RPi.GPIO Module Usage

Import the module:

import RPi.GPIO (as "whatever" if desired - **as IO** is assumed in the following)

Pin numbering:

a choice is required to specify channel designations:
IO.setmode(IO.BOARD)
or
IO.setmode(IO.BCM)

Setup:

every channel that is to be used:
IO.setup(channel, IO.IN)
IO.setup(channel, IO.OUT)
You can specify an initial state for the pin:
IO.setup(channel, IO.OUT, initial=IO.HIGH)
Or setup a bunch at a time:
chan_list = [11,12] add multiple channels
can use tuples instead i.e.: chanlist = (11,12)
IO.setup(chan_list, IO.OUT)

Read or write (set) pins:

(NOTE: a "pin" is the same as a "channel")
IO.input(channel) (0=False=IO.Low,1=True=IO.High)
IO.output(channel, state) (states same as above)
Can output to several channels with one command:
chanlist = [11,12] <- this also works with tuples
IO.output(chanlist, IO.LOW) <- this sets all to IO.LOW
IO.output(chanlist, (IO.HIGH, IO.LOW)) <- this sets first HIGH and the second LOW

Environmental information:

GPIO.RPI_INFO about your RPi
GPIO.RPI_INFO['P1_REVISION'] Raspberry Pi board revision
GPIO.VERSION RPi.GPIO version number
Find the function of a channel:
func = IO.gpio_function(pin)
will return a value from:
IO.IN, IO.OUT, IO.SPI, IO.I2C, IO.HARD_PWM, IO.SERIAL, IO.UNKNOWN

Pull UP / Pull DOWN:

Unconnected pins float.
Default values (High or Low) can be set in **software** or with **hardware**

Hardware:

Pull Up:
Input channel -> 10K resistor -> 3.3V
Pull Down:
Input channel -> 10K resistor -> 0V

Software:

IO.setup (channel, IO.IN, pull_up_down = IO.PUD_UP) or **IO.PUD_DOWN)** or **IO.PUD_OFF)**

Edge detection:

change of state event — 3 ways to handle

1. wait_for_edge() function - stops everything until an edge is detected.

IO.wait_for_edge (channel, IO.RISING)
can detect edges of type IO.RISING, IO.FALLING or IO.BOTH

2. event_detected() function - use in a loop with other activity — event triggers priority response. Example:
IO.add_event_detect(channel, IO.RISING)
activity detection on a channel
[your loop activity here]
if **IO.event_detected(channel)**:
print('Button pressed')

3. Threaded callbacks - RPi.GPIO runs a second thread for callback functions. This means that callback functions can be run at the same time as your main program, in immediate response to an edge. For example:

```
def my_callback(channel):
    print('Edge detected on channel %s'%channel')
    print('This is run in a different thread to your main program')
```

IO.add_event_detect(channel, IO.RISING, callback=my_callback) add rising edge detection on a channel
...the rest of your program...

If you want more than one callback function:

```
def my_callback_one (channel):
    print ('Callback one')
def my_callback_two (channel):
    print ('Callback two')
```

IO.add_event_detect(channel, IO.RISING)
IO.add_event_callback(channel, my_callback_one)
IO.add_event_callback(channel, my_callback_two)

Note that in this case, the callback functions are run sequentially, not concurrently. This is because there is only one thread used for callbacks, in which every callback is run in the order in which they have been defined.

Switch debounce:

solutions to a button event causing multiple callbacks

Hardware:

add a 0.1uF capacitor across your switch.

Software:

add the bouncetime= parameter to a function where you specify a callback function. bouncetime= should be specified in milliseconds.
IO.add_event_detect(channel, IO.RISING, callback=my_callback, bouncetime=200)
or
IO.add_event_callback(channel, my_callback, bouncetime=200)

Remove Event Detection:

IO.remove_event_detect(channel)

BIG DADDY'S PYTHON TOOLBOX For 3.5

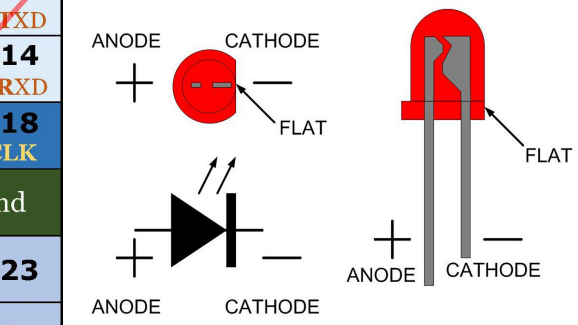
Cleanup: resets all channels and clears pin num -bering system at the end of a program - just do it.
IO.cleanup()
Or cleanup just select pins:
IO.cleanup(channel)
IO.cleanup((channel1, channel2)) <-tuple
IO.cleanup([channel1, channel2]) <-or list

PWM in RPi.GPIO is an analog signal, **P**ulse **W**idth **M**odulation - available ONLY on one of the Pi's pins: board #12 = BCM #18 ; used mostly for audio
To create a **software** instance of PWM on any in/out pin:
p = IO.PWM(channel, frequency)
To start PWM: **p.start(dc)** where dc is the duty cycle (0.0 <= dc <= 100.0)
To change the frequency:
p.ChangeFrequency(freq) freq `is the new frequency in Hz*`
To change the duty cycle:
p.ChangeDutyCycle(dc) where `0.0 <= dc <= 100.0`
To stop PWM:
p.stop()
*100 = 100 times a second, .5 = once every 2 seconds, .1 is every 10 seconds, .0167 = once a minute

Common breadboard numbering

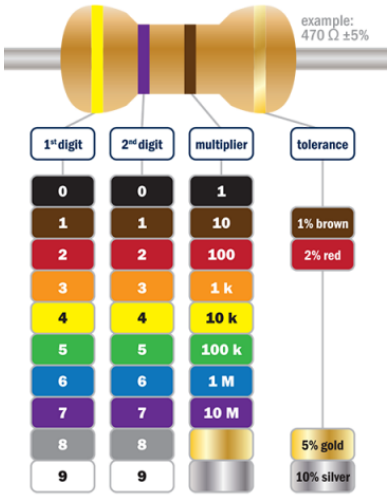
	Raspberry Pi Model B+			
1	3V Power	1	2	5V Power
2	GPIO2 SDA1 12C	3	4	5V Power
3	GPIO3 SCL1 12C	5	6	Ground
4	GPIO4	7	8	GPIO14 UART0-TXD
5	Ground	9	10	GPIO14 UART0-RXD
6	GPIO17	11	12	GPIO18 PCM-CLK
7	GPIO27	13	14	Ground
8	GPIO22	15	16	GPIO23
9	3V Power	17	18	GPIO24
10	GPIO10 SPIo-MOSI	19	20	Ground
11	GPIO9 SPIo-MOSO	21	22	GPIO25
12	GPIO11 SPIo-SCLK	23	24	GPIO8 SPIo-CEo-N
13	Ground	25	26	GPIO7 SPIo-CE1-N
14	ID_SD 12C ID EEPROM	27	28	ID_SC 12C ID EEPROM
15	GPIO5	29	30	Ground
16	GPIO6	31	32	GPIO12
17	GPIO13	33	34	Ground
18	GPIO11 PCM-FS	35	36	GPIO16
19	GPIO26	37	38	GPIO20 PCM-DIN
20	Ground	39	40	GPIO20 PCM-DOUT

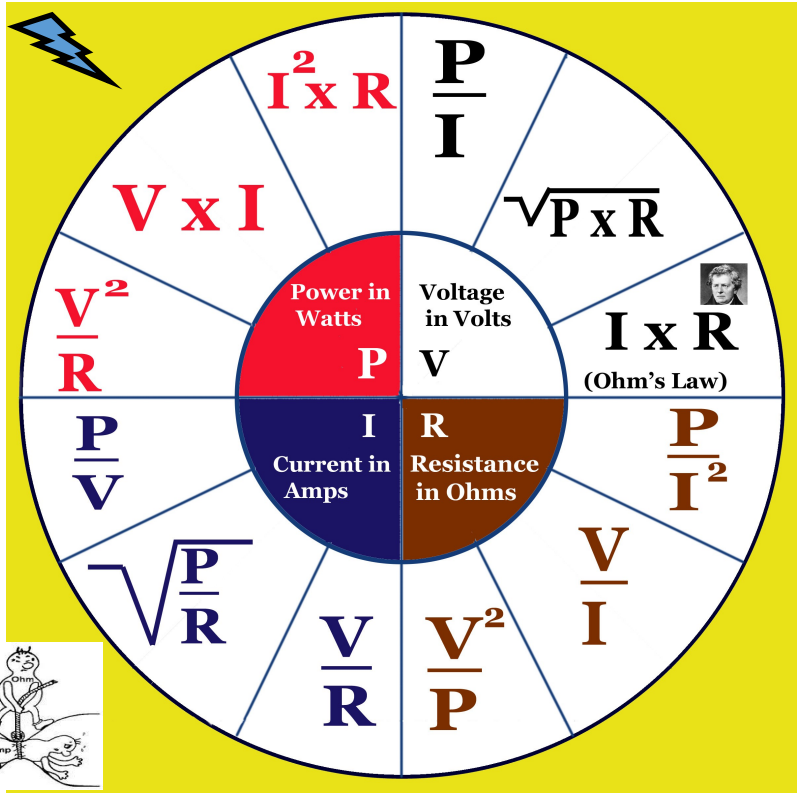
SERIAL PERIPHERAL INTERFACE PINS
19 MOSI-master output, slave input
21 MISO-masster input, slave output
23 SCK-serial clock **24** & 26-slave select pins
UART - UNIVERAL ASYNCHRONOUS RECEIEVER/TRANSMITTER pins
8 UART-TDX & **10** UART-RDX



270Ω -> red, purple, brown
330Ω -> orange, orange, brown
10KΩ -> brown, black, yellow

Note: RPi maximum current to a single pin is 16ma, to all pins is 50ma





comments and suggestions appreciated:
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