

GPIO

The old sysfs GPIO interface is deprecated and will be phased out of the kernel. As part of this the base offset of GPIO ports has been omitted in the kernel. Setting the base GPIO number to zero will result in a boot up error on kernels from 6.6. At the same time, the sysfs interface to the GPIOs has been deprecated - some distributions have already disabled it and are expecting users to go through libgpiod. In 6.6, high-numbered GPIOs - probably still available by sysfs, but eventually that will be switched off.

Query GPIO ports

From 6.5 onwards, the Pi kernel is not forcing a base GPIO for the main GPIO driver. Whilst the sysfs API is still enabled, the base GPIOs will change. The dynamic assignment generally starts at 512 and counts down. If you really need to track down a GPIO using sysfs, look through `/sys/class/gpiochipN/` for a device with an appropriate label or `ngpio`, and then use `base` to determine the GPIO number.

```
cat /sys/kernel/debug/gpio
-----
gpiochip0: GPIOs 512-565, parent: platform/3f200000.gpio, pinctrl-bcm2835:
gpio-512 (ID_SDA           )
gpio-513 (ID_SCL           )
gpio-514 (GPIO02          )
gpio-515 (GPIO03          )
gpio-516 (GPIO04          )
gpio-517 (GPIO05          |sysfs           ) in hi
gpio-518 (GPIO06          )
gpio-519 (GPIO07          )
gpio-520 (GPIO08          )
gpio-521 (GPIO09          )
gpio-522 (GPIO10         )
gpio-523 (GPIO11         )
gpio-524 (GPIO12         )
gpio-525 (GPIO13         )
gpio-526 (GPIO14         )
gpio-527 (GPIO15         )
gpio-528 (GPIO16         )
gpio-529 (GPIO17         )
gpio-530 (GPIO18         )
gpio-531 (GPIO19         )
gpio-532 (GPIO20         )
gpio-533 (GPIO21         )
gpio-534 (GPIO22         )
gpio-535 (GPIO23         )
gpio-536 (GPIO24         )
gpio-537 (GPIO25         )
gpio-538 (GPIO26         )
gpio-539 (GPIO27         )
```

```
gpio-540 (SDA0 )
gpio-541 (SCL0 )
gpio-542 (NC )
gpio-543 (LAN_RUN )
gpio-544 (CAM_GPIO1 )
gpio-545 (NC )
gpio-546 (NC )
gpio-547 (PWR_LOW_N |PWR ) in lo
gpio-548 (NC )
gpio-549 (NC )
gpio-550 (USB_LIMIT )
gpio-551 (NC )
gpio-552 (PWM0_OUT )
gpio-553 (CAM_GPIO0 |cam1_regulator ) out lo
gpio-554 (SMPS_SCL )
gpio-555 (SMPS_SDA )
gpio-556 (ETH_CLK )
gpio-557 (PWM1_OUT )
gpio-558 (HDMI_HPD_N |hpd ) in hi ACTIVE LOW
gpio-559 (STATUS_LED |ACT ) out lo
gpio-560 (SD_CLK_R )
gpio-561 (SD_CMD_R )
gpio-562 (SD_DATA0_R )
gpio-563 (SD_DATA1_R )
gpio-564 (SD_DATA2_R )
gpio-565 (SD_DATA3_R )
```

gpiochip1: GPIOs 566-569, parent: usb/l-1.4:1.0, ftdi-cbus, can sleep:

GPIOD

You can install the libraries and tools to interact with this device, using `sudo apt install gpiod`. This will install the gpiod tools, and the libgpiod2 library to let you interact with the device from your own code.

```
# apt install gpiod --> runtime
# apt install libgpiod2 --> build libraries
```

- `gpiodetect` - list all gpiochips present on the system, their names, labels and number of GPIO lines
- `gpioinfo` - list all lines of specified gpiochips, their names, consumers, direction, active state and additional flags
- `gpioget` - read values of specified GPIO lines
- `gpioset` - set values of specified GPIO lines, potentially keep the lines exported and wait until timeout, user input or signal
- `gpiofind` - find the gpiochip name and line offset given the line name
- `gpiomon` - wait for events on GPIO lines, specify which events to watch, how many events to process before exiting or if the events should be reported to the console

gpiodetect

gpiochip0 [pinctrl-bcm2835] (54 lines)

gpiochip1 [ftdi-cbus] (4 lines)

gpioinfo

gpiochip0 - 54 lines:

line 0:	"ID_SDA"	unused	input	active-high	
line 1:	"ID_SCL"	unused	input	active-high	
line 2:	"GPIO2"	unused	input	active-high	
line 3:	"GPIO3"	unused	input	active-high	
line 4:	"GPIO4"	unused	input	active-high	
line 5:	"GPIO5"	"sysfs"	input	active-high	[used]
line 6:	"GPIO6"	unused	input	active-high	
line 7:	"GPIO7"	unused	input	active-high	
line 8:	"GPIO8"	unused	input	active-high	
line 9:	"GPIO9"	unused	input	active-high	
line 10:	"GPIO10"	unused	input	active-high	
line 11:	"GPIO11"	unused	input	active-high	
line 12:	"GPIO12"	unused	input	active-high	
line 13:	"GPIO13"	unused	input	active-high	
line 14:	"GPIO14"	unused	input	active-high	
line 15:	"GPIO15"	unused	input	active-high	
line 16:	"GPIO16"	unused	input	active-high	
line 17:	"GPIO17"	unused	input	active-high	
line 18:	"GPIO18"	unused	input	active-high	
line 19:	"GPIO19"	unused	input	active-high	
line 20:	"GPIO20"	unused	input	active-high	
line 21:	"GPIO21"	unused	input	active-high	
line 22:	"GPIO22"	unused	input	active-high	
line 23:	"GPIO23"	unused	input	active-high	
line 24:	"GPIO24"	unused	input	active-high	
line 25:	"GPIO25"	unused	input	active-high	
line 26:	"GPIO26"	unused	input	active-high	
line 27:	"GPIO27"	unused	input	active-high	
line 28:	"SDA0"	unused	input	active-high	
line 29:	"SCL0"	unused	input	active-high	
line 30:	"NC"	unused	input	active-high	
line 31:	"LAN_RUN"	unused	output	active-high	
line 32:	"CAM_GPIO1"	unused	output	active-high	
line 33:	"NC"	unused	input	active-high	
line 34:	"NC"	unused	input	active-high	
line 35:	"PWR_LOW_N"	"PWR"	input	active-high	[used]
line 36:	"NC"	unused	input	active-high	
line 37:	"NC"	unused	input	active-high	
line 38:	"USB_LIMIT"	unused	output	active-high	
line 39:	"NC"	unused	input	active-high	
line 40:	"PWM0_OUT"	unused	input	active-high	
line 41:	"CAM_GPIO0"	"cam1_regulator"	output	active-high	[used]
line 42:	"SMPS_SCL"	unused	output	active-high	

line	43:	"SMPS_SDA"	unused	input	active-high	
line	44:	"ETH_CLK"	unused	input	active-high	
line	45:	"PWM1_OUT"	unused	input	active-high	
line	46:	"HDMI_HPD_N"	"hpd"	input	active-low	[used]
line	47:	"STATUS_LED"	"ACT"	output	active-high	[used]
line	48:	"SD_CLK_R"	unused	input	active-high	
line	49:	"SD_CMD_R"	unused	input	active-high	
line	50:	"SD_DATA0_R"	unused	input	active-high	
line	51:	"SD_DATA1_R"	unused	input	active-high	
line	52:	"SD_DATA2_R"	unused	input	active-high	
line	53:	"SD_DATA3_R"	unused	input	active-high	
gpiochip1 - 4 lines:						
line	0:	unnamed	kernel	input	active-high	[used]
line	1:	unnamed	kernel	input	active-high	[used]
line	2:	unnamed	kernel	input	active-high	[used]
line	3:	unnamed	kernel	input	active-high	[used]

Links

- <https://www.auctoris.co.uk/2023/08/18/how-not-to-use-sysfs-for-gpio-on-a-raspberry-pi-how-you-should-do-it-in-2023/>
- <https://openwrt.org/docs/techref/hardware/port.gpio>

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