

How to Enable SPI/I2C/UART/PWM Using DTBO

- DTBO feature requires a specific kernel version or up. Please see the following for the boards.
 - Odroid-XU4: 5.4
 - Odroid-N2/N2+: 4.9.230
 - Odroid-C4: 4.9.230
 - Android
 - ODROID-N2/N2+: 4.9.113
 - ODROID-C4: 4.9.113
- And also need the latest **boot.ini**, **config.ini** and including **overlays** directory structure in **BOOT** partition.
- The other boards including C2 are not supported and there's no plan to support them for now.

- To know Device Tree Overlay further, please refer to the document linked below.
 - [Device Tree Overlay](#)

SPI/I2C/UART/PWM DTBO

By default, SPI, I2C, UART are enabled when you flash a new Odroid Linux image. But to control them, we can use **config.ini** file.

In your Odroid board, move to the **/media/boot** directory.

```
cd /media/boot
```

Then you can see the below files. Those files may be different from yours because it depends on the boards.

ODROID-C4

```
/media/boot
├── Image.gz
├── amlogic
│   ├── meson64_odroidc4.dtb
│   └── overlays
│       └── odroidc4
```

```
├── ads7846.dtbo
├── can0.dtbo
├── esp8089.dtbo
├── fanspeed-full.dtbo
├── gpio-joystick0.dtbo
├── gpio-joystick1.dtbo
├── hifishield.dtbo
├── hifishield2.dtbo
├── hktft32.dtbo
├── hktft35.dtbo
├── i2c0.dtbo
├── i2c1.dtbo
├── lineout.dtbo
├── onewire.dtbo
├── pcf8563.dtbo
├── pwm_a-pwmfan.dtbo
├── pwm_ab.dtbo
├── pwm_b-backlight.dtbo
├── pwm_cd.dtbo
├── pwm_ef.dtbo
├── sdio.dtbo
├── spi0.dtbo
├── sx865x-i2c1.dtbo
├── uart0.dtbo
├── uart1.dtbo
├── uart2.dtbo
├── uart3.dtbo
├── boot.ini
├── boot.ini.default
├── config.ini
├── display.bin
├── edid.bin
└── uInitrd
```

ODROID-N2

```
/media/boot
├── Image.gz
├── amlogic
│   ├── meson64_odroidn2.dtb
│   ├── meson64_odroidn2_plus.dtb
│   └── overlays
│       └── odroidn2
│           ├── ads7846.dtbo
│           ├── can0.dtbo
│           ├── fanspeed-full.dtbo
│           └── gpio-joystick0.dtbo
```

```
├── gpio-joystick1.dtbo
├── gpio_spdif.dtbo
├── hktft32.dtbo
├── hktft35.dtbo
├── i2c0.dtbo
├── i2c1.dtbo
├── irblaster.dtbo
├── onewire.dtbo
├── pwm_c-pwmfan.dtbo
├── pwm_cd.dtbo
├── pwm_d-backlight.dtbo
├── pwm_ef.dtbo
├── saradc.dtbo
├── spi0.dtbo
├── sx865x-i2c1.dtbo
├── uart0.dtbo
├── uart1.dtbo
├── boot.ini
├── boot.ini.old
├── config.ini
├── config.ini.old
├── display.bin
├── edid.bin
├── uInitrd
```

Check that **/media/boot/amlogic/overlays/odroid(c4/n2)** directory and SPI, I2C, UART, PWM **.dtbo** files.

All the Odroid ARM boards have exportable 1 SPI, 2 I2C, 1 UART, 4 PWM bus on their 40 pin header. But some boards may have the other rest buses. We're providing all the possible bus as a DTBO file, so that you can enable them just by referring the **Expansion connectors** page of each board.

Enable them using config.ini

Here's the Device Tree Overlay part of the **config.ini** file.

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
```

```
overlays="hktft35 sx865x-i2c1"
```

To enable a communication protocol that you want to use, just change the **section profile** or the **overlays** key.

Examples

Check the **overlay_profile** key and that corresponded **section profile** that added to the bottom of the codes.

SPI

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=spi
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
overlays="hktft35 sx865x-i2c1"

[overlay_spi]
overlays="spi0"
```

I2C

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=i2c
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
overlays="hktft35 sx865x-i2c1"
```

```
[overlay_i2c]
overlays="i2c0 i2c1"
```

UART

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=uart
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
overlays="hktft35 sx865x-i2c1"

[overlay_uart]
overlays="uart0"
```

PWM

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=pwm
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
overlays="hktft35 sx865x-i2c1"

[overlay_pwm]
overlays="pwm_cd pwm_ef"
```

All the possible components

In Odroid-C4 and ODROID-N2, there're two more UART channels exposed on the 40 pin header.

Here's an example that shows the codes when if all of the protocols to be enabled.

```
; Device Tree Overlay
overlay_resize=16384
overlay_profile=all
overlays="spi0 i2c0 i2c1 uart0"

[overlay_custom]
overlays="i2c0 i2c1"

[overlay_hktft32]
overlays="hktft32 ads7846"

[overlay_hktft35]
overlays="hktft35 sx865x-i2c1"

[overlay_all]
overlays="spi0 i2c0 i2c1 uart0 uart1 uart2"
```

In this case, we can check if that enabled by using [WiringPi](#).

```
sudo gpio readall
```

ODROID-C4

```
+-----+-----+-----+-----+-----+----- C4 -----+-----+-----+-----+-----+
--+
| I/O | wPi | Name | Mode | V | Physical | V | Mode | Name | wPi |
I/O |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
--+
| | | 3.3V | | | 1 || 2 | | | 5V | | |
|
| 493 | 8 | SDA.2 | ALT1 | 1 | 3 || 4 | | | 5V | | |
|
| 494 | 9 | SCL.2 | ALT1 | 1 | 5 || 6 | | | 0V | | |
|
| 481 | 7 | IO.481 | IN | 1 | 7 || 8 | 1 | ALT1 | TxD1 | 15 |
488 |
| | | 0V | | | 9 || 10 | 1 | ALT1 | RxD1 | 16 |
489 |
| 479 | 0 | IO.479 | IN | 1 | 11 || 12 | 1 | IN | IO.492 | 1 |
492 |
| 480 | 2 | IO.480 | IN | 1 | 13 || 14 | | | 0V | | |
|
| 483 | 3 | IO.483 | ALT2 | 1 | 15 || 16 | 1 | IN | IO.476 | 4 |
476 |
```

```

|      |      | 3.3V |      |      | 17 || 18 | 1 | IN  | IO.477 | 5 |
477 |
| 484 | 12 | MOSI | ALT4 | 1 | 19 || 20 |   |     | 0V     |   |
|
| 485 | 13 | MISO | ALT4 | 1 | 21 || 22 | 1 | IN  | IO.478 | 6 |
478 |
| 487 | 14 | SLCK | ALT4 | 1 | 23 || 24 | 1 | OUT | SS     | 10 |
486 |
|      |      | 0V   |      |      | 25 || 26 | 0 | ALT2 | IO. 23 | 11 | 23
|
| 474 | 30 | SDA.3 | ALT2 | 1 | 27 || 28 | 1 | ALT2 | SCL.3  | 31 |
475 |
| 490 | 21 | IO.490 | IN  | 1 | 29 || 30 |   |     | 0V     |   |
|
| 491 | 22 | IO.491 | IN  | 1 | 31 || 32 | 1 | ALT2 | IO. 24 | 26 | 24
|
| 482 | 23 | IO.482 | ALT2 | 1 | 33 || 34 |   |     | 0V     |   |
|
| 495 | 24 | IO.495 | IN  | 0 | 35 || 36 | 1 | OUT | IO. 22 | 27 | 22
|
|      | 25 | AIN.2 |      |      | 37 || 38 |   |     | 1V8    | 28 |
|
|      |      | 0V   |      |      | 39 || 40 |   |     | AIN.0  | 29 |
|
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
--+
| I/O | wPi | Name | Mode | V | Physical | V | Mode | Name | wPi |
I/O |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
--+

```

ODROID-N2

```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
--+
| I/O | wPi | Name | Mode | V | Physical | V | Mode | Name | wPi |
I/O |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
--+
|      |      | 3.3V |      |      | 1 || 2 |   |     | 5V     |   |
|
| 493 | 8 | SDA.2 | ALT1 | 1 | 3 || 4 |   |     | 5V     |   |
|
| 494 | 9 | SCL.2 | ALT1 | 1 | 5 || 6 |   |     | 0V     |   |
|
| 473 | 7 | IO.473 | IN  | 0 | 7 || 8 | 1 | ALT1 | TxD1   | 15 |
488 |
|      |      | 0V   |      |      | 9 || 10 | 1 | ALT1 | RxD1   | 16 |
489 |

```

479	0	I0.479	IN	1	11	12	1	IN	I0.492	1
480	2	I0.480	IN	1	13	14			0V	
483	3	I0.483	ALT2	1	15	16	1	IN	I0.476	4
		3.3V			17	18	1	IN	I0.477	5
484	12	MOSI	ALT4	1	19	20			0V	
485	13	MISO	ALT4	1	21	22	1	IN	I0.478	6
487	14	SCLK	ALT4	1	23	24	1	OUT	CE0	10
		0V			25	26	0	IN	I0.464	11
474	30	SDA.3	ALT2	1	27	28	1	ALT2	SCL.3	31
490	21	I0.490	ALT1	0	29	30			0V	
491	22	I0.491	IN	1	31	32	0	IN	I0.472	26
481	23	I0.481	IN	1	33	34			0V	
482	24	I0.482	ALT2	1	35	36	0	IN	I0.495	27
	25	AIN.3			37	38			1V8	28
		0V			39	40			AIN.2	29

I/O	wPi	Name	Mode	V	Physical	V	Mode	Name	wPi
					N2				

Also, we can check them with on **/dev** directory.

```
ls -al /dev/i2c* /dev/spi* /dev/ttyS*
```

```
crw----- 1 root root    89, 0 Jun 18 08:48 /dev/i2c-0
crw----- 1 root root    89, 1 Jun 18 08:48 /dev/i2c-1
crw----- 1 root root   153, 0 Jun 18 08:48 /dev/spidev0.0
crw-w---- 1 root tty     239, 0 Jun 18 08:48 /dev/ttyS0
crw-rw---- 1 root dialout 239, 1 Jun 18 08:47 /dev/ttyS1
crw-rw---- 1 root dialout 239, 2 Jun 18 08:47 /dev/ttyS2
crw-rw---- 1 root dialout 239, 3 Jun 18 08:47 /dev/ttyS3
```


From:

<http://wiki.odroid.com/> - **ODROID Wiki**

Permanent link:

http://wiki.odroid.com/common/application_note/gpio/enable_spi_i2c_uart_with_dtbo

Last update: **2021/05/31 09:17**

