NanoPi Cheat Sheet

A comprehensive cheat sheet covering NanoPi single-board computers, their specifications, setup, and common operations.

NanoPi Overview

NanoPi Models

NanoPi NEO	Ultra-small, low-power, ideal for IoT applications.
NanoPi NEO2	Improved performance over NEO, still compact.
NanoPi M4	Higher performance, suitable for media and desktop use.
NanoPi R2S	Dual Gigabit Ethernet ports, designed for routing applications.
NanoPi 4	Powerful board with good memory and speed, for desktop and server purposes.

Key Features

CPU	ARM Cortex-A53, Cortex-A72, or similar architectures, depending on the model.
Memory	256MB to 4GB DDR3/DDR4 RAM, depending on the model.
Storage	MicroSD card slot for OS and data storage. Some models have eMMC.
Connectivity	USB, Ethernet (depending on the model), WiFi/Bluetooth (some models).
GPIO	Headers for connecting sensors, actuators, and other peripherals.

Operating Systems

Most NanoPi boards support various Linux distributions, including:

- Armbian
- Ubuntu Core
- DietPi
- FriendlyCore

Initial Setup

Flashing the OS

1. Download the desired OS image for your NanoPi model.
2. Use a tool like `dd` (Linux) or Rufus (Windows) to flash the image to a MicroSD card.

   Example (Linux):

sudo dd bs=4M if=image.img of=/dev/sdX conv=fsync

```
Replace `/dev/sdX` with the correct device for your SD card.
```

First Boot

1. Insert the MicroSD card into the NanoPi.
2. Connect a monitor (if applicable), keyboard, and mouse.
3. Connect the power supply.
4. The NanoPi should boot automatically. If not, check your power supply and connections.

Accessing the NanoPi

Via SSH	Most distributions enable SSH by default. Find the NanoPi's IP address and connect using: `ssh user@nanopi_ip` Default username/password combinations vary by distribution.
Via Serial Console	Connect a USB-to-TTL serial adapter to the NanoPi's serial pins. Use a terminal program like `minicom` or `PuTTY` to connect. **Example (`minicom`):** `minicom -D /dev/ttyUSB0 -b 115200`

Common Operations

System Updates

Update the package lists and upgrade installed packages.

Ubuntu/Debian:

```
sudo apt update
sudo apt upgrade
```

Arch Linux:

```
sudo pacman -Syu
```

Networking

Checking IP Address	Use `ifconfig` or `ip addr` to display network interface information and IP addresses.
	`ifconfig`
	`ip addr`

Configuring Static IP	Edit the network configuration file (e.g., `/etc/network/interfaces` on Debian/Ubuntu, `/etc/systemd/network/` on systemd-based systems) to set a static IP address.
	Example (`/etc/network/interfaces`):
	`auto eth0`
	`iface eth0 inet static`
	`address 192.168.1.100`
	`netmask 255.255.255.0`
	`gateway 192.168.1.1`
	`dns-nameservers 8.8.8.8 8.8.4.4`

GPIO Control

Using `gpio` command	Many distributions include a `gpio` command-line utility for controlling GPIO pins. Install it if necessary.
	Example (Armbian):
	`sudo apt install wiringpi`
	`gpio readall`

Using Python (RPi.GPIO)	The `RPi.GPIO` library (although named for Raspberry Pi) can often be used on NanoPi boards. Install it and use it to control GPIO pins from Python.
	`sudo pip install RPi.GPIO`
	Example:
	`import RPi.GPIO as GPIO`
	`GPIO.setmode(GPIO.BCM)`
	`GPIO.setup(17, GPIO.OUT)`
	`GPIO.output(17, GPIO.HIGH)`

Troubleshooting

Common Issues

1. **No Boot:**
   - Check the MicroSD card is properly inserted and flashed with a valid OS image.
   - Verify the power supply is adequate.
2. **Network Connectivity Issues:**
   - Ensure the Ethernet cable is connected properly.
   - Check the network configuration.
   - Verify the NanoPi is obtaining an IP address.
3. **GPIO Problems:**
   - Double-check wiring connections.
   - Ensure the correct GPIO pin numbering scheme is being used (BCM vs. physical).

Debugging Tips

Serial Console Output	Connect to the serial console to view boot messages and debug information. This is often the best way to diagnose boot problems.
LED Indicators	Check the LEDs on the NanoPi board. They often provide status information, such as power, network activity, and SD card access.
Checking Logs	Check system logs for errors, such as `/var/log/syslog` or use `journalctl`. `journalctl -xe`

Resources

1. **FriendlyElec Wiki:** The official documentation source for NanoPi boards.
2. **Armbian Forums:** A good place to find support and information about Armbian on NanoPi.
3. **Online Communities:** Check forums and communities dedicated to embedded systems and single-board computers.