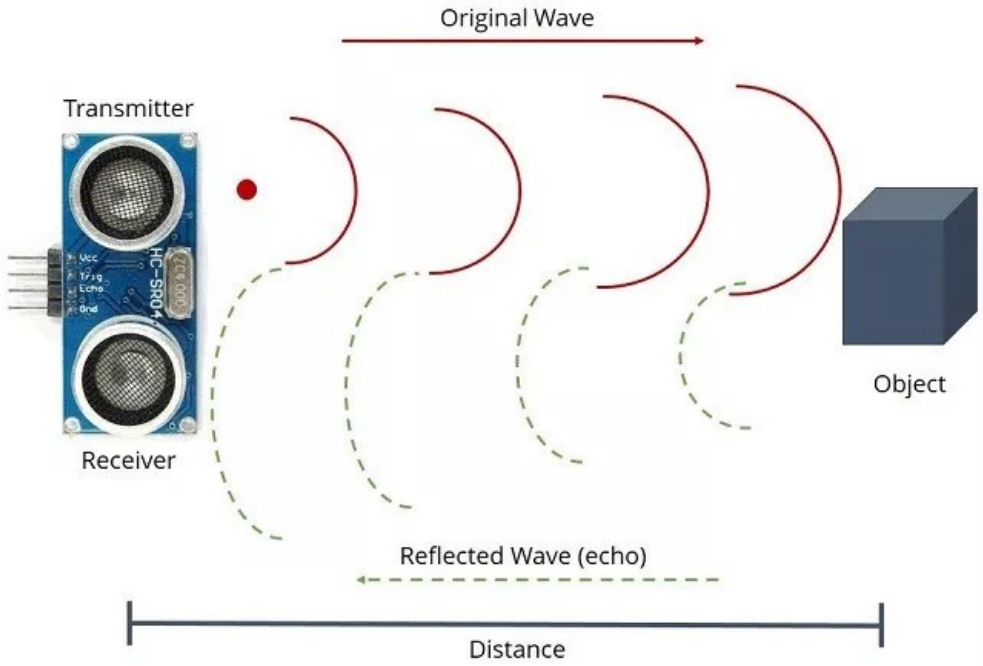
Ultrasonic Distance Sensor

- Works by sending pulse of sound and measuring how long it takes for echo to return
- Max range: 400cm
- **Doesn’t work in “Live” mode**

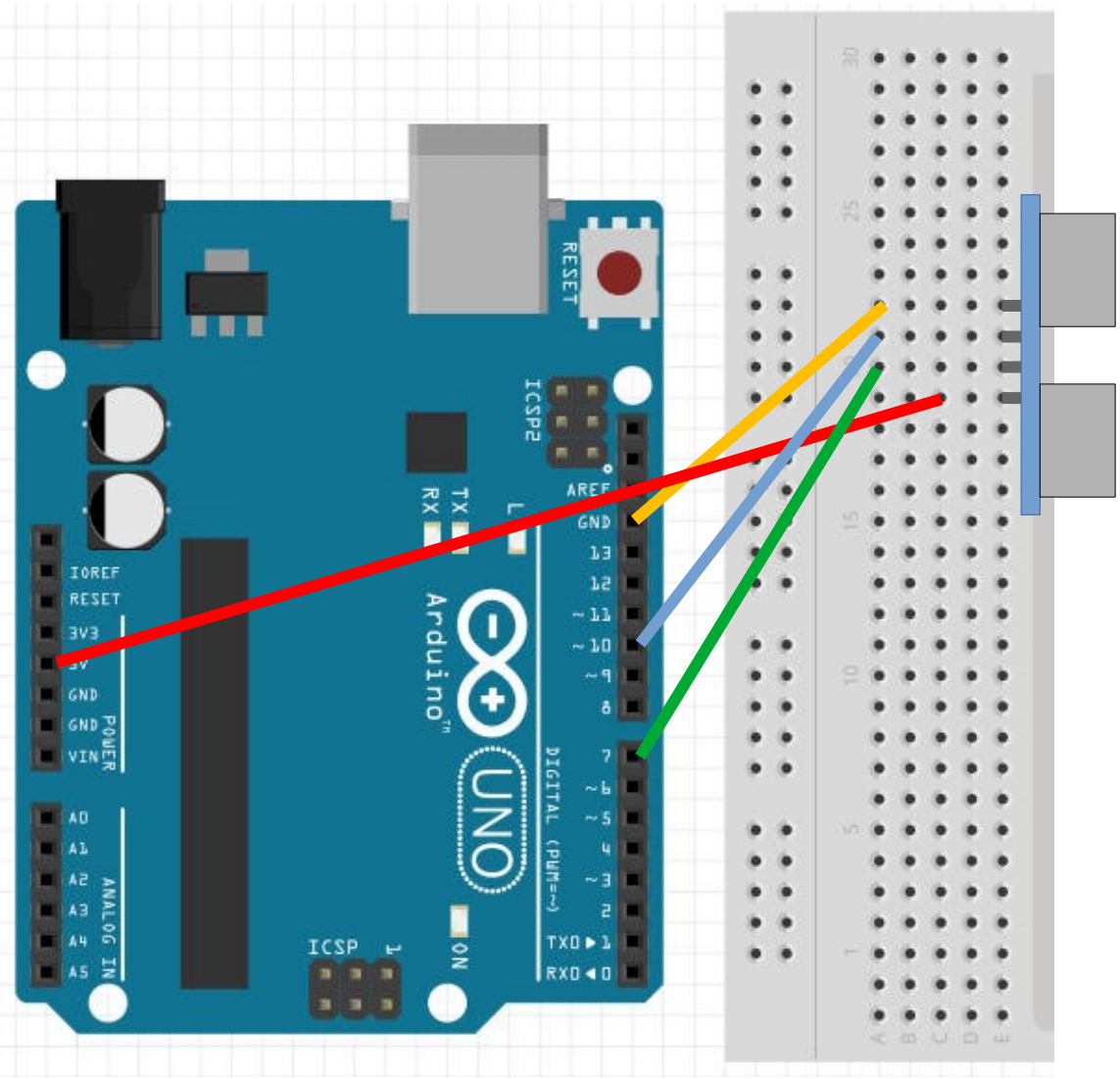
Ultrasonic Distance Sensor

- Total distance traveled by sound wave
  - Time x Speed of sound
- Distance to object
  - Total distance / 2
- Retrieve distance in cm using...



Slides available at: http://a9i.sg/huayi

Ultrasonic Distance Sensor



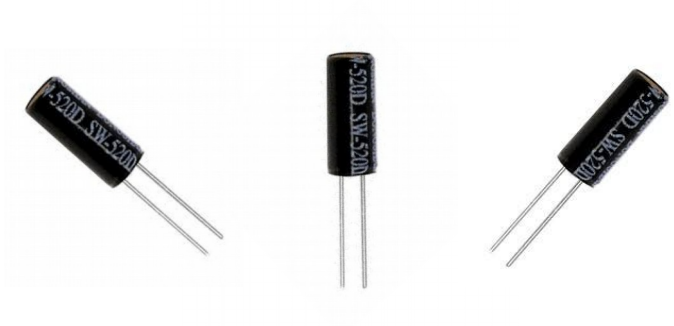
Pins Connections

Sensor	Arduino
Vcc	5V
Trig	Any I/O (Pin 2 to 12)
Echo	Any I/O (Pin 2 to 12)
Gnd	Gnd

Tilt Switch

- Works just like a push button switch
  - Need pull-up / pull-down resistor!
- Turns on when tilted upwards
- Turns off when tilted downwards

On Position

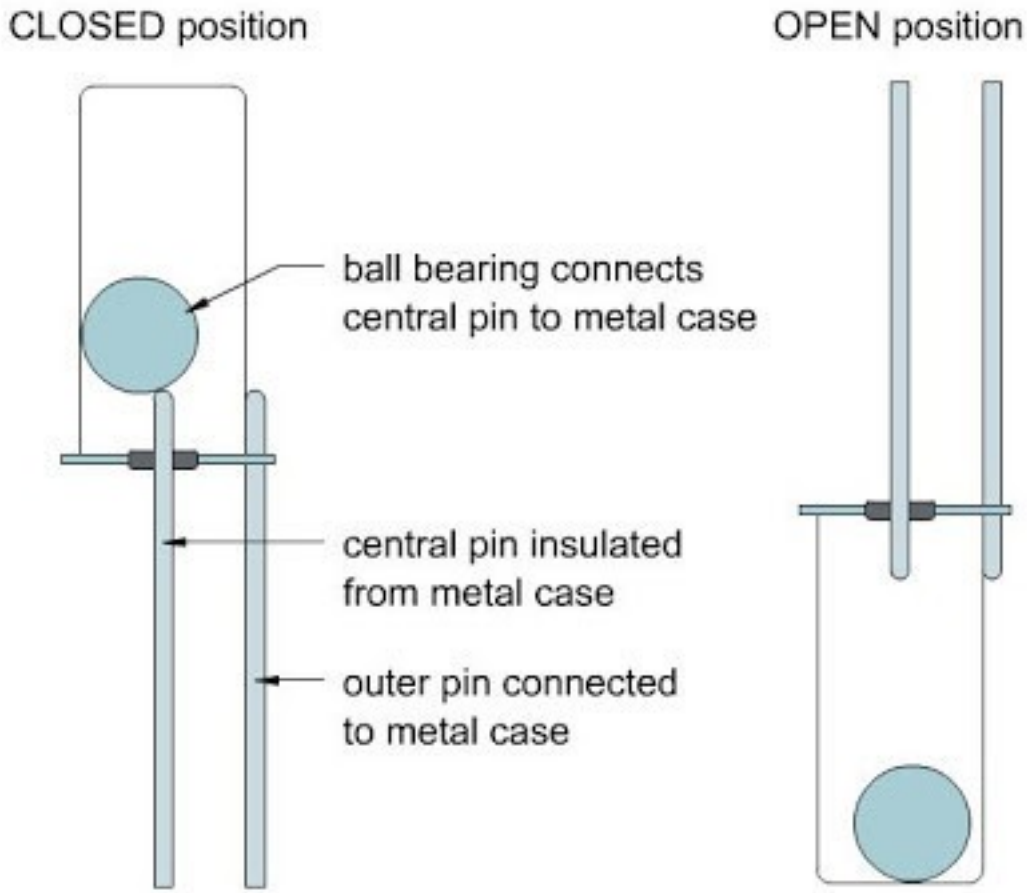


Off Position

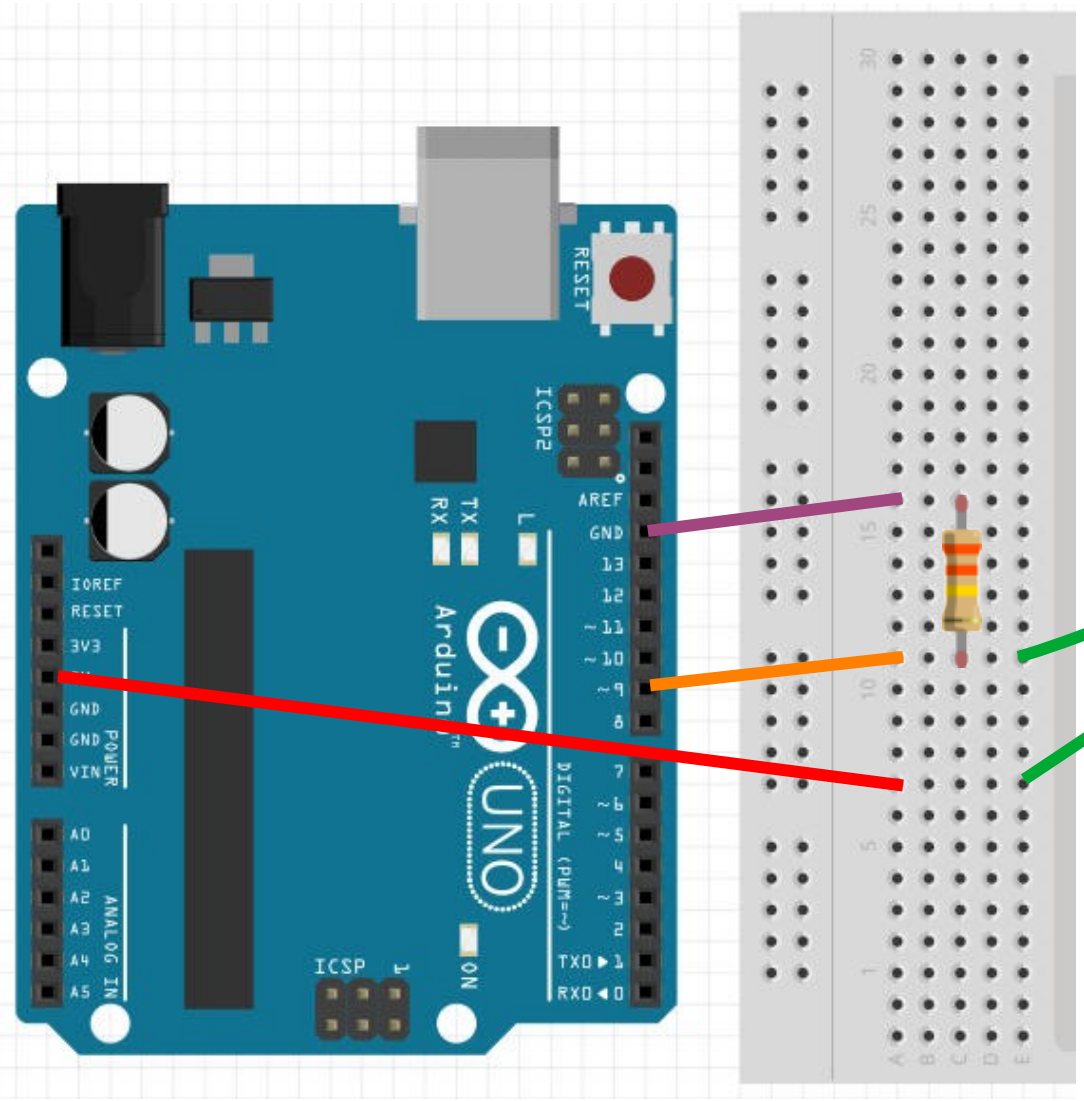
Slides available at: http://a9i.sg/huayi

Tilt Switch

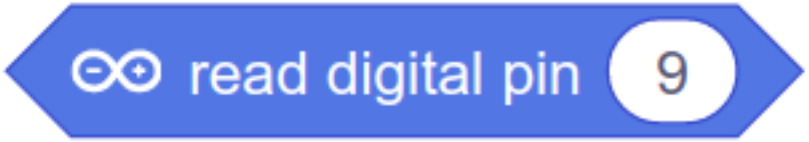
- Metal ball complete connection when switch pointed upwards



Tilt Switch



Read using “read digital pin”



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PIR Sensor

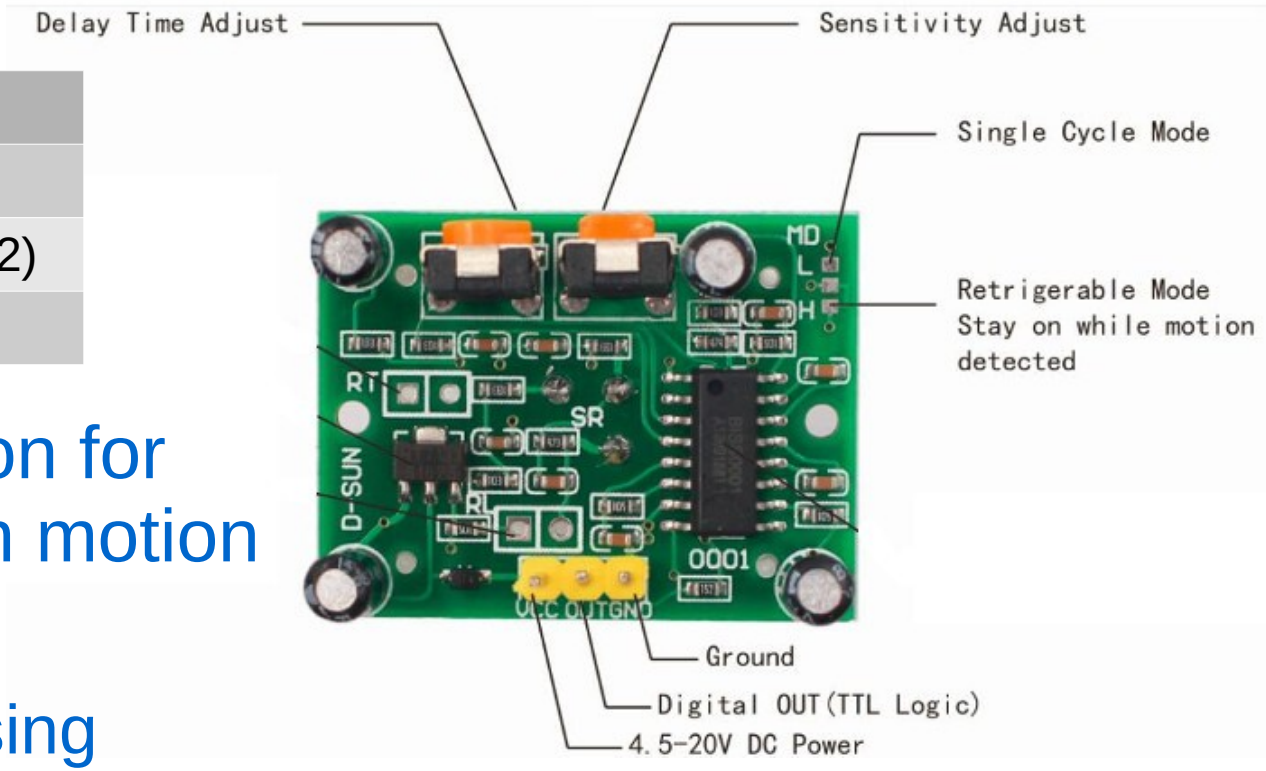
- Passive Infrared Sensor
- Detects far infrared produced by warm objects (eg. human body)
- Can only detect motion, not stationary objects

Slides available at: http://a9i.sg/huayi

PIR Sensor

Pins Connections

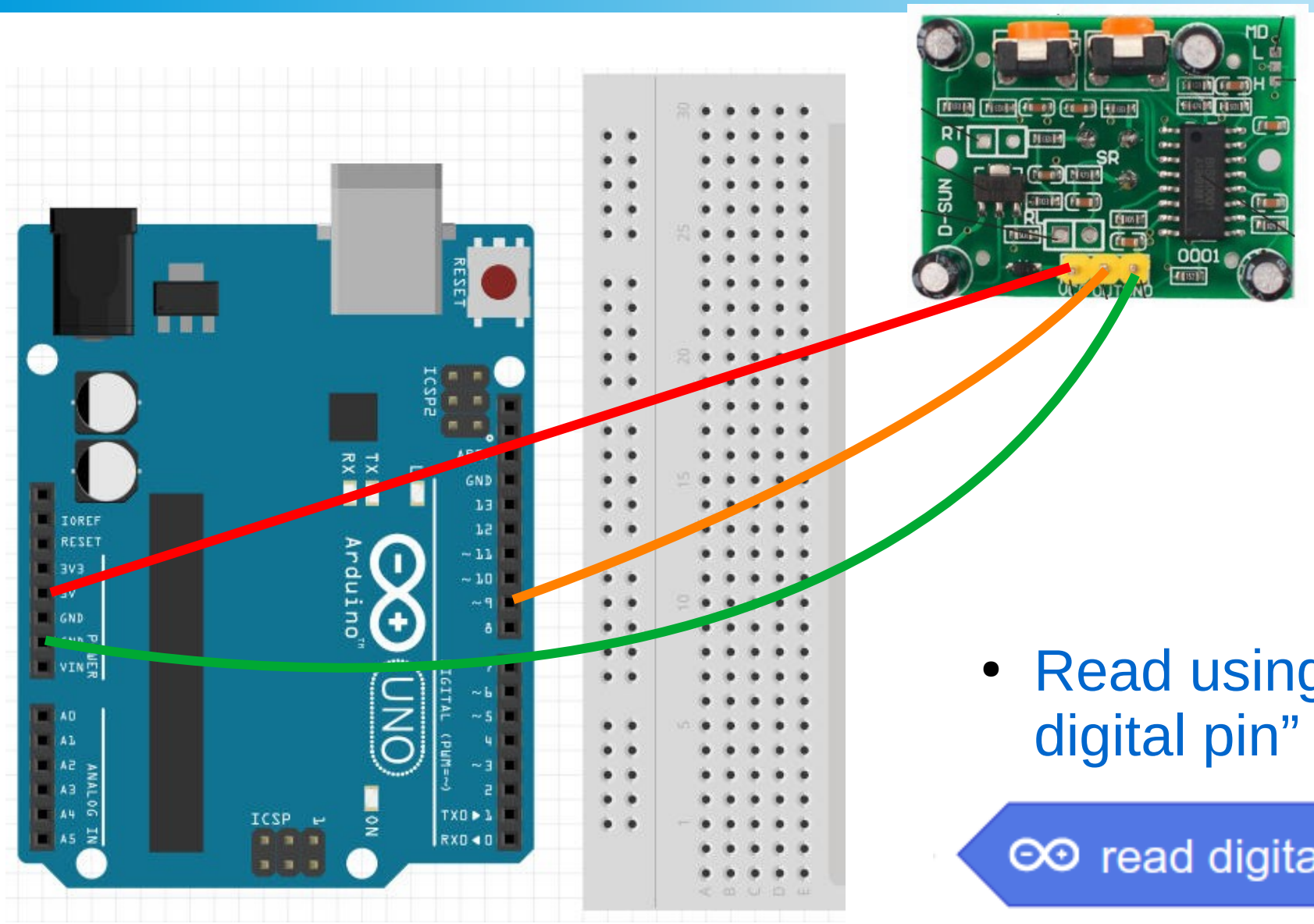
Sensor	Arduino
Vcc / Power	5V
Out	Any I/O (Pin 2 to 12)
Gnd	Gnd



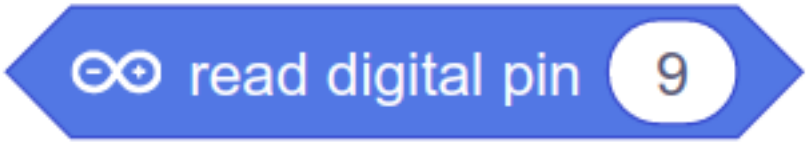
- Turns on and stay on for short duration when motion detected
  - Adjust duration using “Delay Time Adjust”

Slides available at: http://a9i.sg/huayi

PIR Sensor



- Read using “read digital pin”



Slides available at: http://a9i.sg/huayi

Heart Rate Sensor

- Measures amount of light passing through skin
- Amount of light changes with blood flow
- Provides analog voltage signal

Heart Rate Sensor

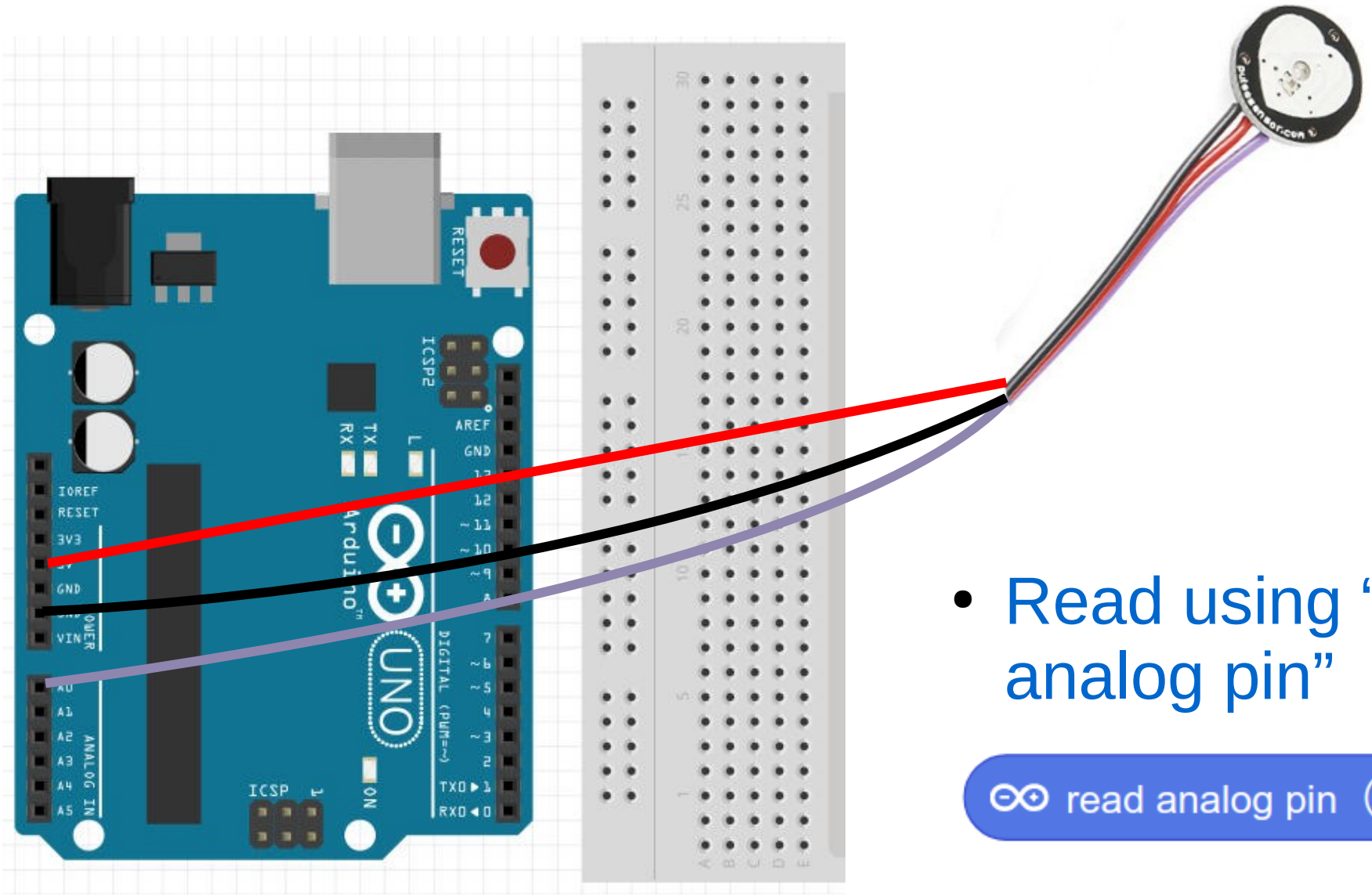
Pins Connections

Sensor	Arduino
Red	5V
Purple	Any Analog (A0 - A5)
Black	Gnd

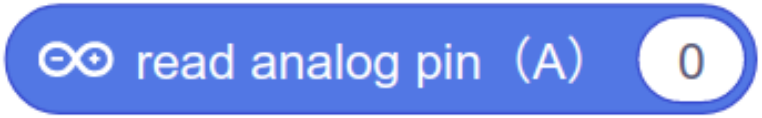
-

- Voltage rises above mid-point (512) on every pulse

Heart Rate Sensor



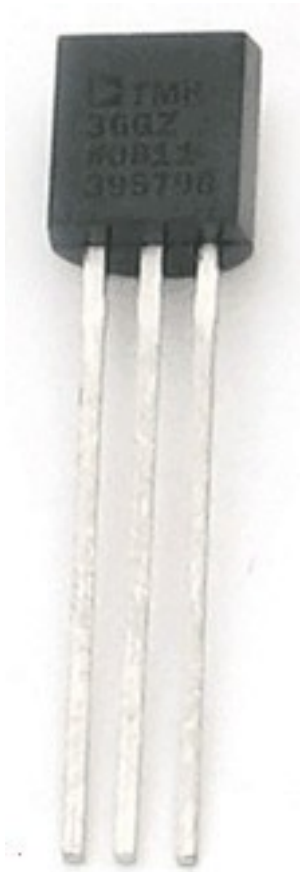
- Read using “read analog pin”



Slides available at: http://a9i.sg/huayi

Temperature Sensor

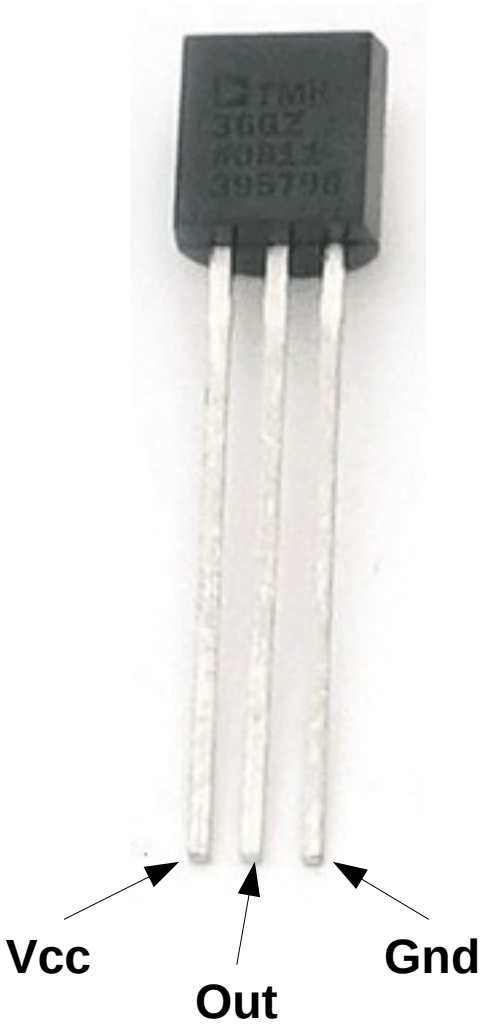
- Model: TMP36
- Range: -40°C to 150°C
- Uses semi-conductors to measure temperature
- Outputs an analog voltage



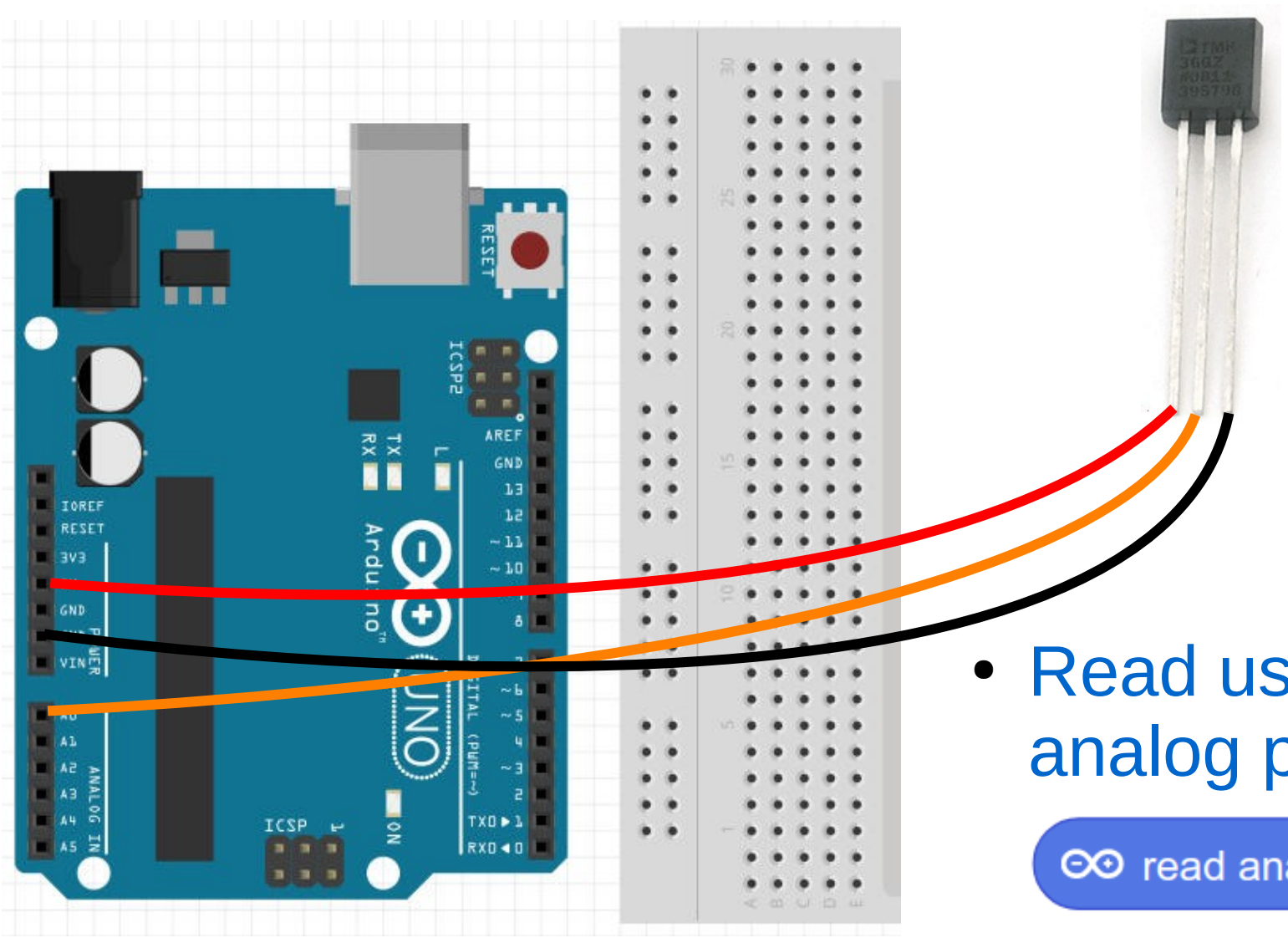
Temperature Sensor

Pins Connections

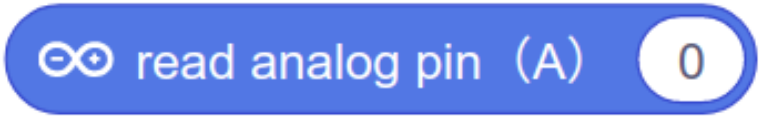
Sensor	Arduino
Vcc	5V
Out	Any Analog (A0 - A5)
Gnd	Gnd



Temperature Sensor



- Read using “read analog pin”



Temperature Sensor

Calculate temperature:

- Convert analog reading to voltage

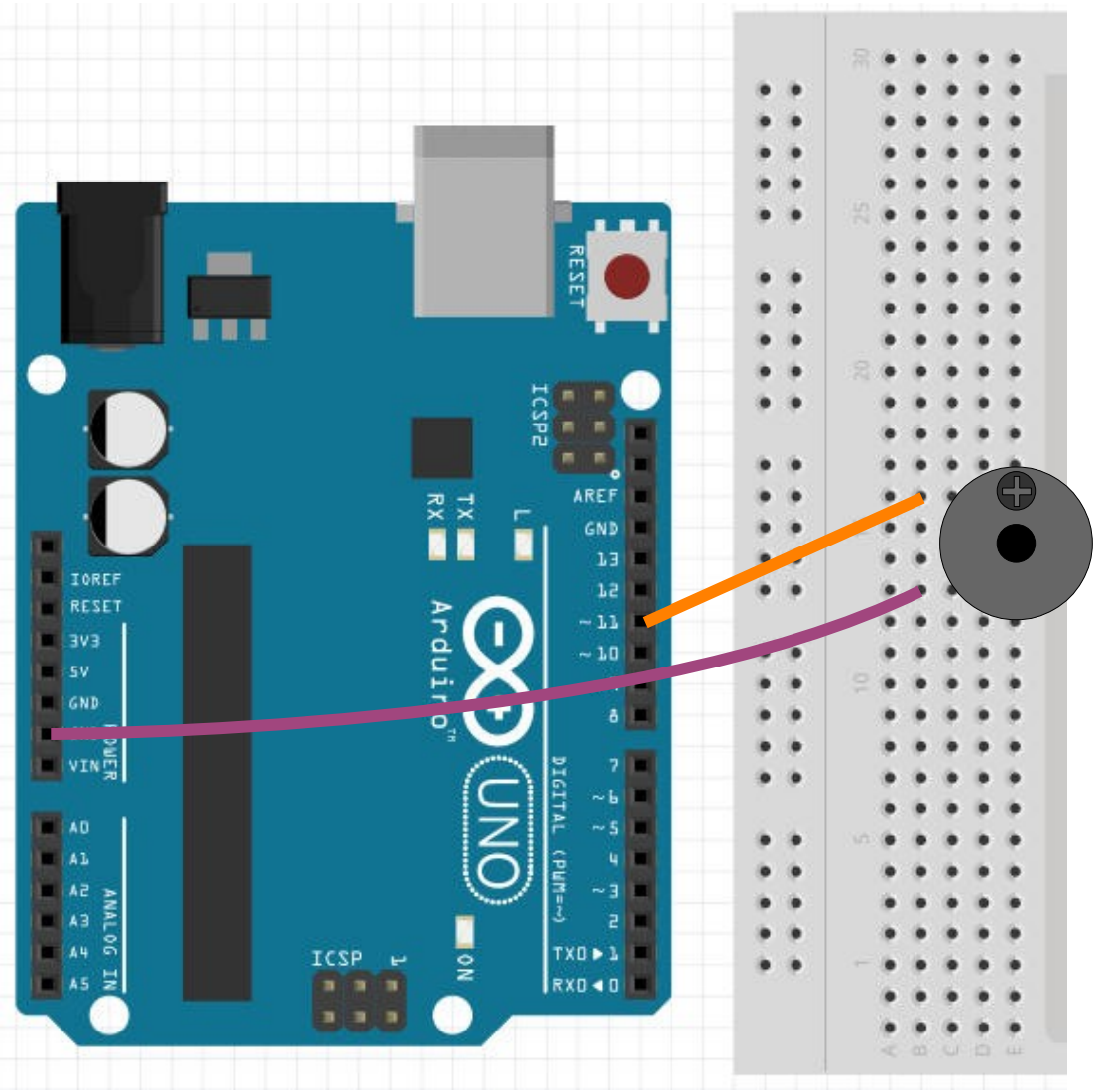
- Convert voltage to °C
  - Temperature = (Voltage – 0.5) x 100

Active Buzzer

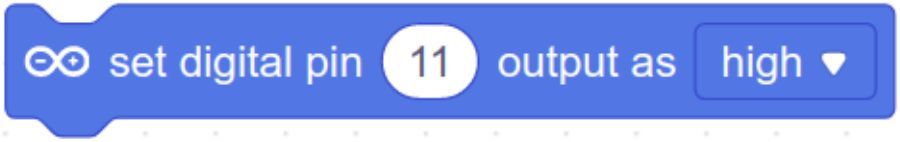
Pins Connections

Buzzer	Arduino
+	Any I/O (Pin 2 to 12)
-	Gnd

- Don’t require resistor
- Cannot be reversed
- Plays only a single tone, cannot control tone or play music



- Control using “Set digital pin”



Servo Motor

- Built-in electronics controls motor position
- Range: 0 to 180 degrees
- **Cannot rotate continuously!**

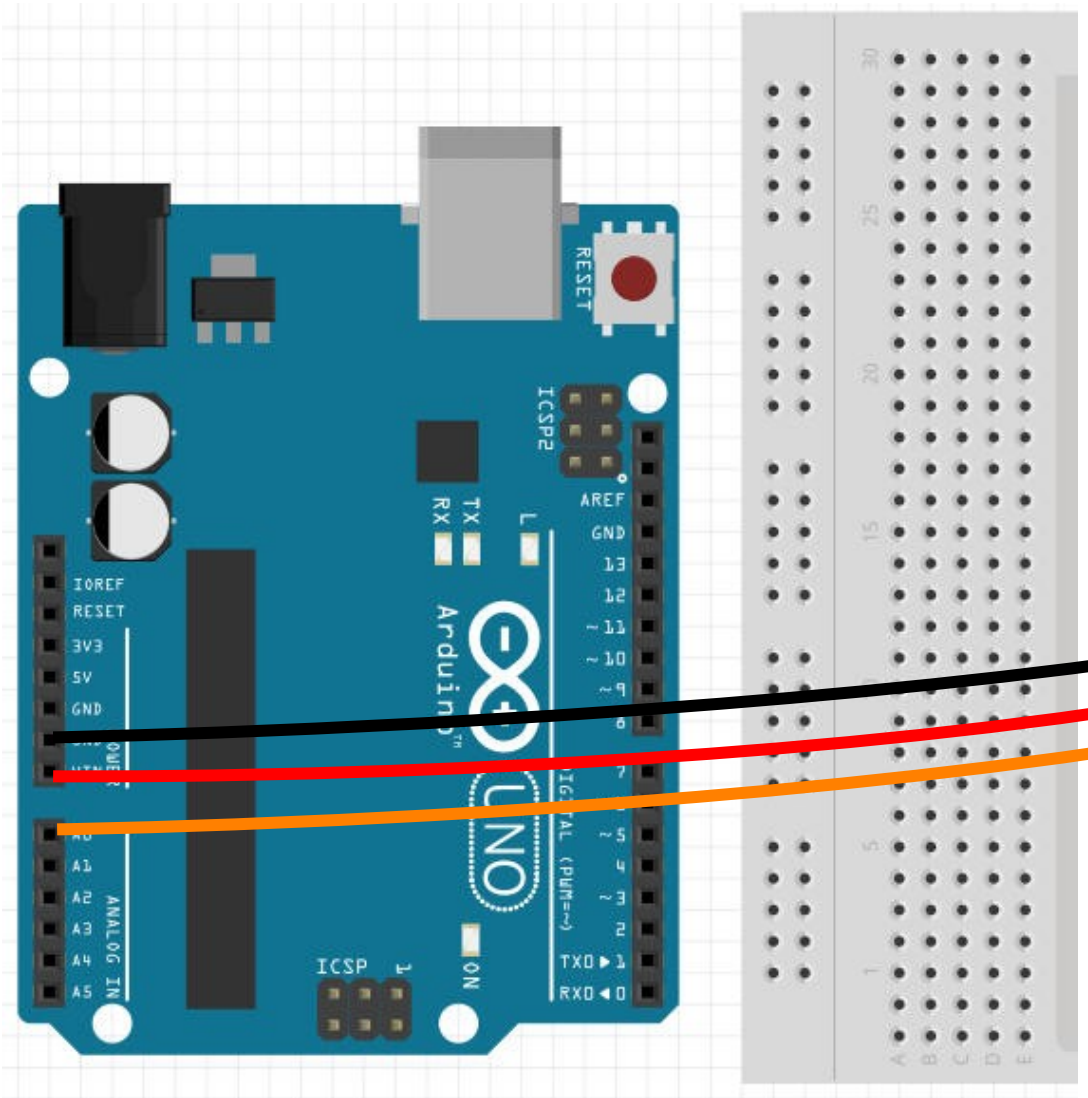
Servo Motor

Pins Connections

Buzzer	Arduino
Brown	Gnd
Red	Vcc or Vin *
Orange	Any I/O (Pin 2 to 12)

* Recommend to use Vin

Servo Motor



- Control using “Set servo pin”