating System

- A flexible framework for writing robot software, providing tools, libraries, and conventions
- Uses topics, services, and actions for modular hardware and software interaction
- Enables robot control, sensor integration, and autonomous behavior in real-time projects

