ChatGPT

Raspberry Pi + Python Cheatsheet & Usage Guide

This document serves as a **comprehensive guide** for using a Raspberry Pi for development, robotics, and embedded systems. It includes navigation commands, GUI access, hardware control, and helpful quirks.

General System Commands

```
# Update and upgrade the Pi
sudo apt update && sudo apt upgrade -y

# Reboot
sudo reboot

# Shutdown
sudo shutdown now

# Show current IP address
hostname -I

# Change hostname
sudo raspi-config  # Then go to Network Options > Hostname

# Open the Raspberry Pi Configuration UI
sudo raspi-config
```

🖥️ Graphical Interface (Desktop UI)

```
# Start GUI from command line (if not booting into GUI)
startx

# Set Pi to boot into Desktop GUI automatically
sudo raspi-config  # Go to System Options > Boot / Auto Login
```

Quirks:

- `startx` may fail if you're already in a graphical session or running as root.
- Some models (like Pi Zero W) are slower in GUI mode; CLI-only may be more stable.

GPIO (Python)

```
import RPi.GPIO as GPIO
GPIO.setmode(GPIO.BCM)
GPIO.setup(18, GPIO.OUT)
GPIO.output(18, GPIO.HIGH)
```

Tips:

- Use `GPIO.cleanup()` at the end of your script.
- Run scripts using `sudo python3 your_script.py` if accessing hardware.

📷 Camera (Picamera2)

```
from picamera2 import Picamera2
cam = Picamera2()
cam.start()
```

Notes:

- Enable the camera using `sudo raspi-config` > Interface Options > Camera
- You may need to `sudo apt install python3-picamera2`

Serial Communication

```
import serial
ser = serial.Serial('/dev/ttyUSB0', 9600)
ser.write(b'hello')
data = ser.readline()
```

Quirks:

- Use `/dev/ttyAMA0` or `/dev/serial0` on GPIO pins.
- Default serial console may conflict—disable it via `raspi-config` under Interface Options > Serial.

🗃 File & Process Navigation

```
# List files with details
ls -la

# Check CPU temperature
vcgencmd measure_temp

# Monitor system usage
top
htop  # (Install with `sudo apt install htop`)

# List USB devices
lsusb

# List GPIO pin usage
gpio readall  # (from wiringPi)
```

Common Paths

```
# Python scripts
/home/pi/scripts/

# Autostart GUI apps
/home/pi/.config/autostart/

# Systemd service files (for background apps)
/etc/systemd/system/
```

🛠 Custom Startup Scripts

```
# Add a script to run on boot using crontab
crontab -e
# Add:
@reboot /usr/bin/python3 /home/pi/scripts/startup_script.py
```

Tips and Tricks

- Use `tmux` to keep sessions running in the background.
- Keep logs with `>> logfile.txt 2>&1` in your scripts.
- For persistent USB device names, create udev rules.
- Always check permissions for GPIO or serial access.

Let this grow as you discover more! Add new commands, quirks, or fixes you learn daily. Keep this local or push to GitHub to version your Pi expertise.