

ENGR 3421: ROBOTICS I

GPIO

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Outline

Python Review

PWM

Motor Driver



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Variables

- a variable can store anything: number, list, object,...
- Use "=" to feed contents to a variable



Conditions

- Use a boolean condition for your loop.
- `" > "`, `" <= "`, `" == "`, `" != "`
- `"and"`, `"or"`, `"not"`, `"is"`



Assignment Hints

- 1 "while" loop takes care of things happened in 0.02 seconds.
- Either set the LED brightness with a specific duty cycle or make it a constant.
- Read [gpiozero](#) documentations, implement some [recipes](#).



Outline

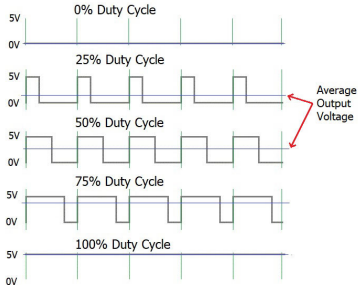
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Pulse Width Modulation



- Simulate analogue signal with digital signal.
- Frequency controls continuity.
- Duty cycle controls signal strength.



Hardware PWM & Software PWM

- Fully hardware PWM
 - The most accurate and possibly the most flexible.
 - Only available on GPIO 12/18 or GPIO 13/19.
- DMA (Direct Memory Access) timed PWM.
 - Intermediate accuracy but not flexible.
 - Available on all GPIO pins.
- Software timed PWM.
 - The timing accuracy will vary but very flexible.
 - Available on all GPIO pins.
 - Not good for servos.
- May require installation of **pigpio** library.



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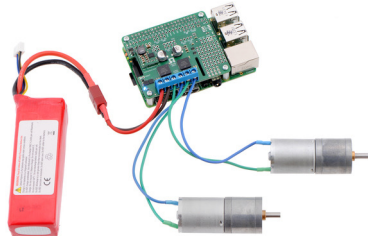
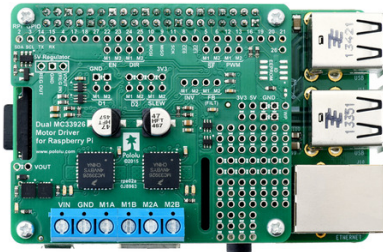
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Pin Mappings

GPIO Pin	Motor Driver Pin	Description
5	Motor 1 \overline{SF}	Status flag output
6	Motor 2 \overline{SF}	
12	Motor 1 PWM	Motor speed input, max PWM frequency: 20kHz
13	Motor 2 PWM	
22	Motor 1 EN	Enable input
23	Motor 2 EN	
24	Motor 1 DIR	Motor direction input. LOW: A to B; HIGH: B to A.
25	Motor 2 DIR	



Python Library for Motor Driver

Check [this repo](#) for installation instructions.

Note

Changes were made due to Python 3 compatibility. If using following original instructions, substitute *python* with *python3* and *pip* with *pip3*



Soldering

Warning

Better get yourselves prepared with the practicing kits.

