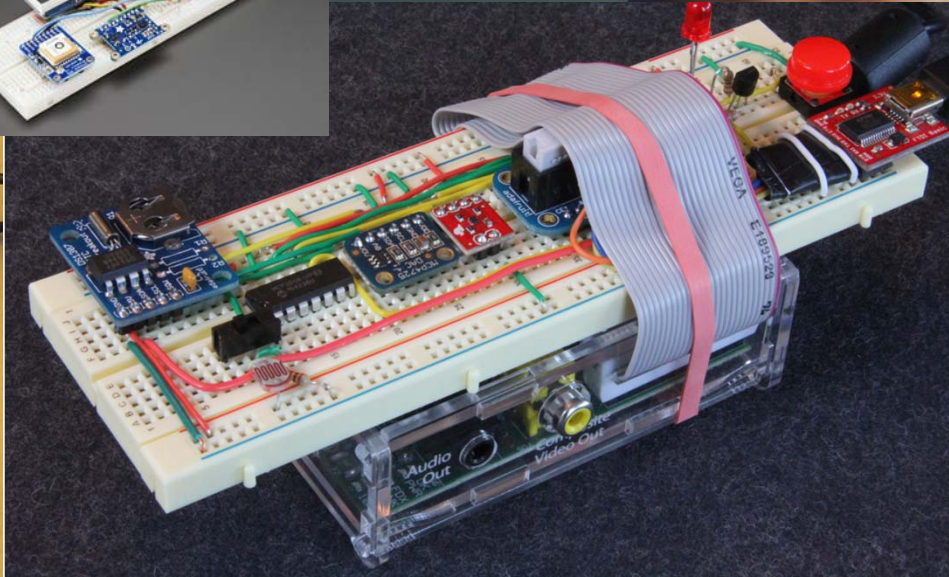
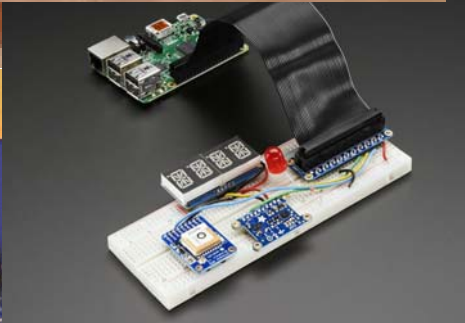
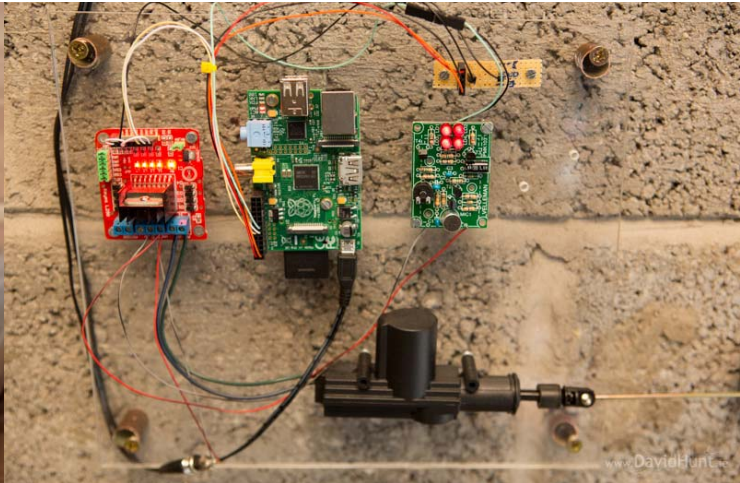
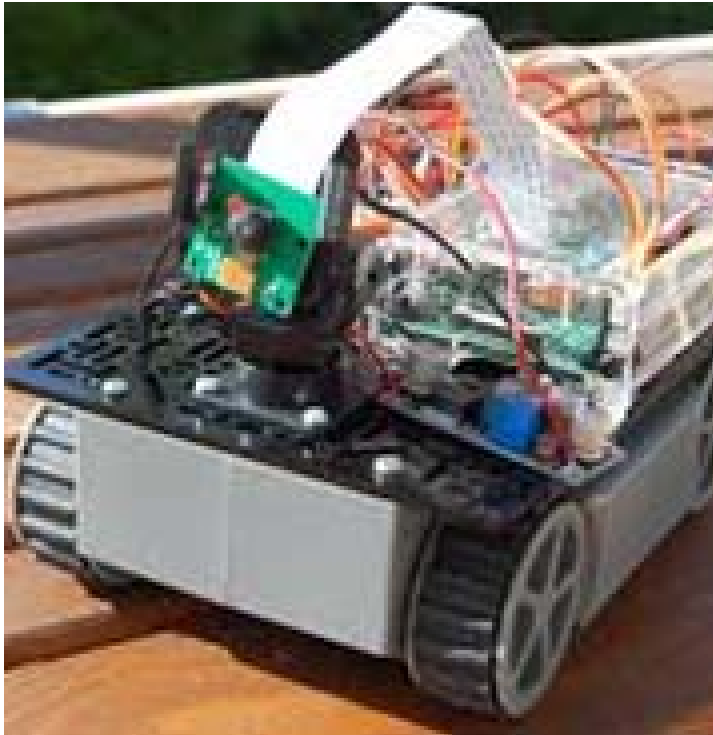
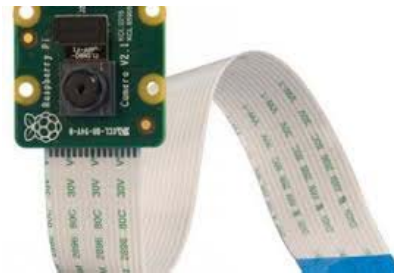
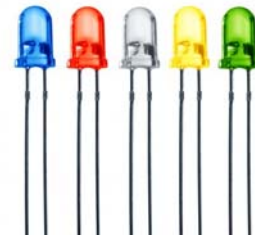


# Intro to Robotics

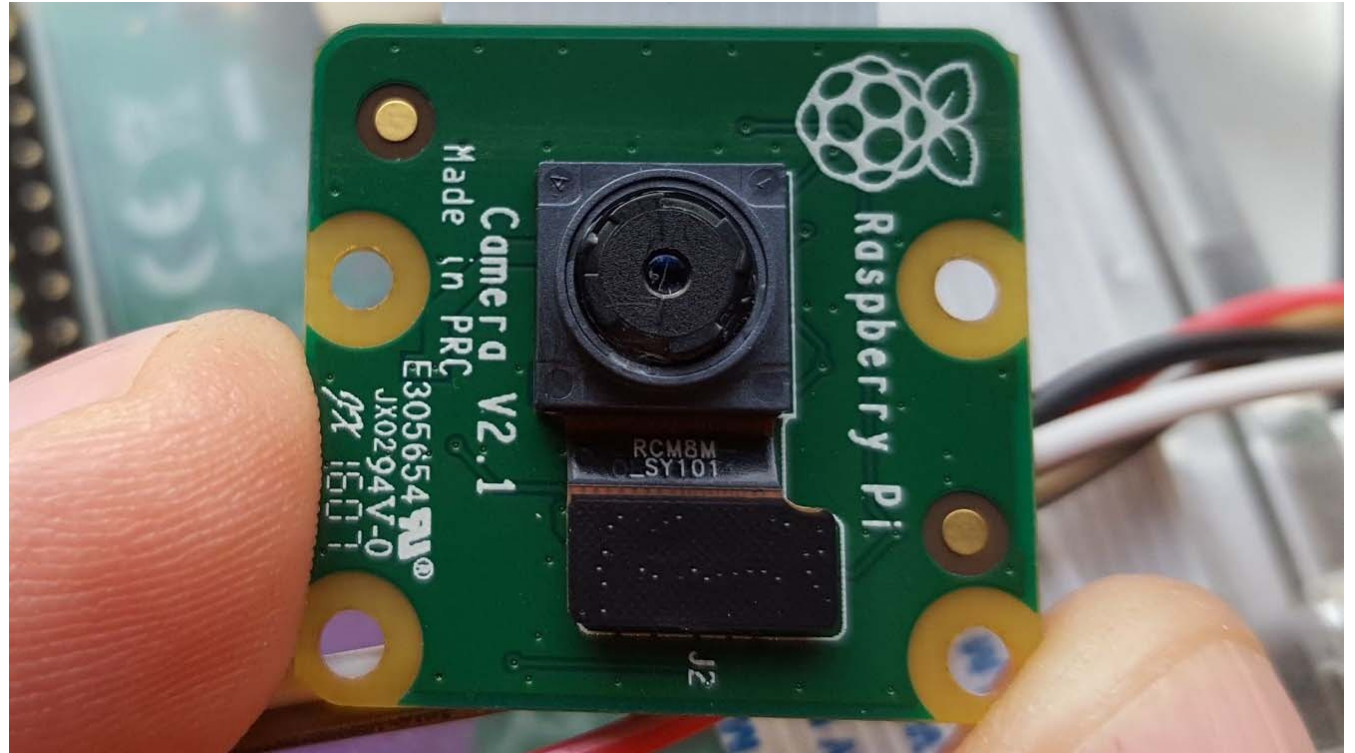


# From the robotics lab assignment ...

- RPi 3
- GPIO
- Resistors
- LED
- Button
- Servo
- Ultrasound
- Picam camera



# Camera

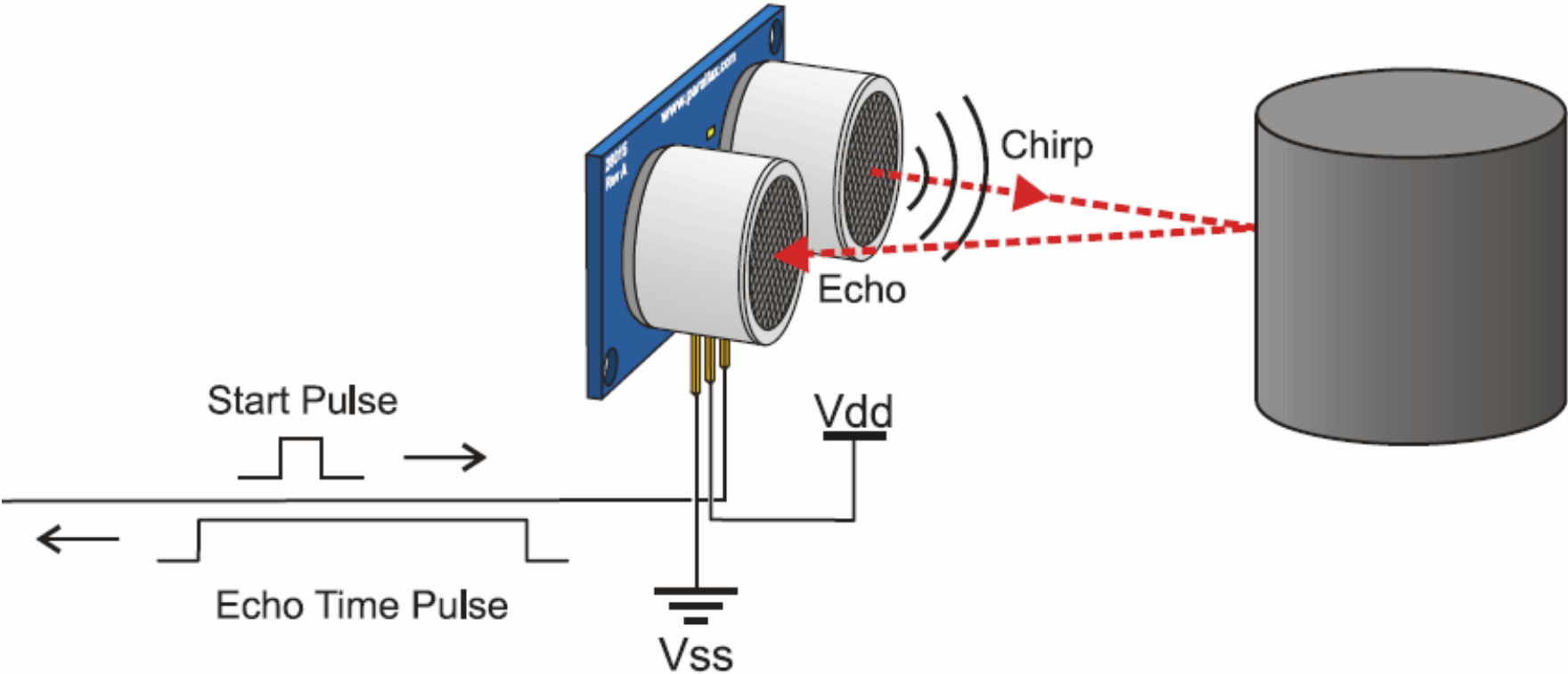


- Picam v2
- Pictures: 8 megapixel
- Video: 1080p at 30 fps, 720 at 60 fps

# Ultrasound Sensor

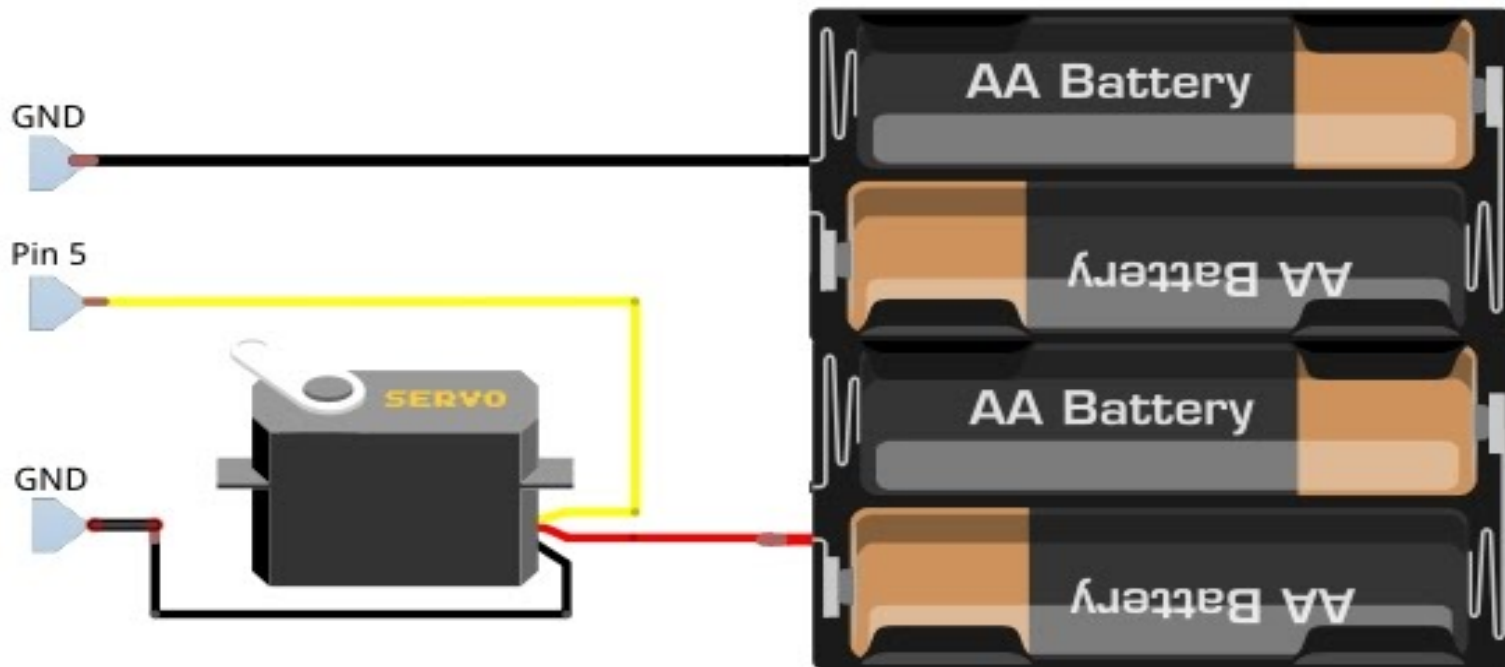


- Pins:
- Vcc
  - Gnd
  - Trig
  - Echo

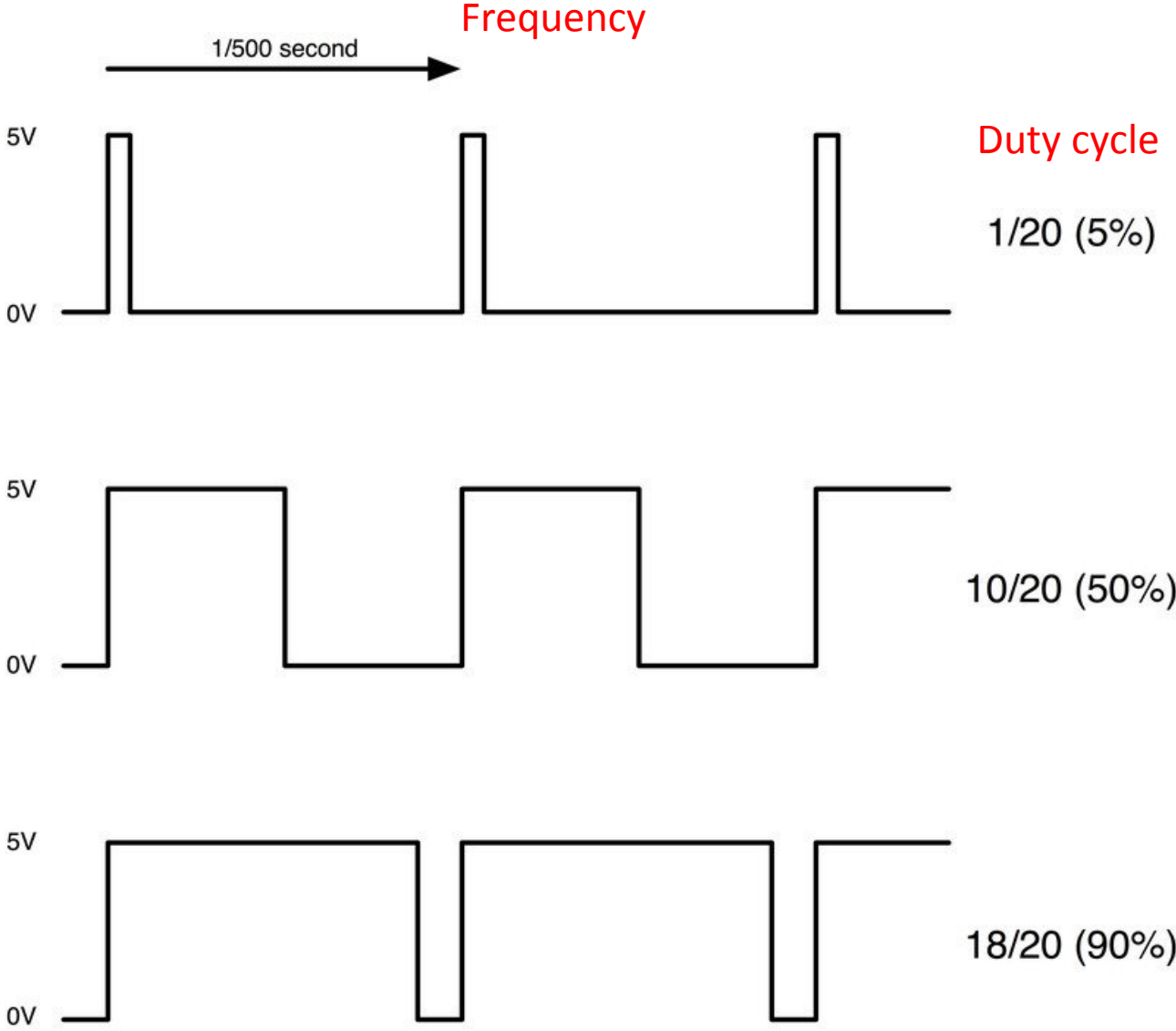


# Servo

- Standard servo
- Continuous rotation servo
- May need external batteries

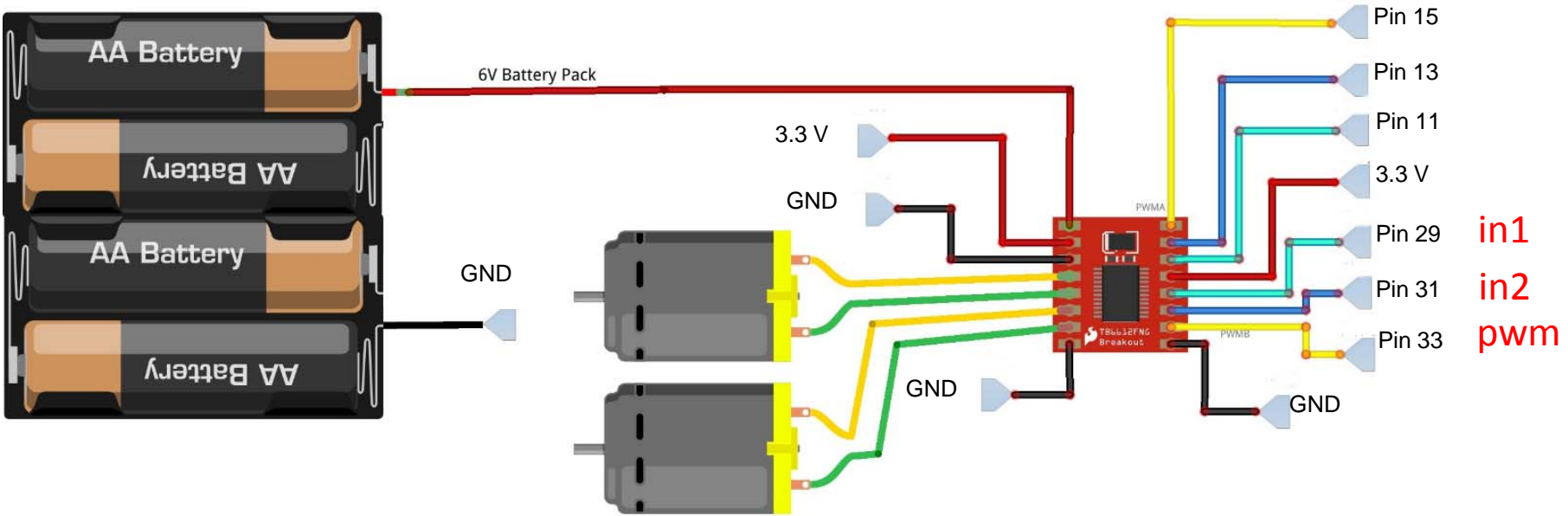


# PWM – Pulse Width Modulation



# DC Motor

- Need external batteries
- Motor driver (H-bridge)
- Control motor speed
- Stall torque

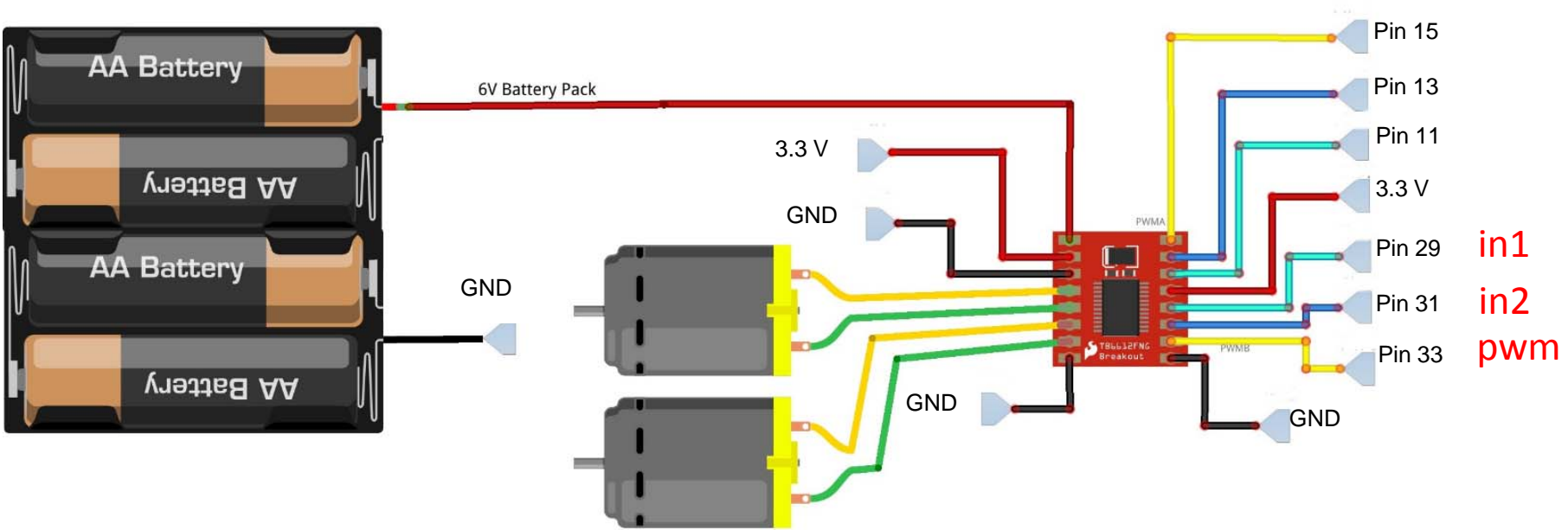




# DC Motor

pwm: speed of the motor

(in1, in2): (HIGH, LOW) forward  
(LOW, HIGH) backward  
(LOW, LOW) stop



# PWM Driver

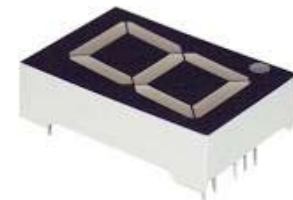


# Wheel Encoders



# Other Peripherals

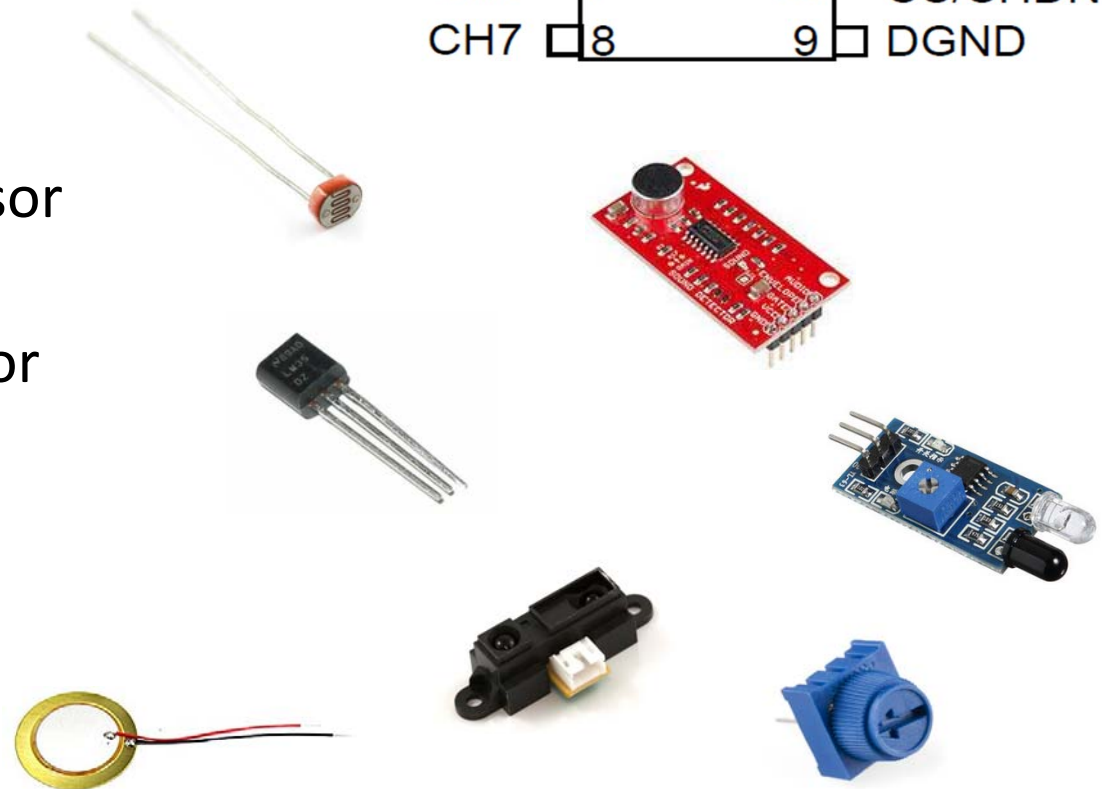
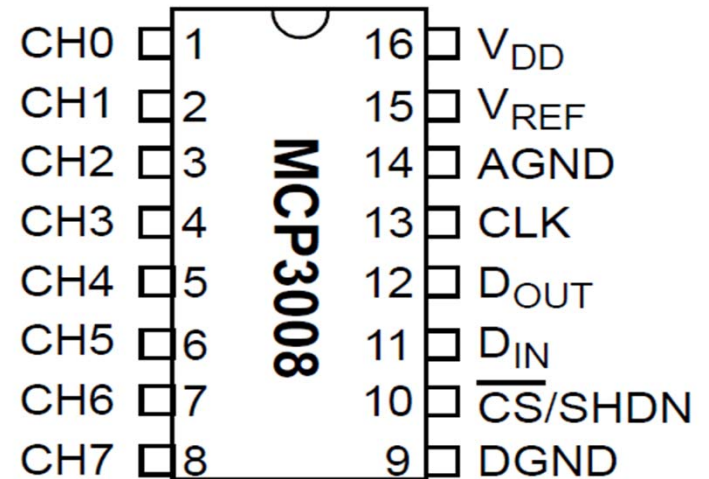
- Buzzer (used PWM)
- 7-segment display
- Bluetooth (to connect to Android App)
- PS3 Controller



# Analog input sensors

- Need an analog-to-digital convertor (ADC)
- Examples:
  - Light sensor
  - Temperature sensor
  - Sound sensor
  - IR proximity sensor
  - Vibration sensor
  - Trimpot
  - ...

## ADC



# Summary

- **Digital input: GPIO**
  - Button, line sensor, wheel encoder, ...
- **Digital output: GPIO**
  - LED, 7-segment display, ...
- **Analog input: ADC chip**
  - Light sensor, temperature sensor, sound sensor, IR proximity sensor, vibration sensor, trimpot, ...
- **Analog output: PWM signal**
  - Standard servo, continuous rotation servo, motor, buzzer, LED, ...
- **Picam camera**

# What can you do with a robot?

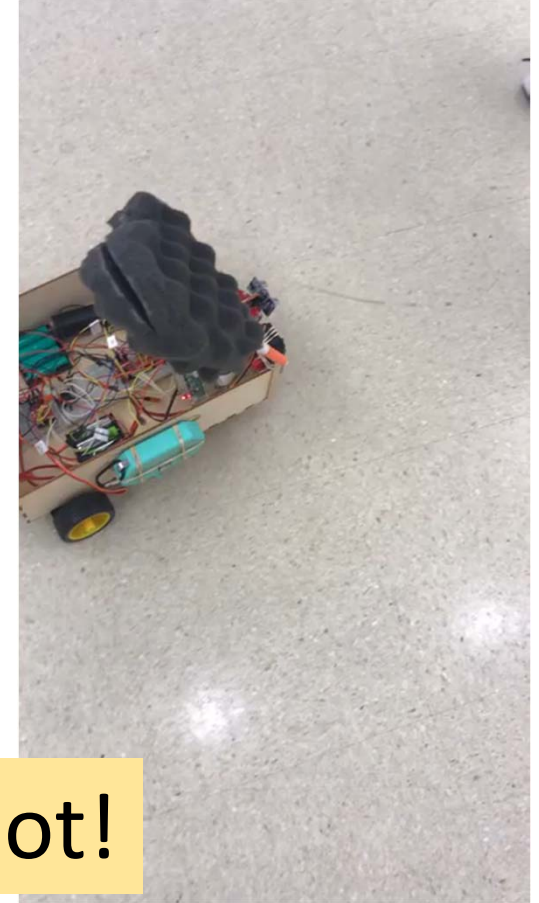
Draw



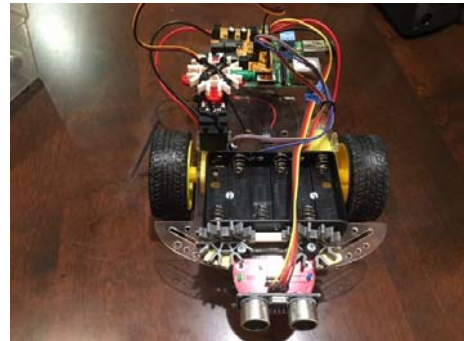
Chase a color



Avoid things



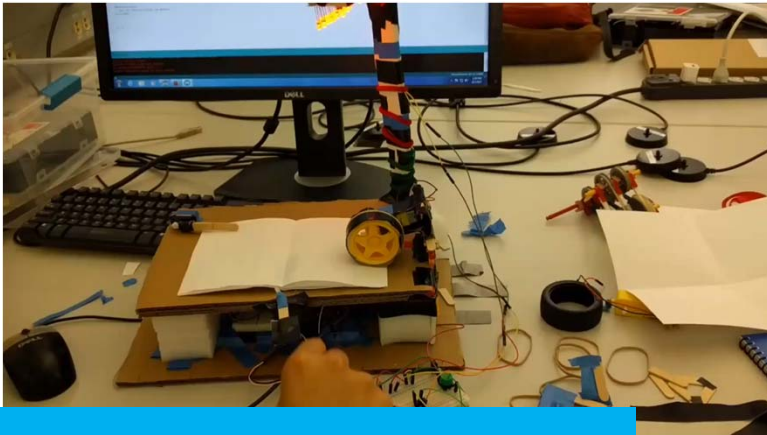
Mimic picobot!



Solve a line maze

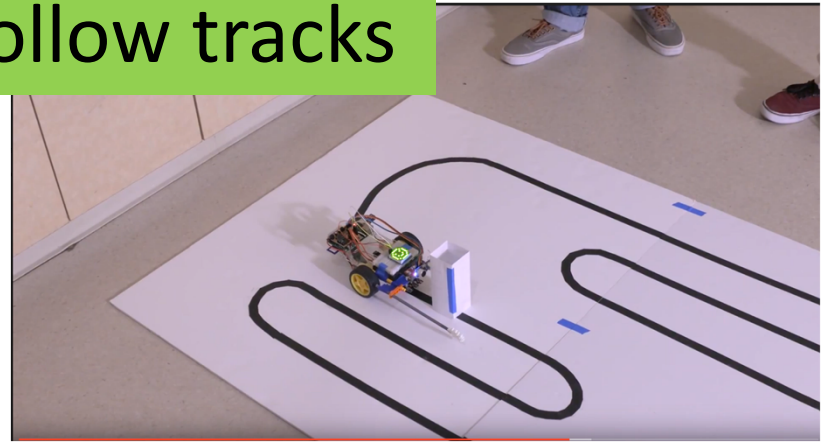


# What can you do with a robot?



Do tasks

Follow tracks



Create a game



Go around obstacles

