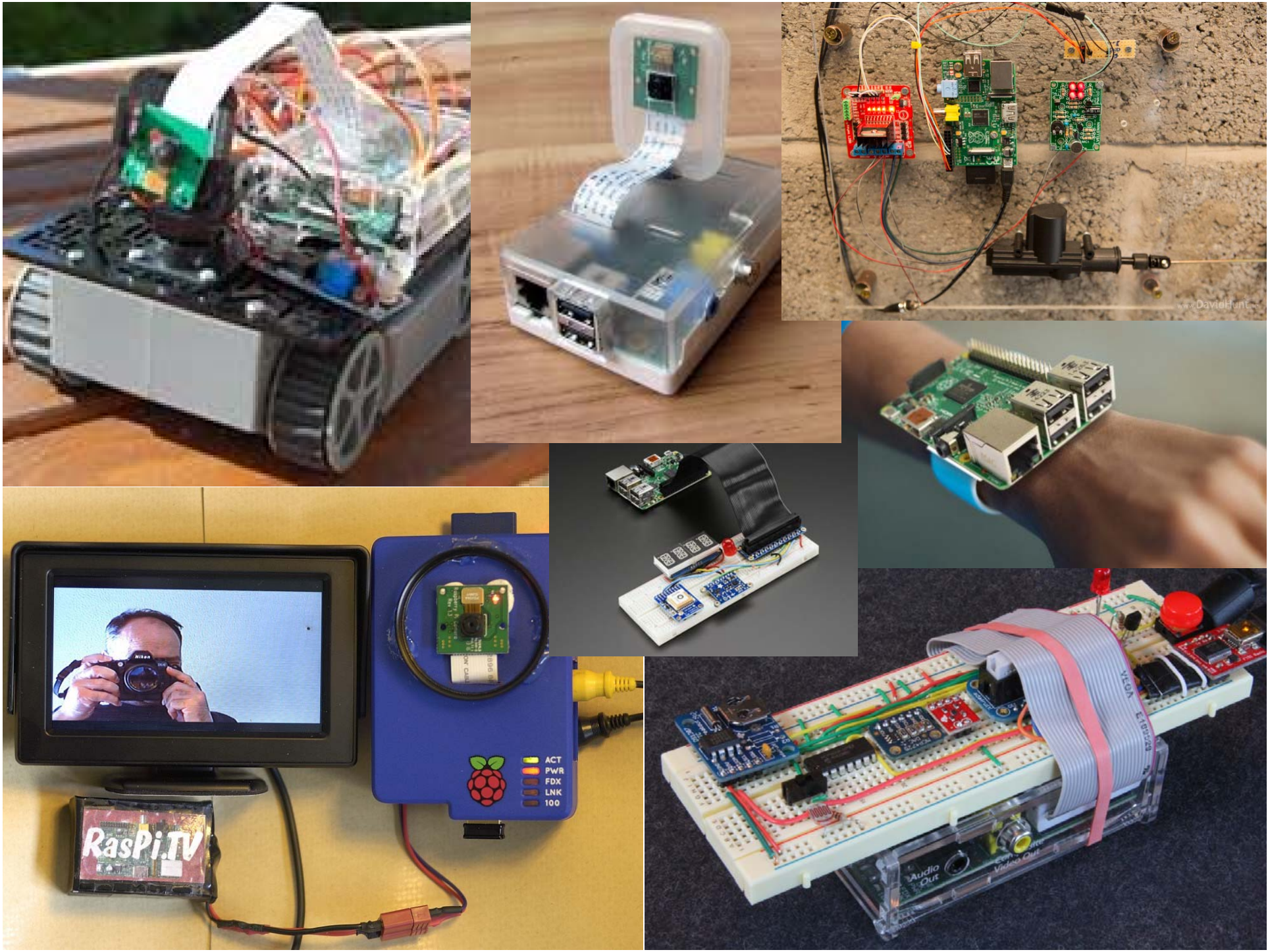
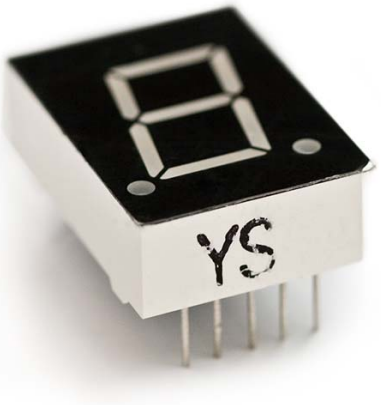
Intro to Robotics

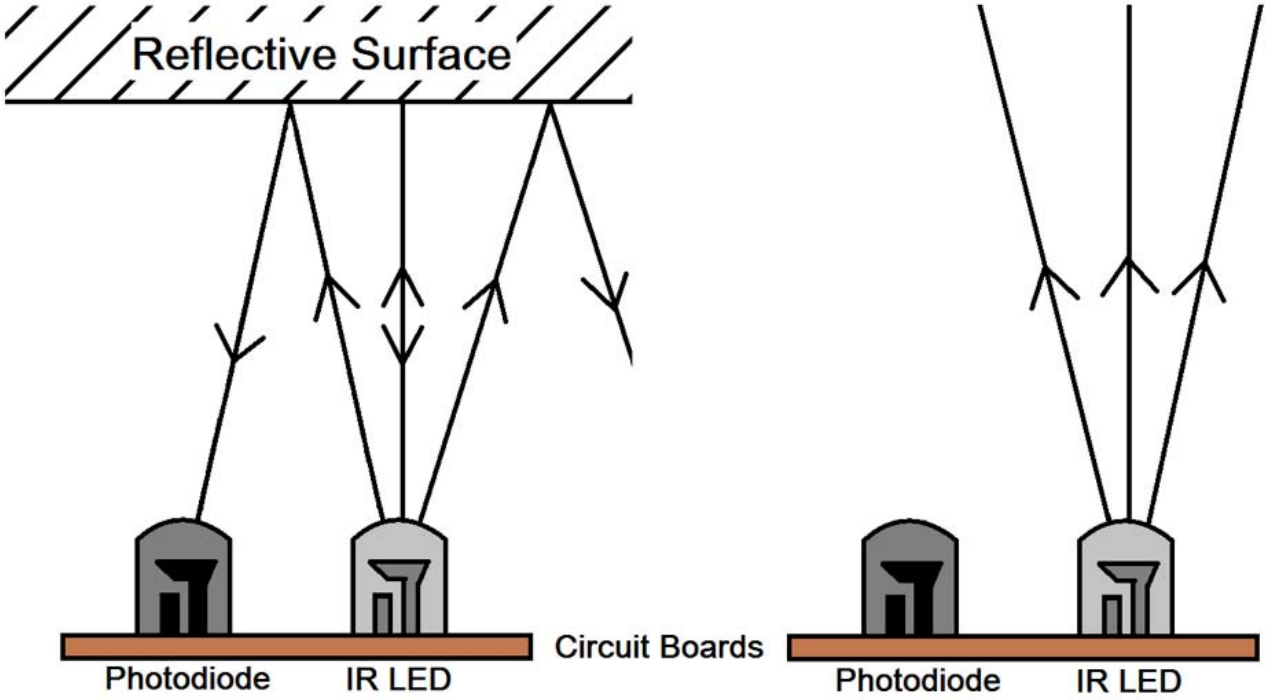

RasPi.TV
ACT
PWR
FDX
LNK
100
Audio Out
Video Out

Things we already know

- RPi 3
- GPIO
- Resistors
- LED
- Button
- 7-segment display

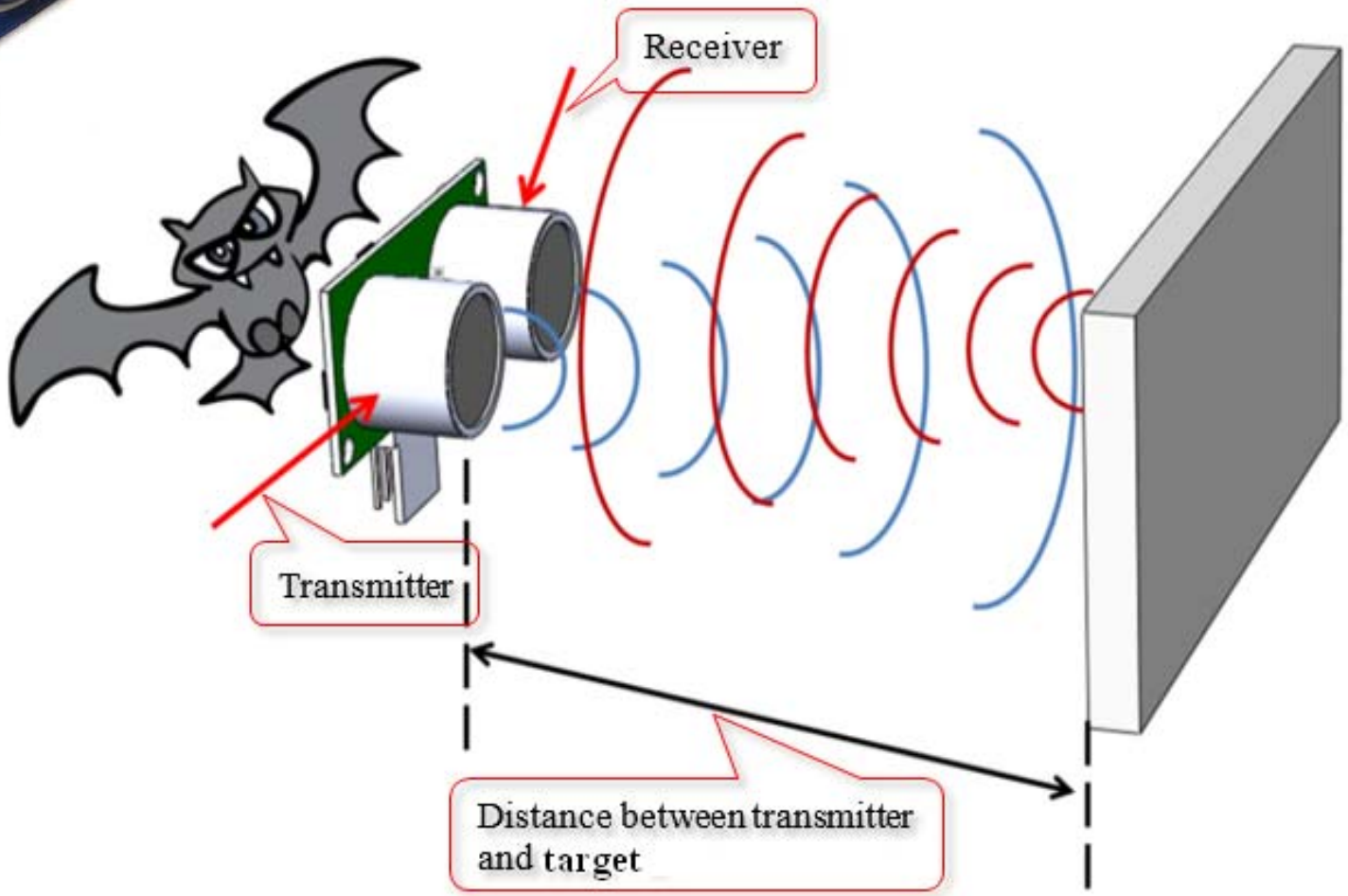


Line sensors



Electrically, the sensor is just a device that transmits 0 volts to a specific GPIO pin when it detects an IR signal and 5 volts to that GPIO pin when it does not detect an IR signal.

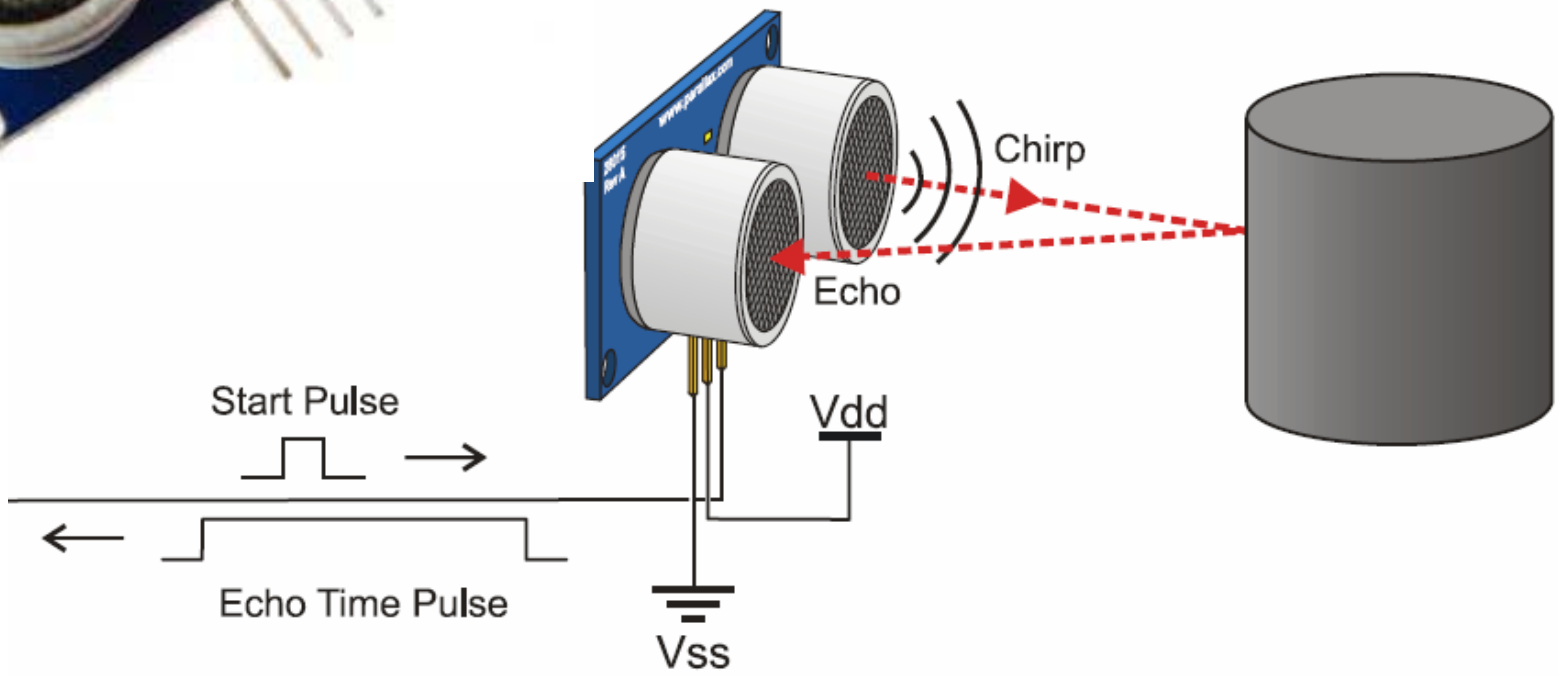
Ultrasound sensors



Ultrasound sensors

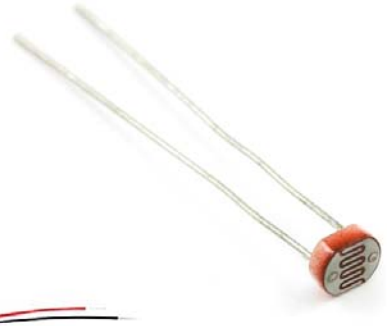
Pins:

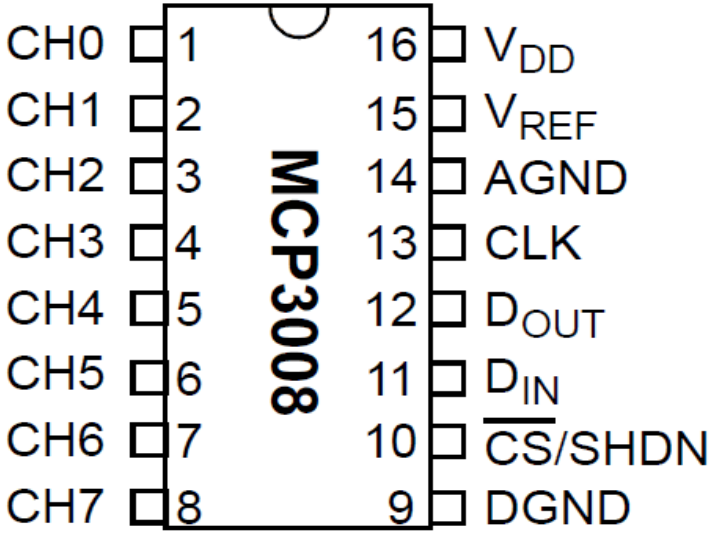
- Vcc
- Gnd
- Trig
- Echo



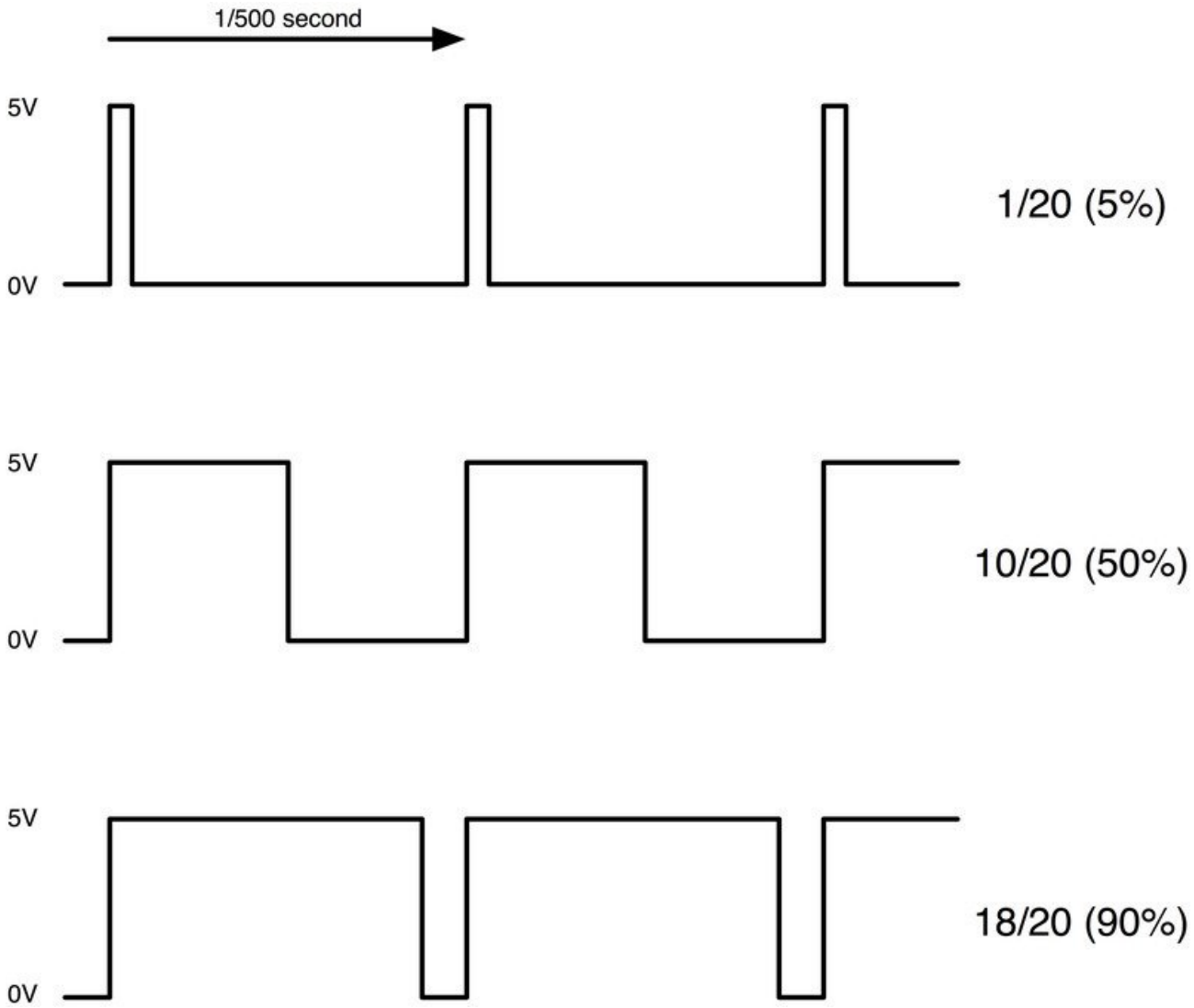
Analog sensors

- Examples of sensors: temperature, light, IR proximity, vibration, etc.
- Need an analog-to-digital convertor

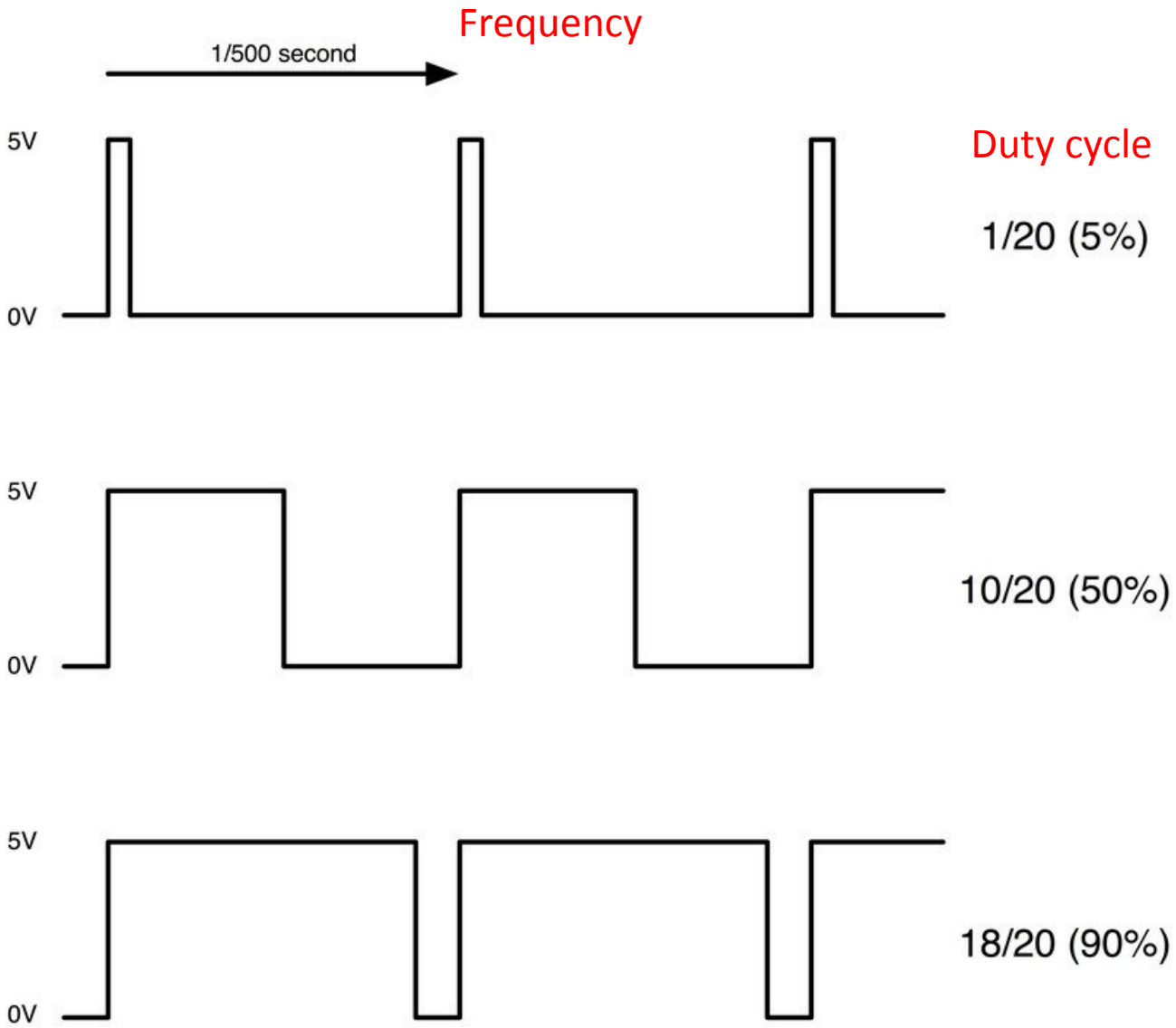




PWM – Pulse Width Modulation



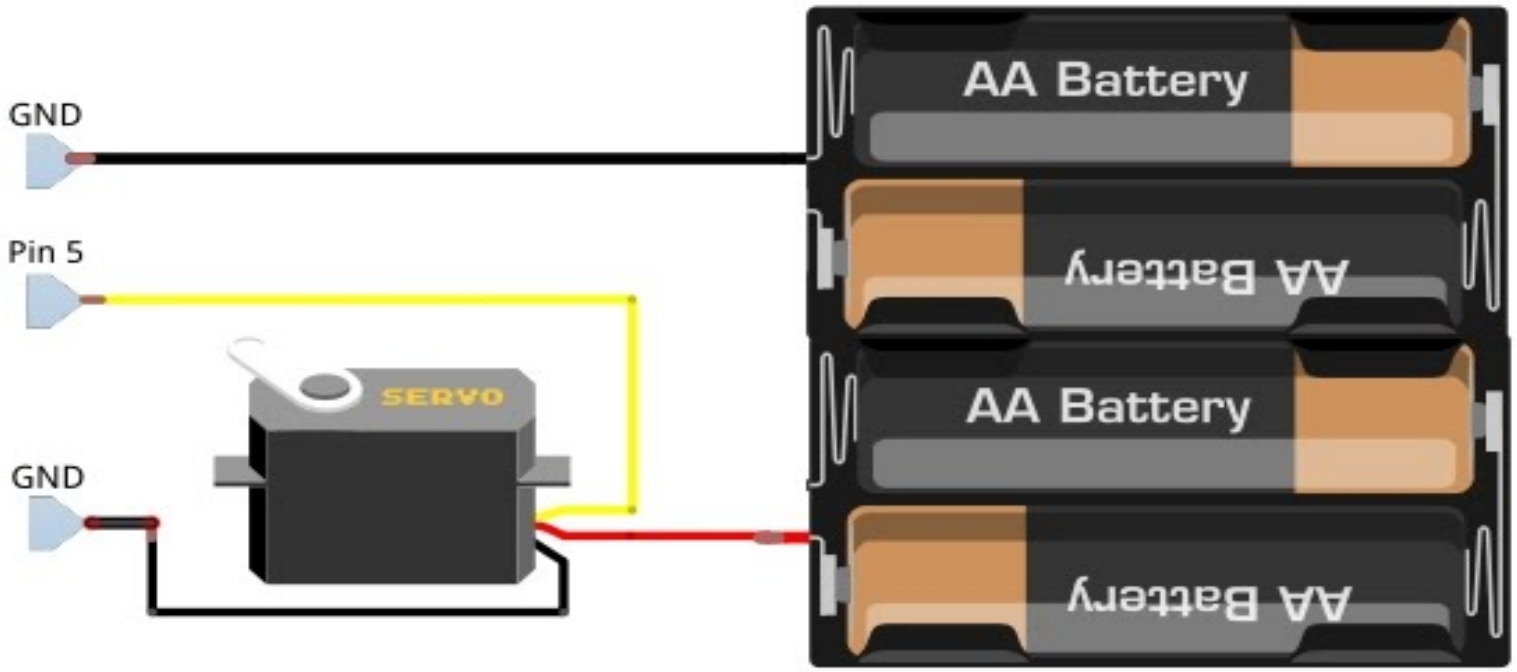
PWM – Pulse Width Modulation



```
GPIO_pin_number = 5
Pwm_duty_cycle = 50

# Set PWM parameters
pwm_frequency = 50

# GPIO Mode (BOARD / BCM)
GPIO.setmode(GPIO.BOARD)

# set GPIO direction (IN / OUT)
GPIO.setup(GPIO_pin_number, GPIO.OUT)

# Create PWM instance
pwm_port1 = GPIO.PWM(GPIO_pin_number, pwm_frequency)

# Start a PWM signal
pwm_port1.start(pwm_duty_cycle)
```

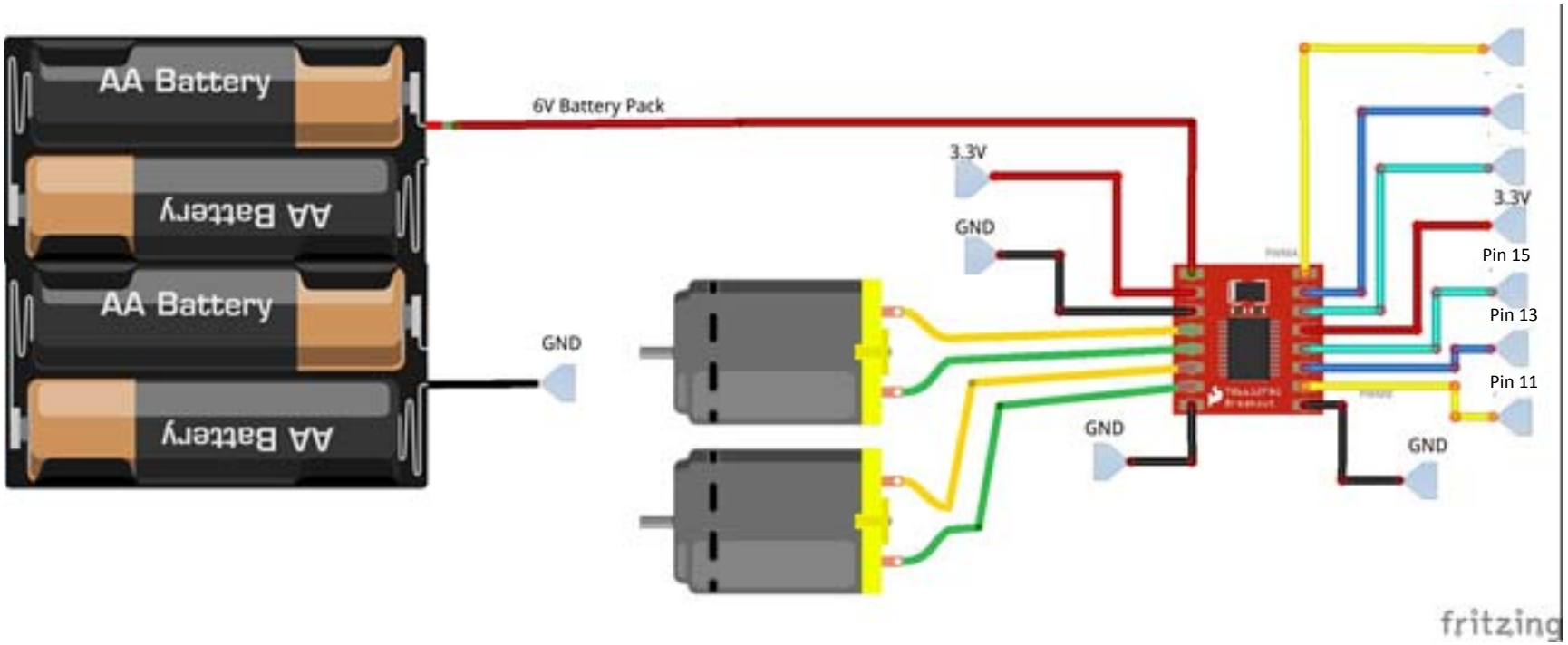
Servo

- Continuous rotation servo
- Standard servo
- Need external batteries



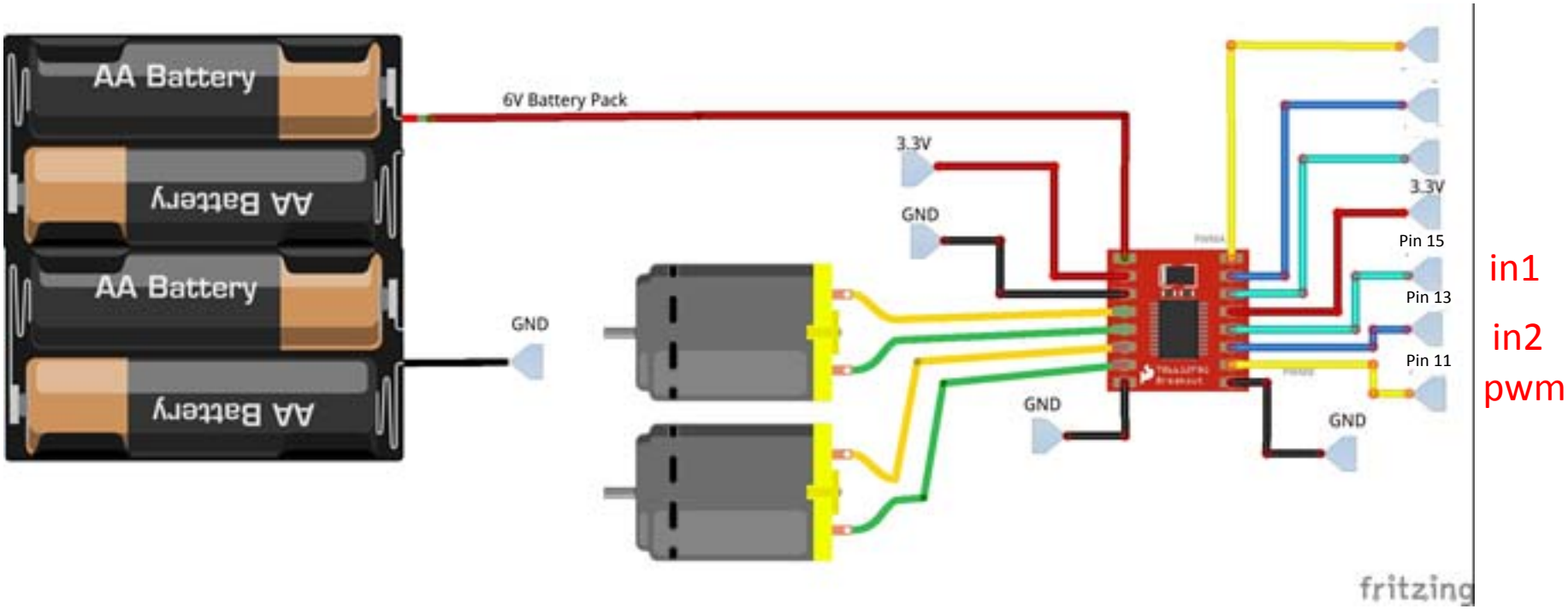
DC Motor

- Stall torque / speed
- Need external batteries
- Motor driver and H-bridge



DC Motor

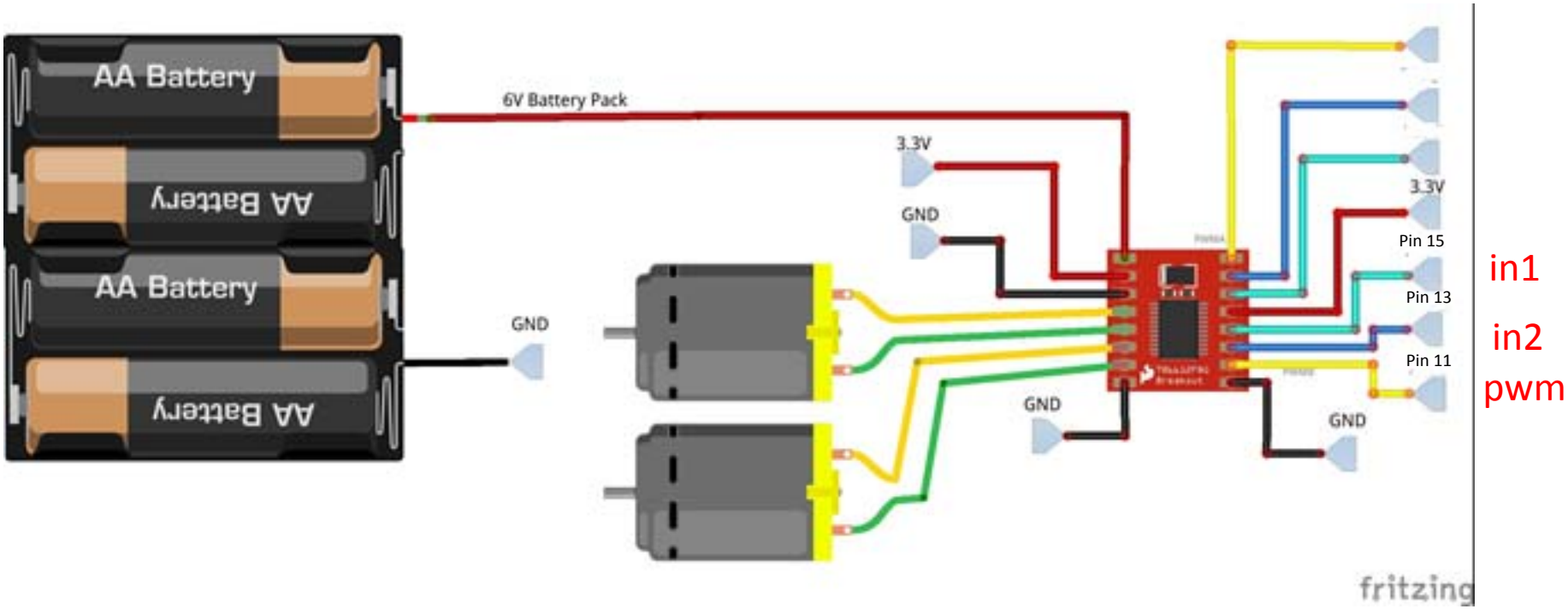
- Stall torque
- Need external batteries
- Motor driver and H-bridge



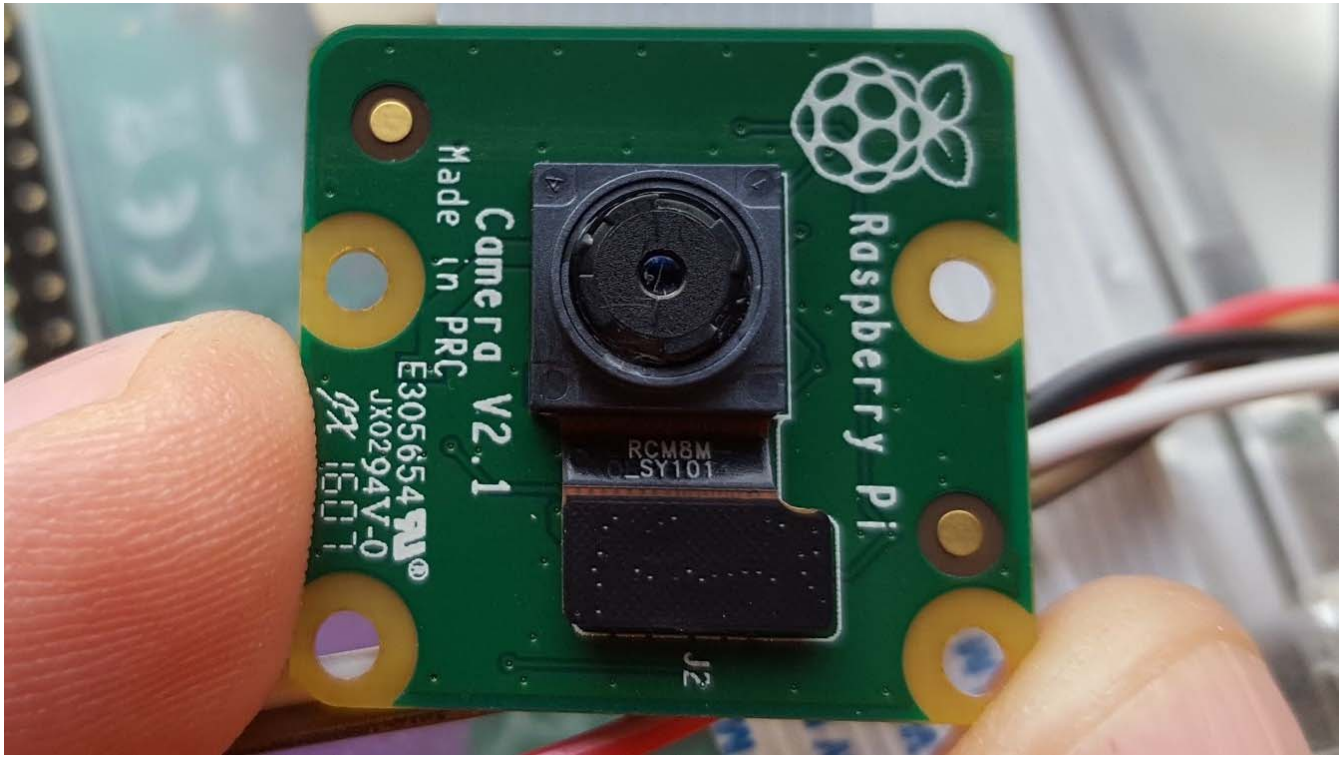
DC Motor

- PWM: speed of the motor
- (In1, In2) = (HIGH, LOW) (LOW, HIGH) (LOW, LOW)

  forward backward stop



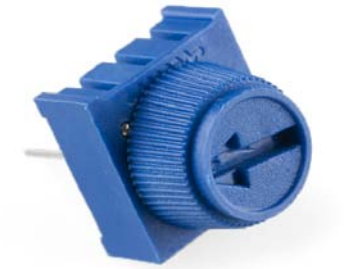
Camera



- Picam v2
- Pictures: 8 megapixel
- Video: 1080p at 30 fps, 720 at 60 fps

Other peripherals

- Sound sensor: needs analog input
- Trimpot: needs analog input
- Speakers: PWM output
- Bluetooth (to connect to Android App)

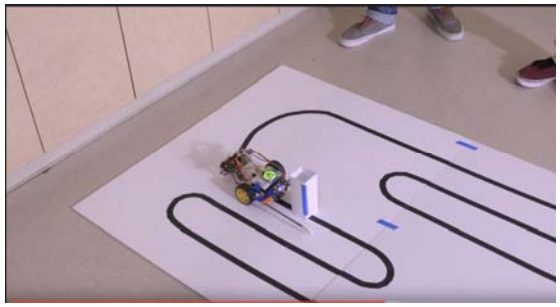


- Digital input: GPIO
- Digital output: GPIO
- Analog input: ADC chip
- Analog output: PWM signal

What can you do with a robot?

Draw

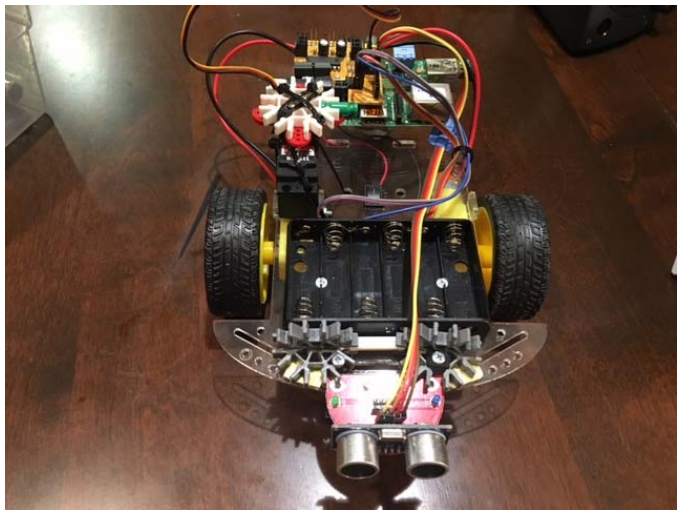
Avoid obstacles



Follow tracks

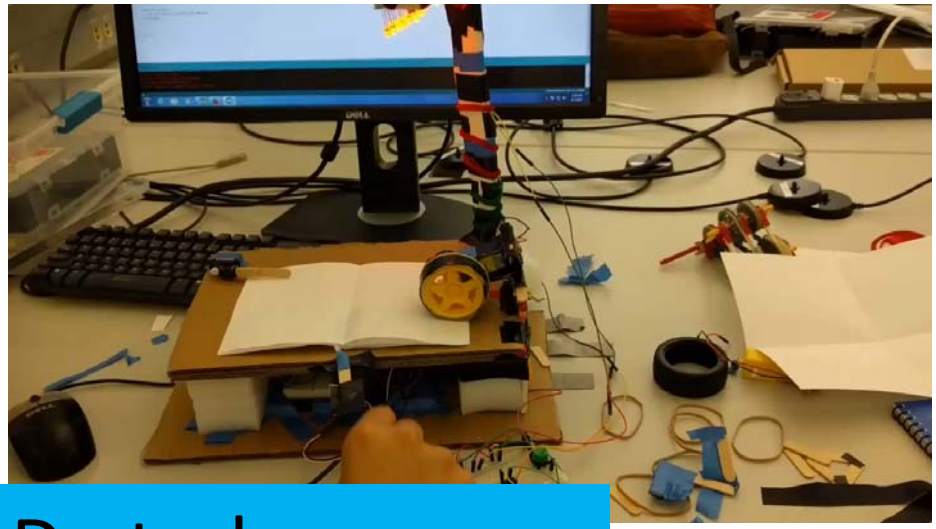
Chase an object

Solve a line maze



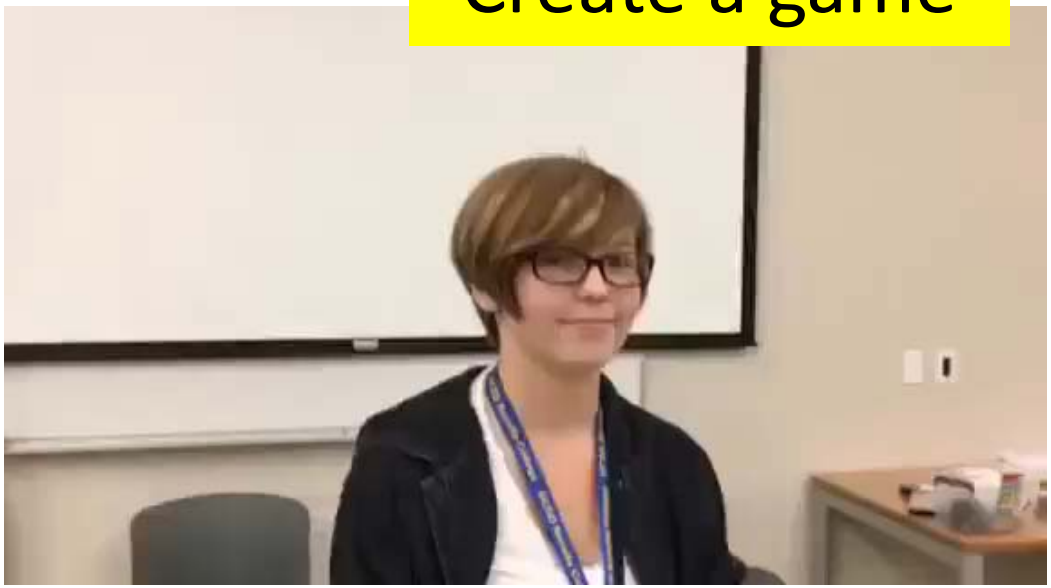
Mimic picobot!

What can you do with a robot?



Do tasks

Create a game



Portfolium

Search...

Home | Discover | Jobs | Notifications | Me | + WORK

PROFILE | PORTFOLIO | CONNECTIONS

Overview

7 Entries | 8 Skills | 18 Connections

Skills

Search April's skills...

- Arduino 101 2
- C / C++ Programming 1
- Green Screen 1
- JES 1
- Raspberry Pi 1
- Teamwork 1

Showing 6 of 8 skills SEE MORE

SHOW SORT BY

AppInventor - Jessica and April - Koala

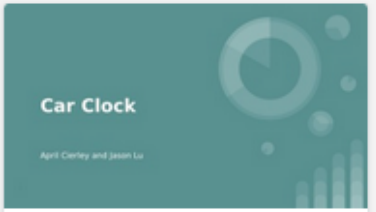
UCSD COSMOS 2017

Other

Image Processing : Underwater

Utilizing Jython, we took images off a greenscreen and transferred them to one image.

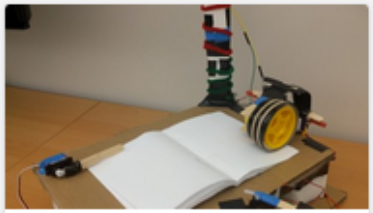
Other



Arduino 101 Project : Runaway Alarm Clock

We mobilized an arduino 101 board and made it into a "car" alarm clock, featuring the idea of having...

Other



Phalangeal Controlled Page Traversal System

We took advantage of an