Using the gpio command with Allstar on the Raspberry Pi 2

The Raspberry Pi 2 Version 1.0 release introduced the 'gpio' linux command supplied by the wiringpi gpio library. This allows complete control of the available bits on the 40 pin GPIO connector. The 'gpio' command can be used with scripts to allow configuring, reading, or writing the bits from within Allstar.

Basic commands are:

Setting the mode to read or write -

gpio mode 1 input - sets pin 1 as an input

gpio mode 1 up - pulls input high

gpio mode 1 down – pulls input low

gpio mode 1 output – sets pin 1 as an output

Reading an input -

read 1 - returns the value of pin 1

Setting an output -

write 1 1 - set pin 1 high

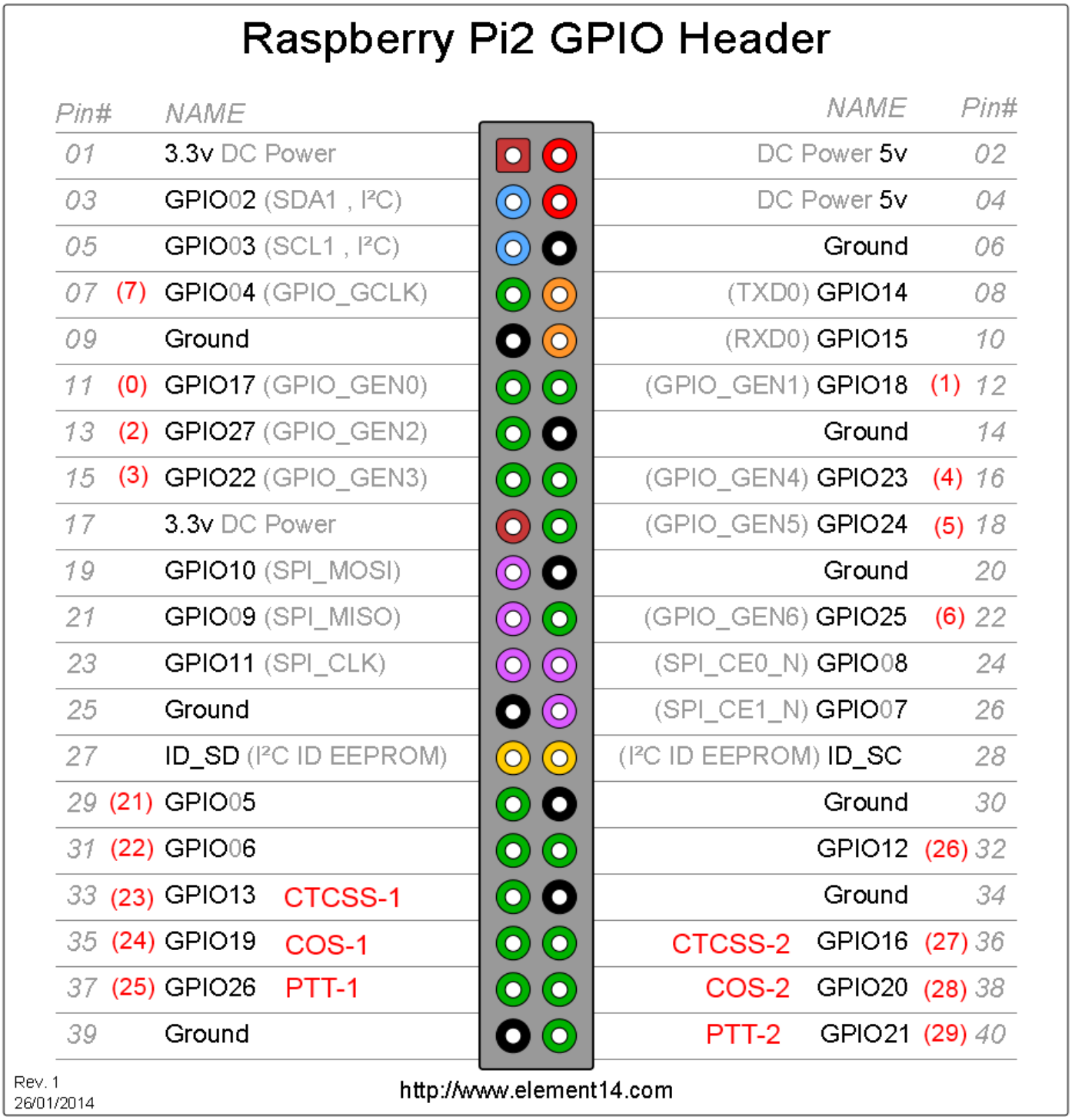
write 1 0 - set pin 1 low

These examples use pin 1 but you must refer to the pin mapping diagram for actual pins. The gpio command uses the wiringpi pin numbering but you can use a command line switch to use standard RPi2 pin numbering.

BCM	wPi	Name	Mode	V	Physical	V	Mode	Name	wPi	BCM
		3.3v			1 || 2			5v		
2	8	SDA.1	IN	1	3 || 4			5V		
3	9	SCL.1	IN	1	5 || 6			0v		
4	7	GPIO. 7	IN	1	7 || 8	1	ALT0	TxD	15	14
		0v			9 || 10	1	ALT0	RxD	16	15
17	0	GPIO. 0	IN	1	11 || 12	0	IN	GPIO. 1	1	18
27	2	GPIO. 2	IN	0	13 || 14			0v		
22	3	GPIO. 3	IN	0	15 || 16	0	IN	GPIO. 4	4	23
		3.3v			17 || 18	0	IN	GPIO. 5	5	24
10	12	MOSI	IN	0	19 || 20			0v		
9	13	MISO	IN	0	21 || 22	0	IN	GPIO. 6	6	25
11	14	SCLK	IN	0	23 || 24	1	IN	CE0	10	8
		0v			25 || 26	1	IN	CE1	11	7
0	30	SDA.0	IN	1	27 || 28	1	IN	SCL.0	31	1
5	21	GPIO.21	IN	1	29 || 30			0v		
6	22	GPIO.22	IN	1	31 || 32	0	IN	GPIO.26	26	12
13	23	GPIO.23	IN	0	33 || 34			0v		
19	24	GPIO.24	IN	1	35 || 36	0	IN	GPIO.27	27	16
26	25	GPIO.25	OUT	0	37 || 38	0	IN	GPIO.28	28	20
		0v			39 || 40	0	OUT	GPIO.29	29	21
BCM	wPi	Name	Mode	V	Pi 2	V	Mode	Name	wPi	BCM

Table showing Pin numbering in wPi and BCM standards. Pins above 26 are RPi2 only

Another table showing Raspberry Pi pin definitions. This does not show wiringpi pin numbers. Refer to above table for cross reference.



This chart shows the wiringpi pin numbers in parenthesis after the pin name. Note that the proposed PTT, COS, and CTCSS pins for two nodes are also shown. Except for these pins the GPIO above pin 26 is probably safe to use with other peripherals as most use pins 26 and below. The Pi model A and B only have 26 GPIO pins available. By default the power down modification uses the GPIO17, wiringpi (0) pin.

Example Script to read a bit

Another very useful 'gpio' command is 'wfi' This command waits for an interrupt based on a rising or falling level at a pin. It takes no processor time unlike polling. The command syntax is:

gpio wfi 1 falling|rising

This example is from the shutdown monitor code I written for the RPi2

```
#!/bin/bash

# Required button hold down seconds
HOLDTIME=6

# set mode to in and pullup pin 0 (Physical pin 11,  GPIO17)
gpio mode 0 in
gpio mode 0 up

TIME1=1

while [ 1=1 ]
  # wait in interrupt for pin to go low
  gpio wfi $PIN falling
  do
  # Got the low now poll to see if it stays low for holdtime
  while [ `gpio read $PIN` -eq "0" ];
  do
    sleep 1
    let TIME1+=1
    if [ $TIME1 -gt $HOLDTIME ]; then
    # if greater than holdtime then exit past done
    break 3;
    fi
  done
  TIME1=1
  continue
done
# code to execute when holdtime is exceeded goes here
```

Simple example to set or reset a bit

This script would be called with both the pin and state parameters - 'write gpio 0 1' - would set wiringpi pin 0

```
#!/bin/bash
# script name - write_gpio

gpio mode $1 out
gpio write $1 $2
```

Calling GPIO scripts in Allstar

Using the above script located in /etc/asterisk/local the function command in rpt.conf would look like this -

833=cmd,/etc/asterisk/local/write_gpio 0 1 ; Set wiringpi pin 0 with DTMF *833

844=cmd,/etc/asterisk/local/write_gpio 0 0 ; Reset wiringpi pin 0 with DTMF *844

Testing GPIO

The 'gpio' commands make I very easy to test your GPIO project at the Linux prompt with these simple 'gpio' commands. You can also read all I/O states producing the chart shown above by using the 'readall' command.

gpio readall

Additional documentation on the 'gpio' command can be found on the man page

man gpio

and at the wiringpi website - http://wiringpi.com/

Considerations when using RPi2 bits

The Rpi2 GPIO bits are 3.3 volts maximum and output bits have a limited current capability. When interfacing be aware of this because you can damage the board if you exceed ratings. Typically you interface output bits with a transistor or FET to drive a relay or other device. Interface chips and boards are available from Adafruit and other sources to interface to 5V TTL and other levels.