• 作業 1:實際練習 /sys/class/gpio 啟動 gpio,設定 gpio 接腳的狀態,並且卸載所啟動的 gpio。同時觀察卸載之後的 gpio 接腳,繼續送設定狀態的資料,將會發生什麼樣的狀態。

## 無法做任何動作

```
pi@neal:/sys/kernel $ echo 4 > /sys/class/gpio/unexport pi@neal:/sys/kernel $ echo 0 > /sys/class/gpio/gpio4/value -bash: /sys/class/gpio/gpio4/value: 沒有此一檔案或目錄 pi@neal:/sys/kernel $ []
```

• 作業 2:使用 raspi-config 啟動 i2c, 觀察 gpio2 以及 gpio3 的變化,透過/sys/kernel/debug/gpio 觀察改變的情形,嘗試重新做一次作業 1,針對 gpio2 以及 gpio3 操作,觀察在 i2c 啟動的狀態下,gpio2 以及 gpio3 相對 gpio4 有何不同。

## 沒有不同

```
gpio-0
         (ID SDA
gpio-l
         (ID SCL
                              |sysfs
                                                    ) in hi
         (SDA1
gpio-2
                              sysfs
gpio-3
         (SCL1
                                                         hi
                              |sysfs
gpio-4
        (GPIO GCLK
                                                         hi
                              |sysfs
                                                    ) in
gpio-5
         (GPIO5
gpio-6
         (GPIO6
gpio-7
         (SPI_CE1_N
                              |spi0 CS1
                                                    ) out hi ACTIVE LOW
         (SPI CEO N
gpio-8
                              |spi0 CS0
                                                    ) out hi ACTIVE LOW
         (SPI MISO
gpio-9
gpio-10 (SPI MOSI
gpio-11 (SPI SCLK
         (GPIO12
gpio-12
gpio-13 (GPIO13
         (TXD1
```

```
pi@neal:~ $ sudo cat /sys/kernel/debug/gpio
gpiochip0: GPIOs 0-53, parent: platform/fe200000.gpio, pinctrl-bcm2835:
         (ID_SDA
 gpio-0
 gpio-l
                               sysfs
          (ID SCL
                                                     ) in
                                                          hi
 gpio-2
          (SDA1
                                                           hi
                               sysfs
 gpio-3
          (SCL1
                               |sysfs
                                                           hi
          (GPIO GCLK
 gpio-4
                               |sysfs
                                                           hi
 gpio-5
          (GPIO5
 gpio-6
          (GPIO6
 gpio-7
          (SPI CE1 N
                               |spi0 CS1
                                                    ) out hi ACTIVE LOW
 gpio-8
          (SPI CEO N
                               |spi0 CS0
                                                     ) out hi ACTIVE LOW
          (SPI_MISO
 gpio-9
 gpio-10
         (SPI_MOSI
 gpio-11
          (SPI_SCLK
 gpio-12
          (GPI012
 gpio-13
           (GPIO13
           (TXD1
 gpio-14
```

• 作業 3:使用 raspi-config 啟動 spi, 觀察 gpio 各接腳的變化狀態, 嘗試將 spi 關閉之後, 透過 /sys/kernel/debug/gpio, 觀察可以使用 gpio 數量的變化情形 。

## 差別在於腳位 7 和 8 未啟動

```
(ID_SDA
(ID_SCL
gpio-l
                                      sysfs
gpio-2
           (SDA1
                                      sysfs
                                                               ) in hi
gpio-3
                                      sysfs
gpio-4
           (GPIO GCLK
                                     |sysfs
                                                               ) in hi
gpio-5
           (GPIO5
gpio-6
           (GPIO6
           (GPIO6
(SPI_CE1_N
(SPI_CE0_N
(SPI_MISO
(SPI_MOSI
(SPI_SCLK
(GPIO12
gpio-7
                                     |spi0 CS1
                                                               ) out hi ACTIVE LOW
gpio-8
                                      |spi0 CS0
                                                               ) out hi ACTIVE LOW
gpio-9
gpio-10
gpio-ll
gpio-12
gpio-13
gpio-14
gpio-15
           (RXD1
```

```
gpio-0
          (ID_SDA
gpio-l
          (ID_SCL
                                  |sysfs
                                                                hi
gpio-2
          (SDA1
                                  sysfs
gpio-3
          (SCL1
                                  sysfs
gpio-4
          (GPIO GCLK
                                  sysfs
                                                          ) in
gpio-5
          (GPIO5
          (GPIO6
gpio-6
gpio-7
          (SPI_CE1_N
gpio-8 (SPI_CEO_N
gpio-9 (SPI_MISO
gpio-10 (SPI_MOSI
gpio-11 (SPI_SCLK
          (GPIO12
gpio-12
gpio-13
          (GPIO13
          (TXD1
gpio-14
gpio-15
          (RXD1
```