# MuntsOS Embedded Linux

## *Application Note #20: Orange Pi Zero 2W Target Platform Notes*

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**by Philip Munts**
**dba Munts Technologies**
**http://tech.munts.com**

## Introduction

The Orange Pi Zero 2W is a small Linux microcomputer with a form factor very similiar to the Raspberry Pi Zero 2 W, making it ideal for embedded system projects. It has a 1500 MHz Allwinner H618 ARMv8 Cortex-A53 quad-core CPU and comes with 1 to 4 GB of RAM and on-board Bluetooth and WiFi radios. It also as a 40-pin expansion header highly compatible with that of Raspberry Pi boards.

## Standard Hardware Configuration

After installing a **MuntsOS Embedded Linux** Thin Server, the Orange Pi Zero 2W will have **`I2C1`**, **`I2C2`**, **`PWM0`**, **`SPI0`**, and **`UART0`** hardware subsystems active. Unlike the Raspberry Pi, which can map **`PWM0`** to either **`GPIO12`** or **`GPIO18`**, the Orange Pi Zero 2W can only map **`PWM0`** to **`GPIO12`**.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 3.3V | 1 | o o | 2 | 5V | | |
| I2C1 SDA | GPIO2 | PI8 | 3 | o o | 4 | 5V | | |
| I2C1 SCL | GPIO3 | PI7 | 5 | o o | 6 | GND | | |
| PWM2 | GPIO4 | PI13 | 7 | o o | 8 | PH0 | GPIO14 | TXD0 |
| | | GND | 9 | o o | 10 | PH1 | GPIO15 | RXD0 |
| | GPIO17 | PH2 | 11 | o o | 12 | PI1 | GPIO18 | |
| | GPIO27 | PH3 | 13 | o o | 14 | GND | | |
| | GPIO22 | PI5 | 15 | o o | 16 | PI14 | GPIO23 | PWM3 |
| | | 3.3V | 17 | o o | 18 | PH4 | GPIO24 | |
| SPI0 MOSI | GPIO10 | PH7 | 19 | o o | 20 | GND | | |
| SPI0 MISO | GPIO9 | PH8 | 21 | o o | 22 | PI6 | GPIO25 | |
| SPI0 SCLK | GPIO11 | PH6 | 23 | o o | 24 | PH5 | GPIO8 | SPI0 CE0 |
| | | GND | 25 | o o | 26 | PH9 | GPIO7 | SPI0 CE1 |
| I2C2 SDA | GPIO0 | PI10 | 27 | o o | 28 | PI9 | GPIO1 | I2C2 SCL |
| | GPIO5 | PI0 | 29 | o o | 30 | GND | | |
| | GPIO6 | PI15 | 31 | o o | 32 | PI11 | GPIO12 | PWM0 |
| PWM1 | GPIO13 | PI12 | 33 | o o | 34 | GND | | |
| | GPIO19 | PI2 | 35 | o o | 36 | PC12 | GPIO16 | |
| | GPIO26 | PI16 | 37 | o o | 38 | PI4 | GPIO20 | |
| | | GND | 39 | o o | 40 | PI3 | GPIO21 | |
| 1 | 2 | 3 | | | | 4 | 5 | 6 |

***Column 1, 2, 5, and 6 pin names match Raspberry Pi GPIO header pin names.***
***Column 3 and 4 pin names match the Orange Pi Zero 2W schematic diagram.***

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Alternate GPIO pin functions (shown as gray in the above diagram) can be configured with device tree overlays described in the following section.

## Device Tree Overlays

**MuntsOS** includes the following device tree overlays for altering the Orange Pi Zero 2W hardware configuration. Device tree overlays are applied by the boot loader and selected by editing **`/boot/config.txt`**, changing **`OVERLAYS=`** to *e.g.* **`OVERLAYS=disable-pwm`**.

### `disable-i2c1.dtbo`

Disables the **`I2C1`** hardware subsystem and enables **`GPIO2`** and **`GPIO3`**.

### `disable-i2c2.dtbo`

Disables the **`I2C2`** hardware subsystem and enables **`GPIO0`** and **`GPIO1`**. These pins are reserved on a Raspberry Pi.

### `disable-spi1.dtbo`

Disables the **`SPI1`** hardware subsystem (which actually instantiates as **`/dev/spidev0.0`** and **`/dev/spidev0.1`**) and enables **`GPIO7`**, **`GPIO8`**, **`GPIO9`**, **`GPIO10`**, and **`GPIO11`**.

### `disable-pwm.dtbo`

Disables the **`PWM0`** hardware system and enables **`GPIO12`**.