Flashing firmware on an ESP32 depends on your setup and tools. Since you are working with **ESP32 and ESP32-C3 Zero** and want to use **MicroPython**, I'll guide you through that.

**Flashing MicroPython on ESP32**

**1. Requirements**

* **ESP32 board**
* **USB-to-Serial adapter** (if using ESP32-C3 Zero without built-in USB)
* **MicroPython firmware** (download from [here](https://micropython.org/download/esp32/))
* **esptool.py** (for flashing)

**2. Install esptool.py**

If you haven't installed esptool.py, do it using:

pip install esptool

**3. Put ESP32 in Flash Mode**

* Hold **BOOT** button and press **EN (Reset)** button.
* Keep holding **BOOT** for a few seconds.
* If using ESP32-C3 Zero, use **GPIO9 pulled low** instead.

**4. Erase Flash (Optional)**

If you want a clean install, erase the existing firmware:

esptool.py --chip esp32 erase\_flash

For ESP32-C3:

esptool.py --chip esp32c3 erase\_flash

**5. Flash MicroPython Firmware**

Replace <firmware.bin> with your actual firmware file:

esptool.py --chip esp32 --port COMx --baud 460800 write\_flash -z 0x1000 firmware.bin

For ESP32-C3:

esptool.py --chip esp32c3 --port COMx --baud 460800 write\_flash -z 0x0 firmware.bin

(Replace COMx with the correct port on Windows, or /dev/ttyUSBx on Linux/Mac.)

**6. Connect to MicroPython REPL**

Use a serial terminal like:

picocom /dev/ttyUSBx -b 115200

or

screen /dev/ttyUSBx 115200

On Windows, use **PuTTY** or **Thonny**.

**Flashing via USB on ESP32-C3 Zero**

Since you want to flash without an external USB-to-Serial adapter:

1. **Put ESP32-C3 Zero in USB Boot Mode**:
   * Hold **BOOT** while plugging in USB.
   * The device should appear as USB JTAG/Serial in the device manager.
2. **Flash Using ESPTool**:
3. esptool.py --chip esp32c3 --port /dev/ttyACM0 write\_flash -z 0x0 firmware.bin

Let me know if you need more details! 🚀