

Robotics Workshop

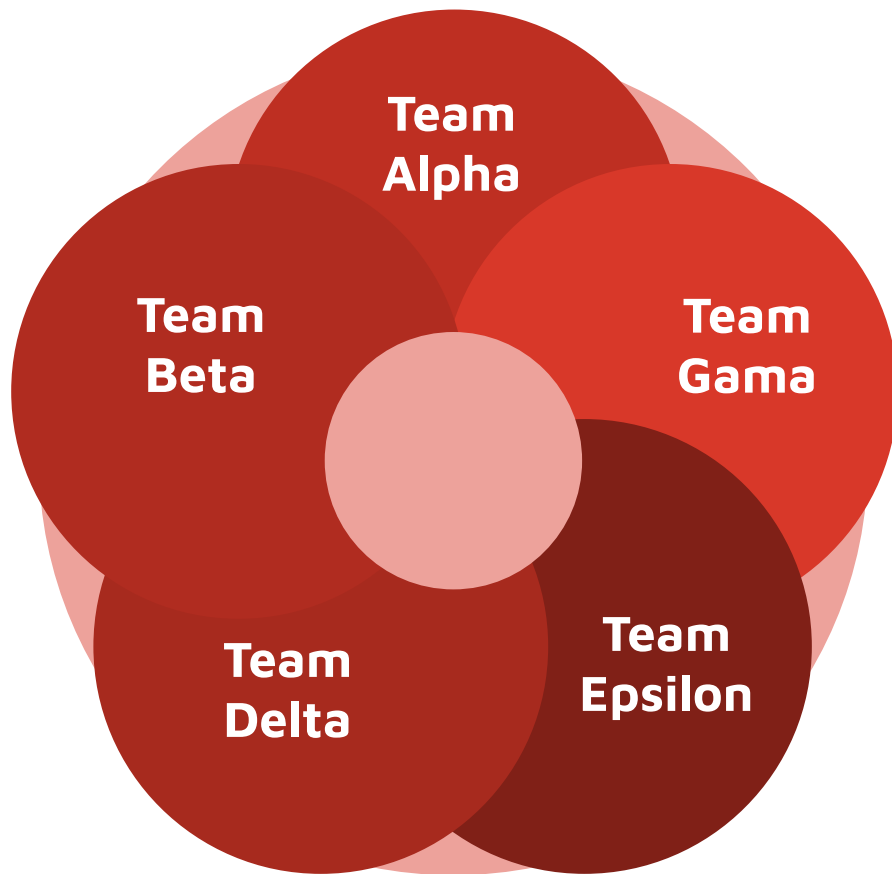
For Mentorship Program





Workshop Outline :

Date	Event
24 March 2022	Circuits & Arduino
25 March 2022	Working Principle of Different Sensors
26 March 2022	Line Follower Robot
27 March 2022	Project Hunt
28 March 2022	Project Hunt
29 March 2022	Project Hunt



Team Alpha  Shad & Joy Raj

Team Beta  Mowaz & Sajjad

Team Gama  Aditto & Nihal

Team Delta  Afif & Razin

Team Epsilon  Prमित & Anwoy



Juniors (2019 Batch)



Circuit

1. Electricity
2. Voltage
3. Current
4. Resistance
5. Ohm's Law
6. Resistance in Series and Parallel
7. Resistance Color Coding
8. Breadboard

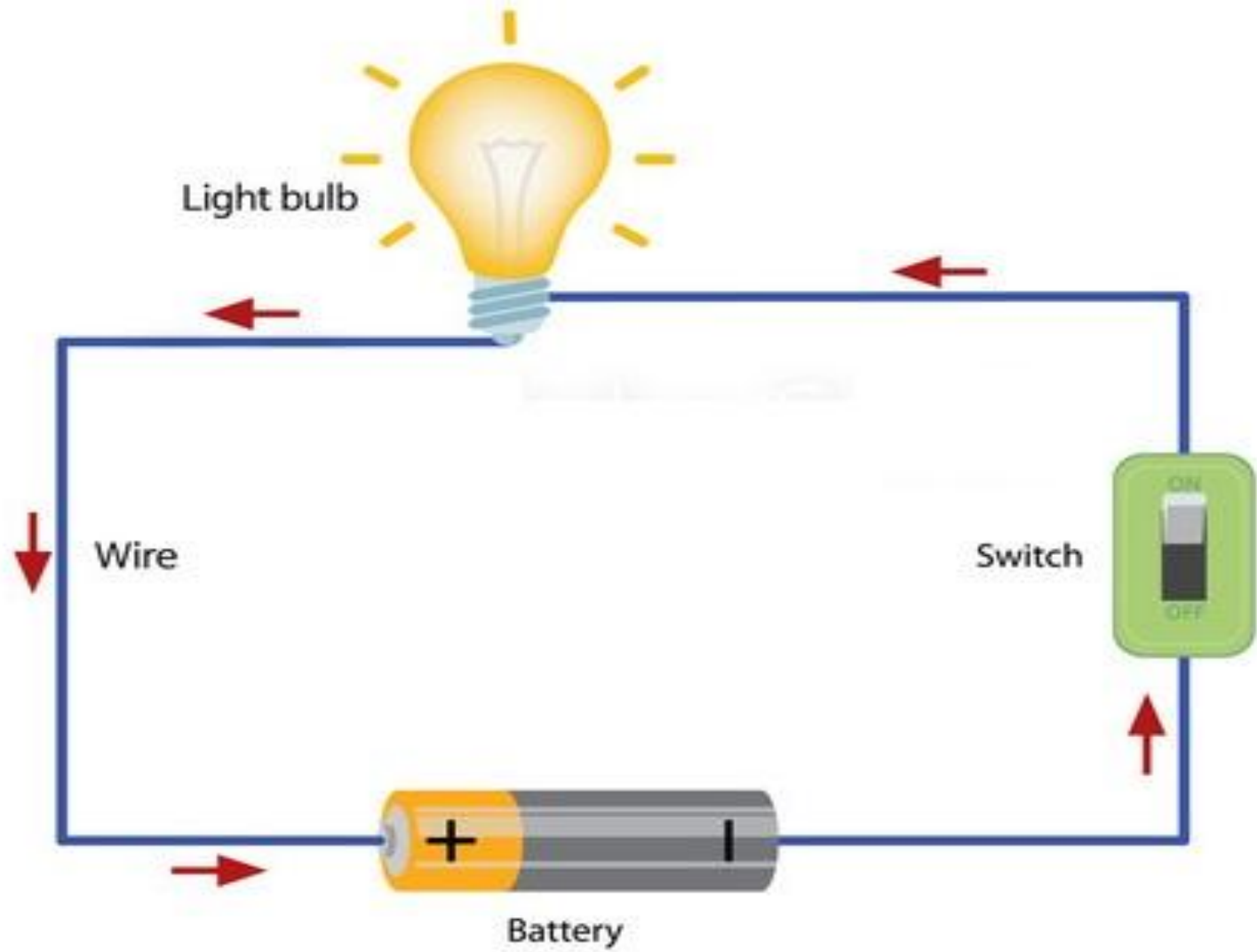
Arduino

1. About Arduino
2. Parts of the Arduino
3. Arduino IDE
4. Blinking LED with Arduino



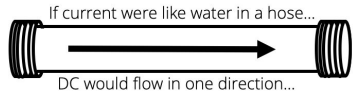
Electricity

- Static Electricity
- Dynamic Electricity
 - Direct Current
 - Alternating Current



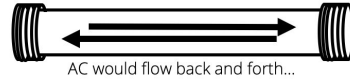
Alternating Current vs Direct Current

DC

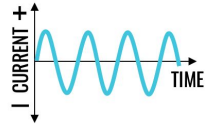


FREEING
ENERGY

AC



Things that use DC



Things that use AC

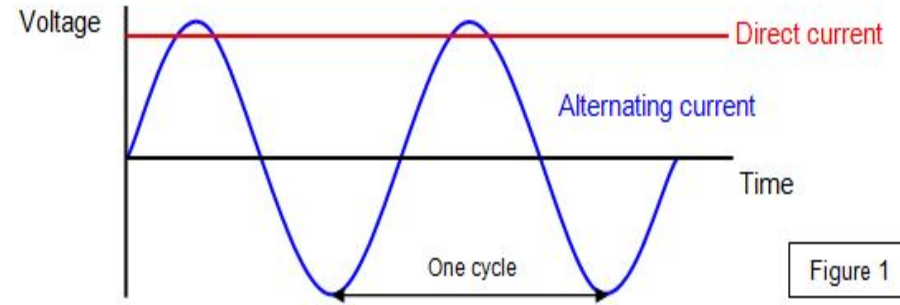
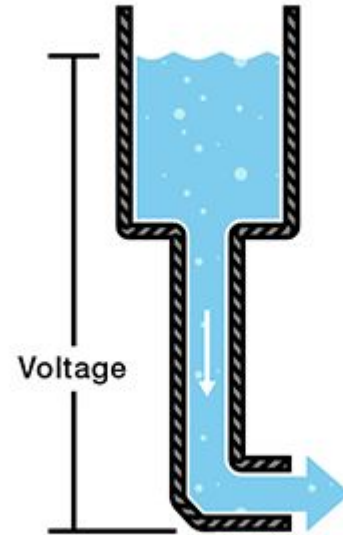
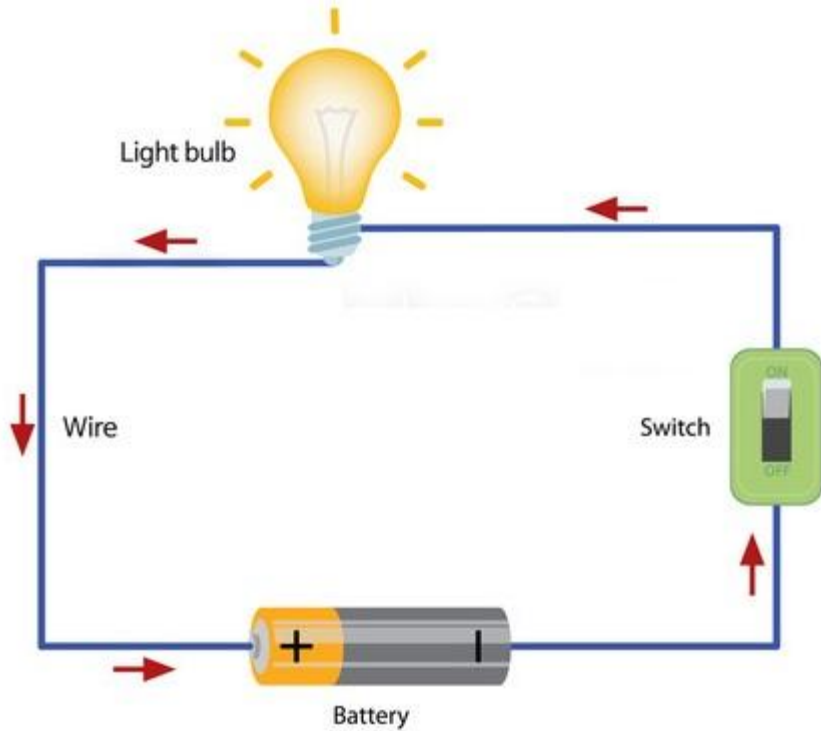
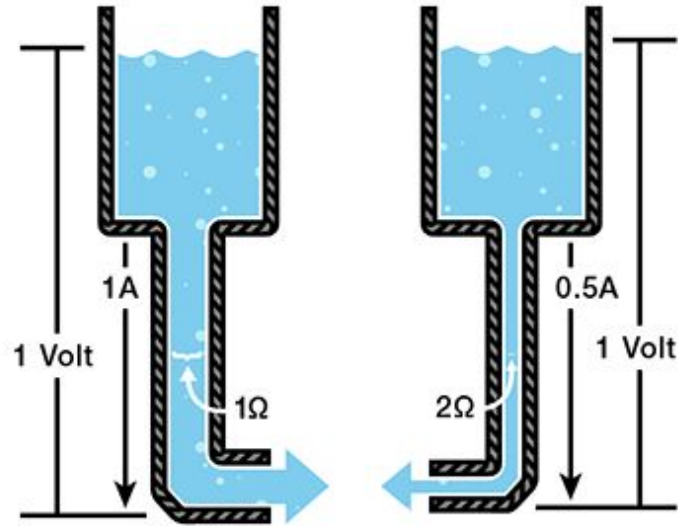


Figure 1

Voltage

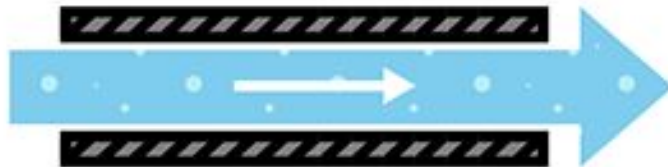


Current



Resistance

Less resistance



More resistance



Electricity is like a water hose

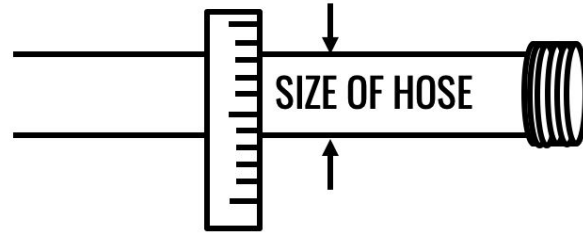
Voltage

Volts (V)



Current

Amps (A or I)



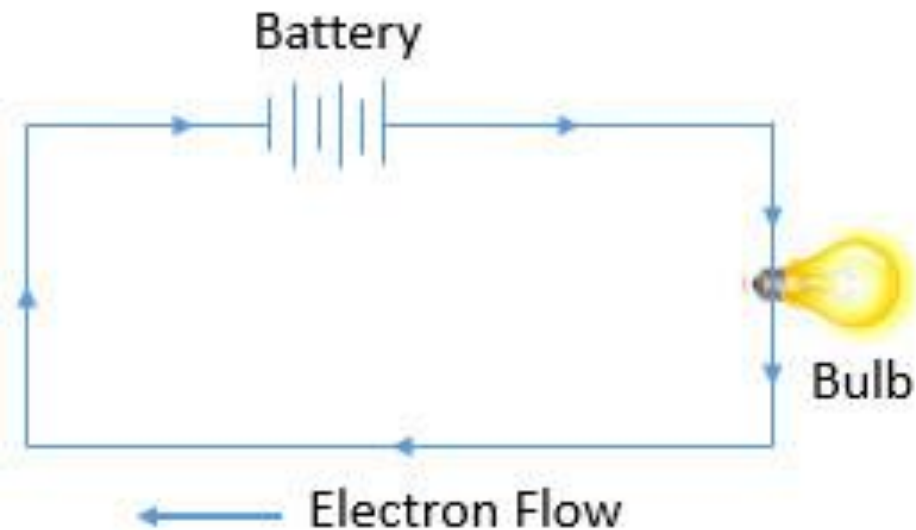
Resistance

Ohms (R or Ω)



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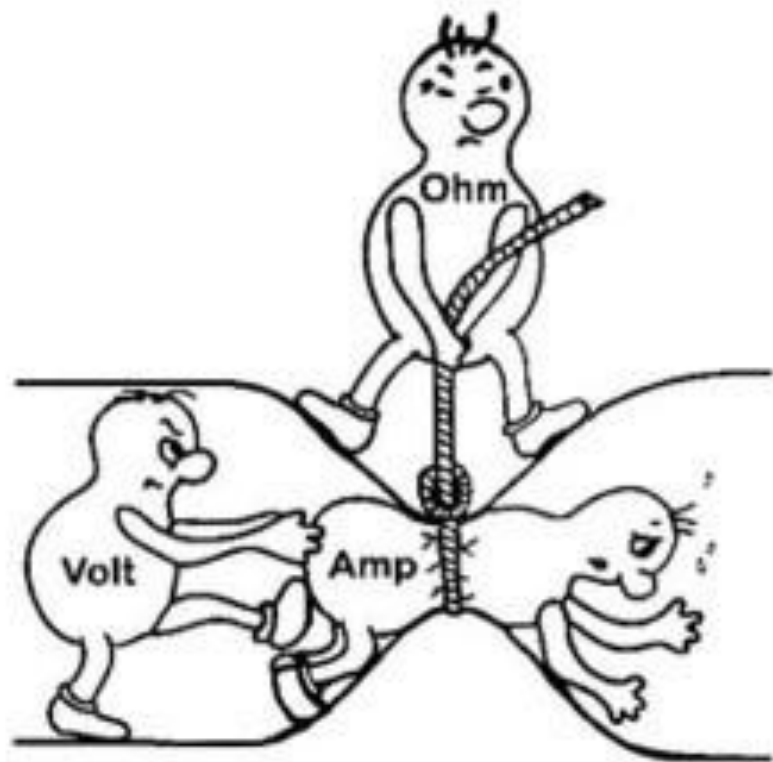
Ohm's Law



Resistance (R) = Bulb

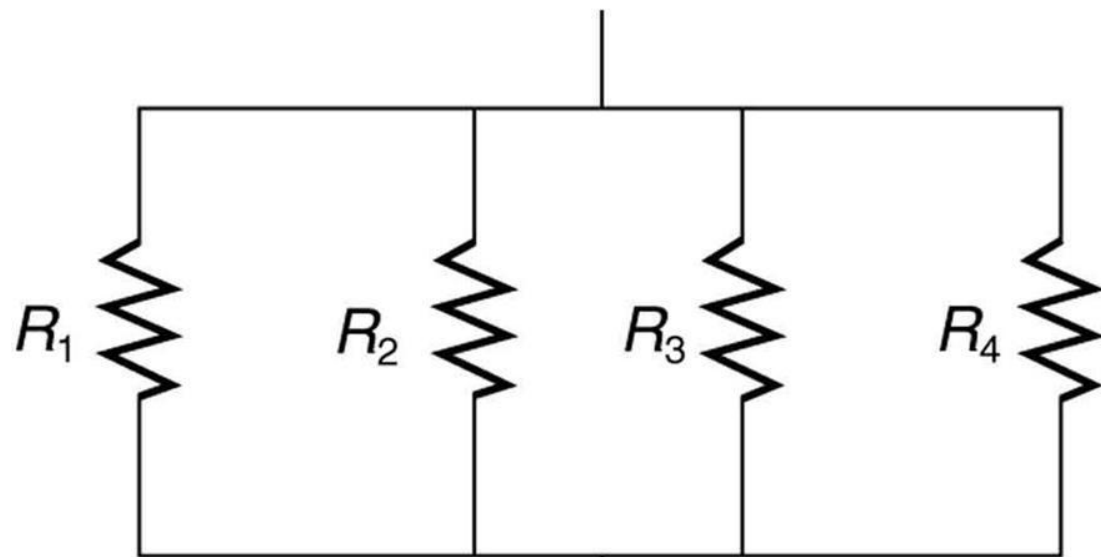
Current (I) = Flow of Electron

Voltage (V) = Battery

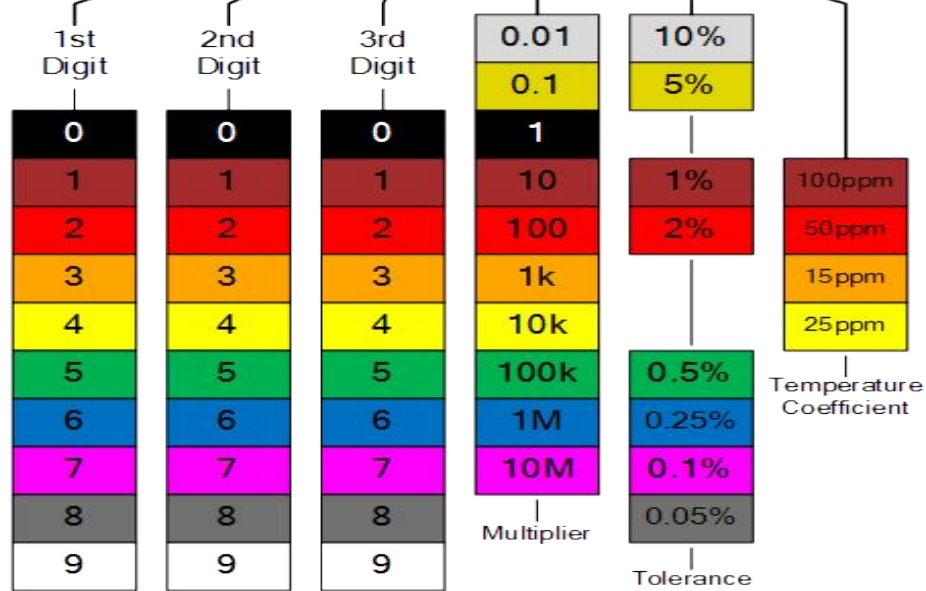
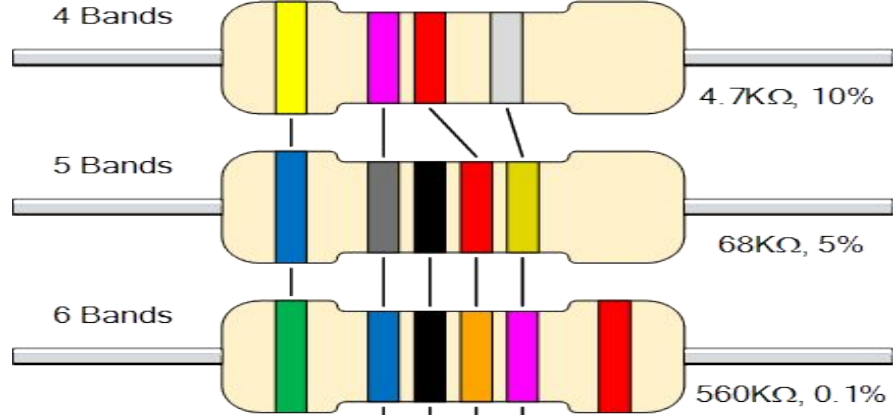




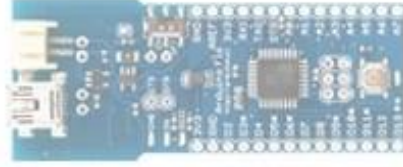
(a)



(b)



Arduino

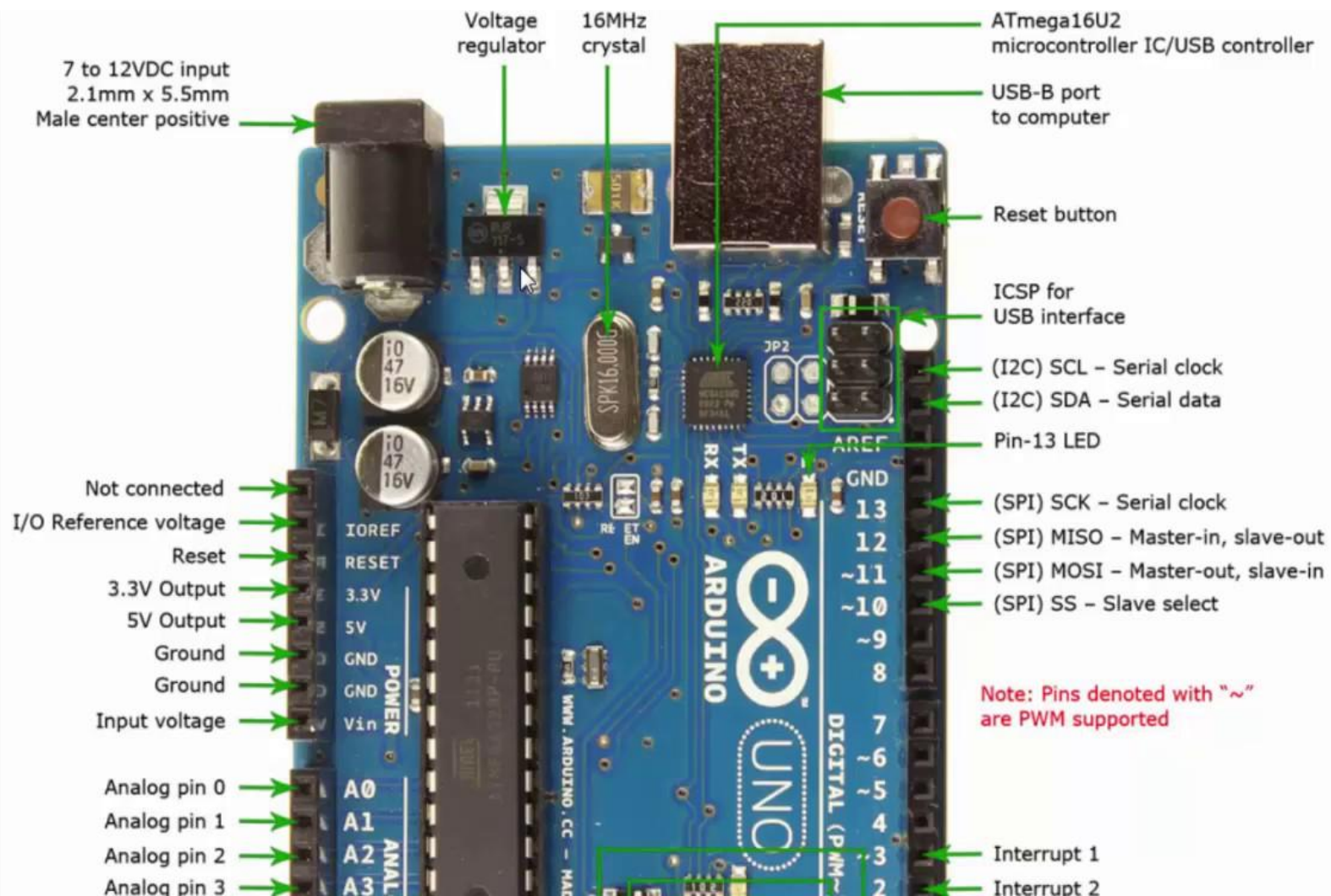




Arduino Specifications

- Microcontroller : ATmega328
- Operating Voltage : 5 V
- Input Voltage (Recommended) : 7-12 V
- Input Voltage (Limits) : 6-20 V
- Digital I/O pins : 14 (PWM pin = 6)
- Analog Input Pins : 6
- DC Current per I/O pin : 40mA
- DC Current for 3.3V pin : 50mA
- Flash Memory : 32 KB
- Clock Speed : 16 MHz





Pulse Width Modulation

0% Duty Cycle – `analogWrite(0)`



25% Duty Cycle – `analogWrite(64)`



50% Duty Cycle – `analogWrite(127)`



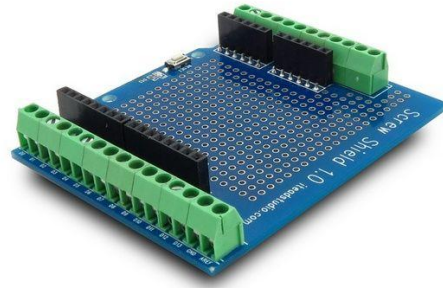
75% Duty Cycle – `analogWrite(191)`



100% Duty Cycle – `analogWrite(255)`



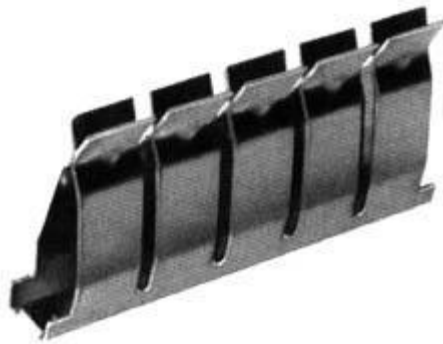
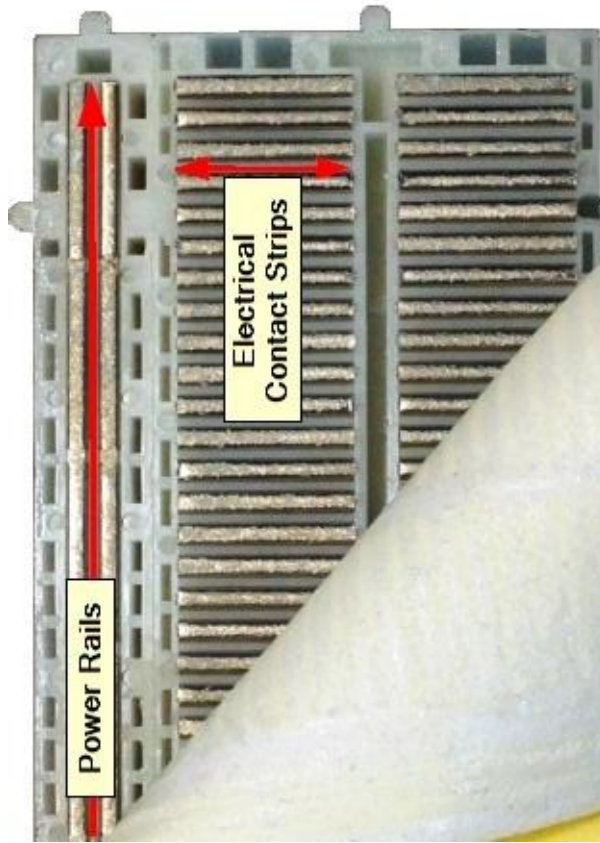
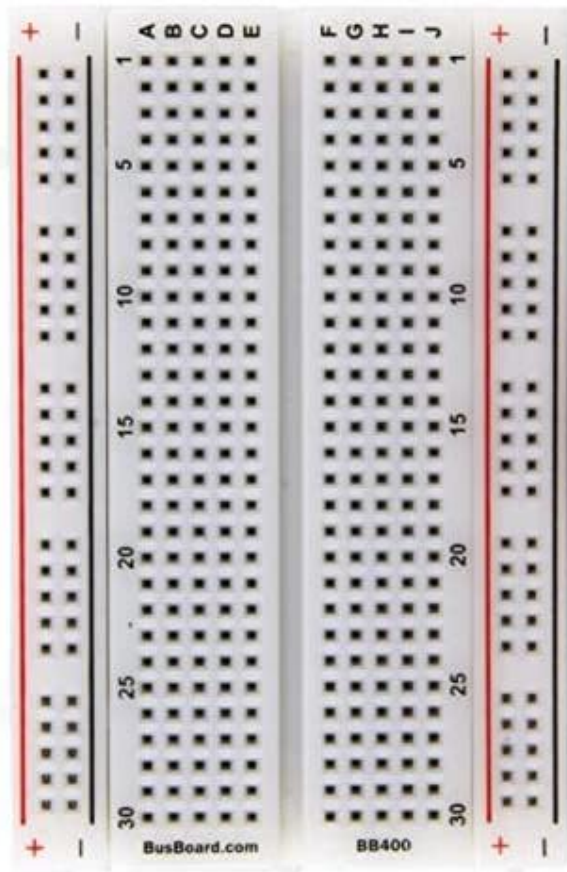
It is to let a shield know what voltage levels to expect on the IO pins from the underlying Arduino.
3.3V or 5V.



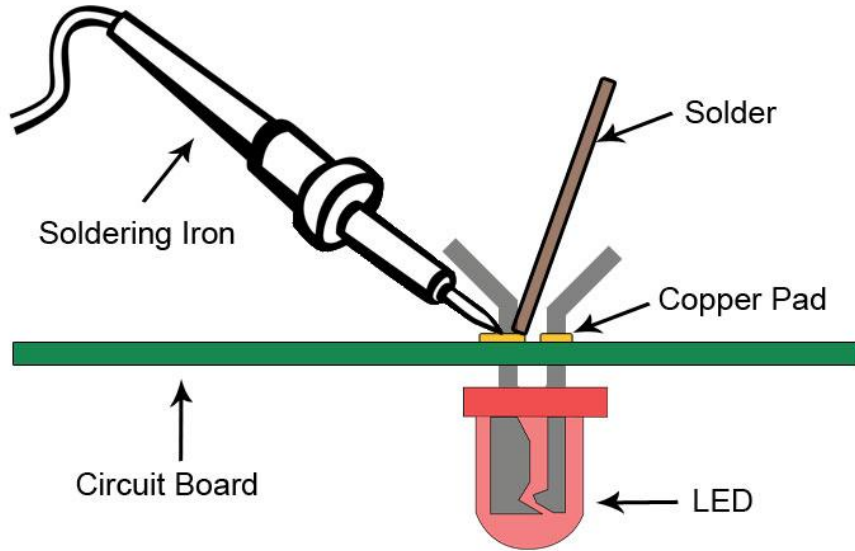
Shields are **boards that can be plugged on top of the Arduino PCB extending its capabilities**. The different shields follow the same philosophy as the original toolkit: they are easy to mount, and cheap to produce.



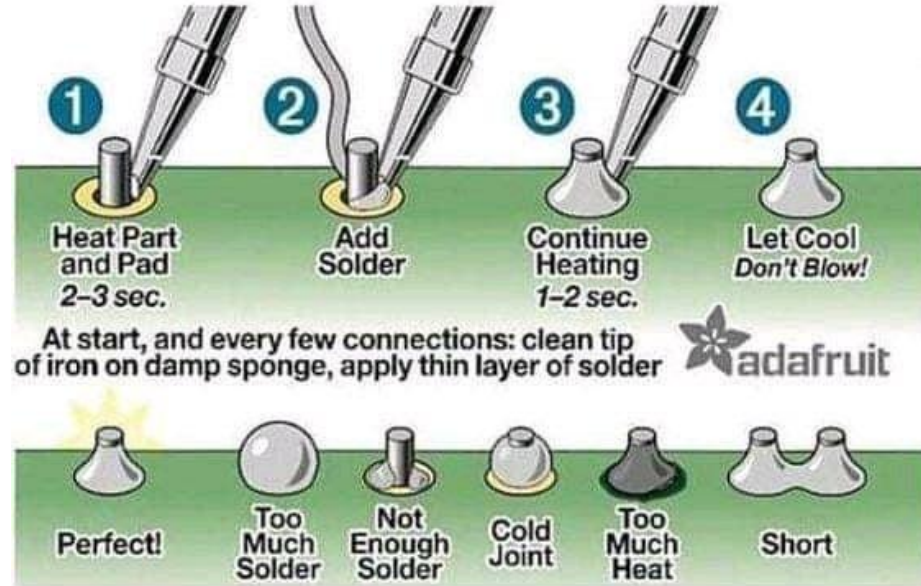
Always read resistors from left to right. - Resistors never start with a metallic band on the left. If you have a resistor with a gold or silver band on one end, you have a 5% or 10% tolerance resistor. Position the resistor with this band on the right side and again read your resistor from left to right.



How To Solder

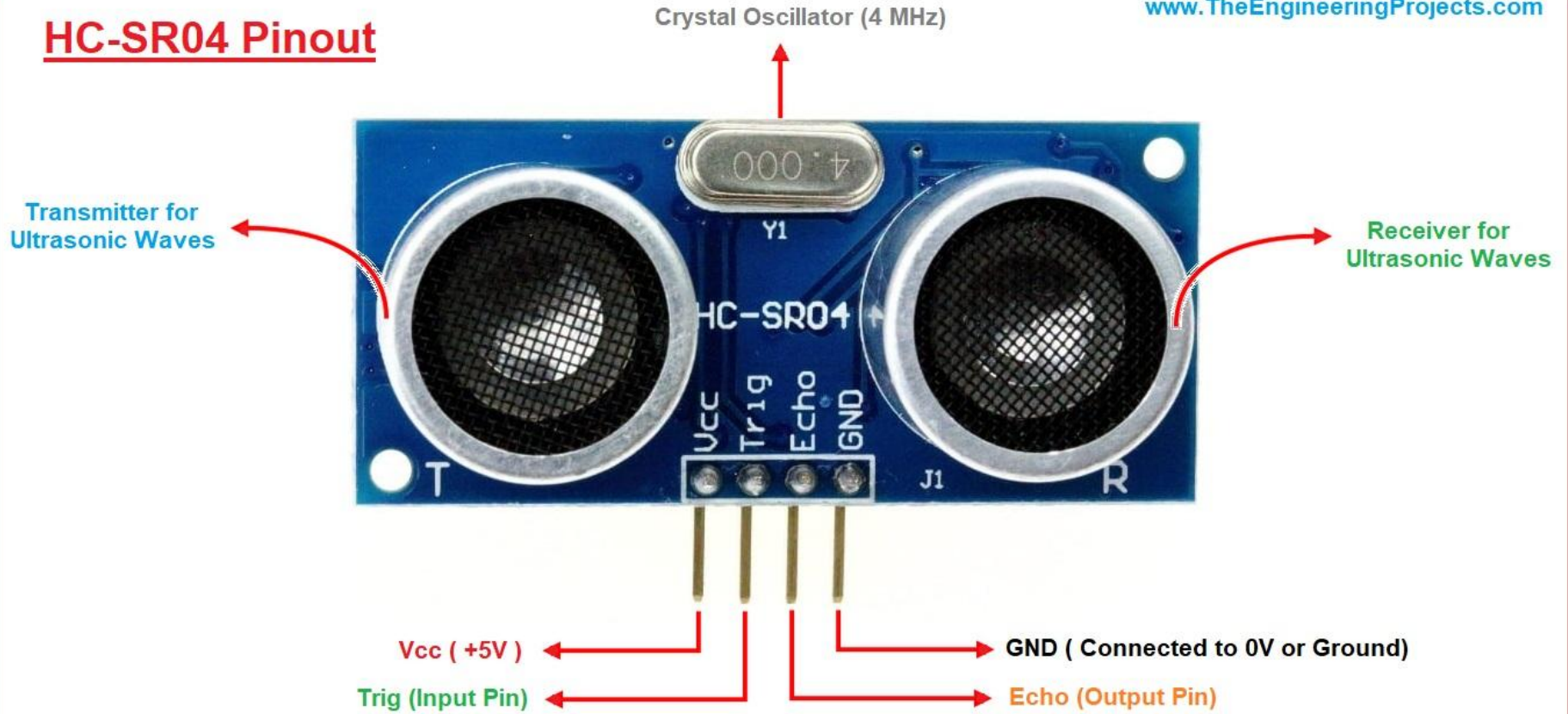


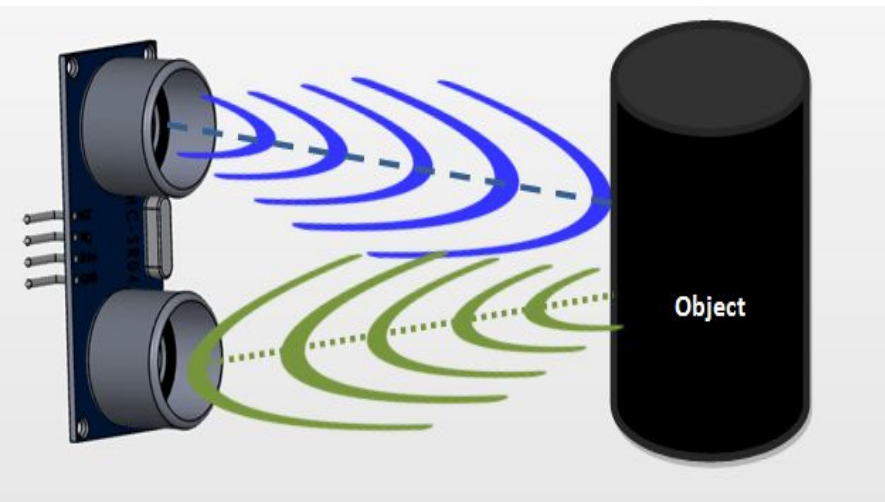
Soldering Procedures



HC-SR04 Pinout

www.TheEngineeringProjects.com

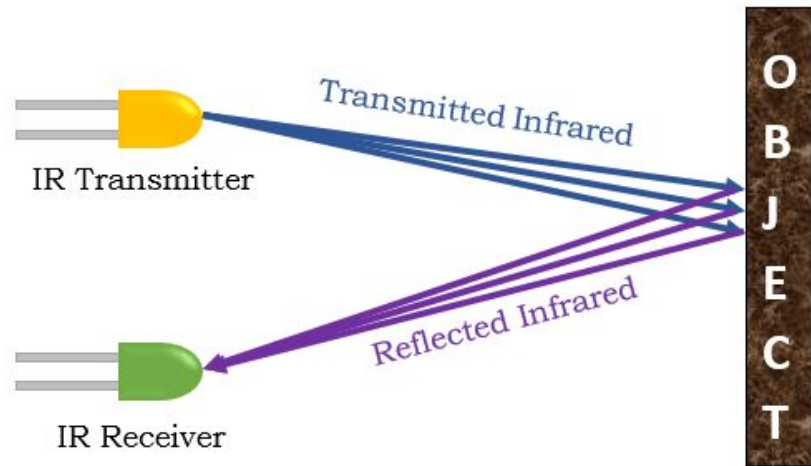
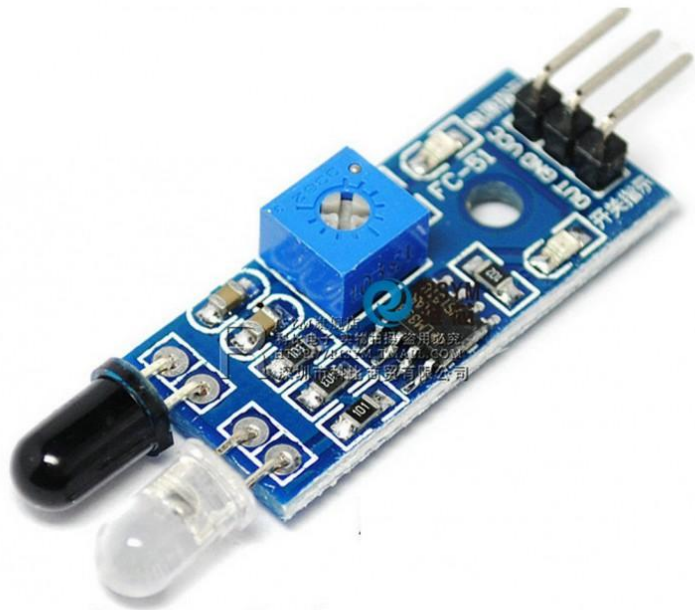




$\text{distance} = (\text{traveltime}/2) \times \text{speed of sound}$

The speed of sound is: $343\text{m/s} = 0.0343\text{ cm/uS} = 1/29.1\text{ cm/uS}$

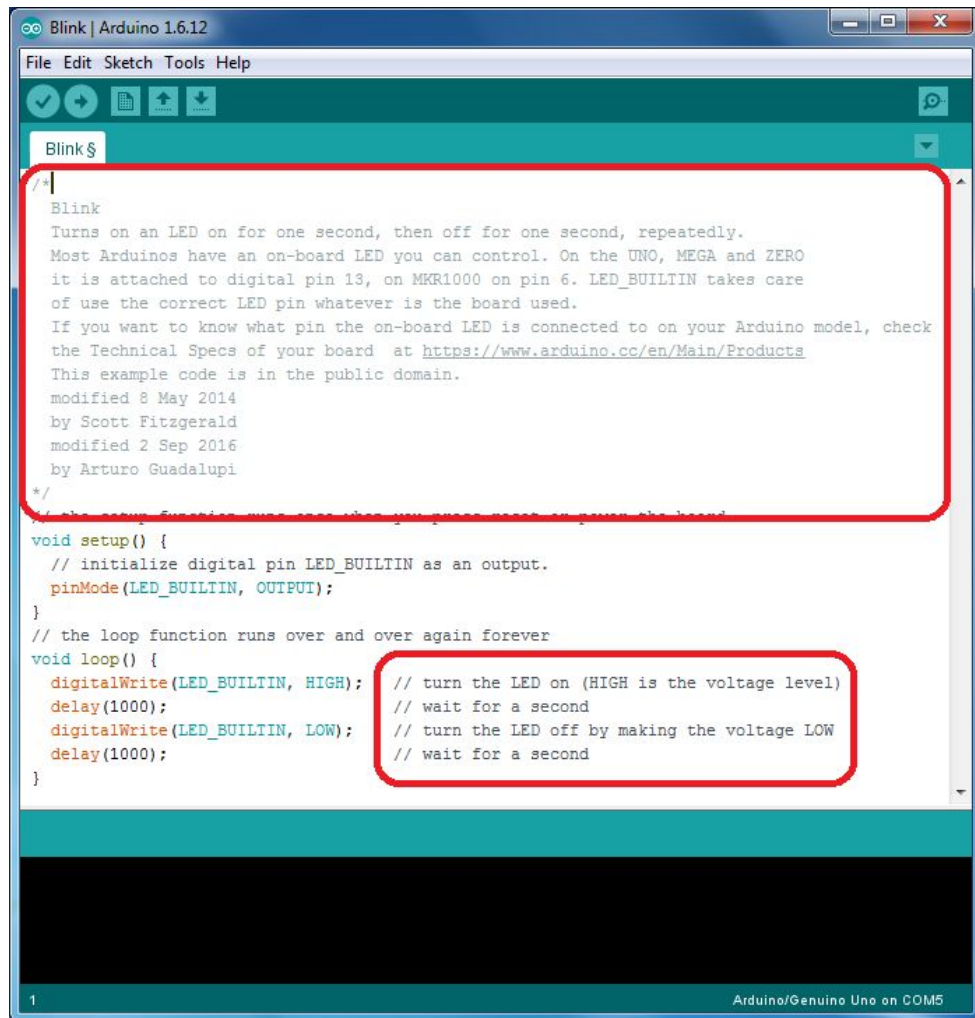
Or in inches: $13503.9\text{in/s} = 0.0135\text{in/uS} = 1/74\text{in/uS}$

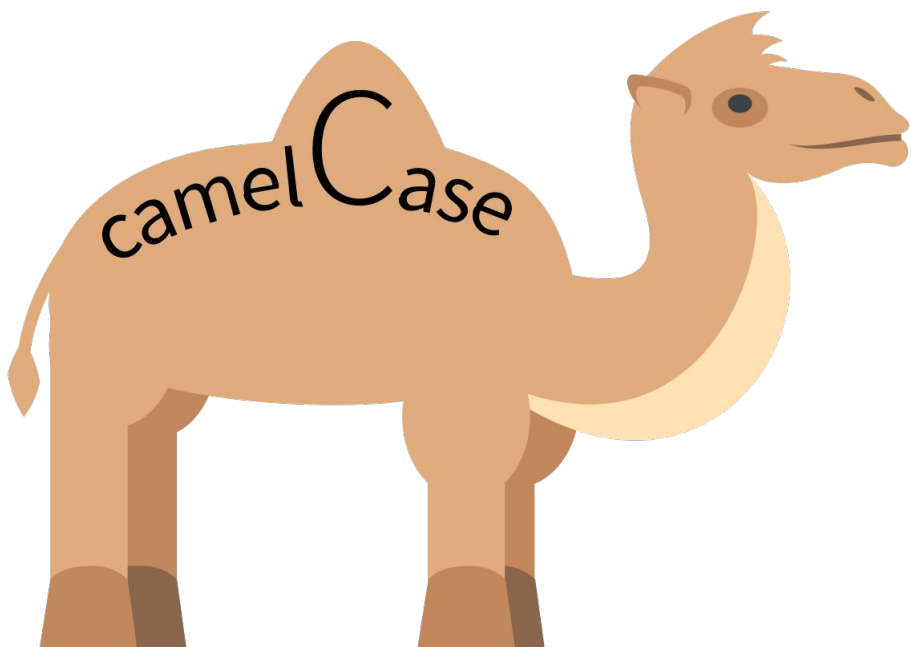


Programming

- ❖ Structure of the code
- ❖ Comments
- ❖ Camel casing
- ❖ Variables & Data Types
- ❖ Operators
- ❖ Control
- ❖ Loops
- ❖ Functions

```
|void setup() {  
    // put your setup code here, to run once:  
  
}  
  
void loop() {  
    // put your main code here, to run repeatedly:  
  
}
```





Explained

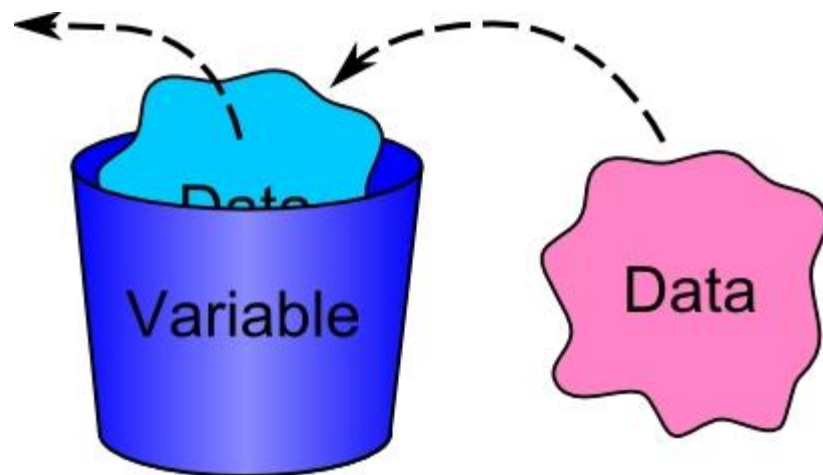
camelCase
snake_case
PascalCase

$$C = 2\pi r$$

Variables

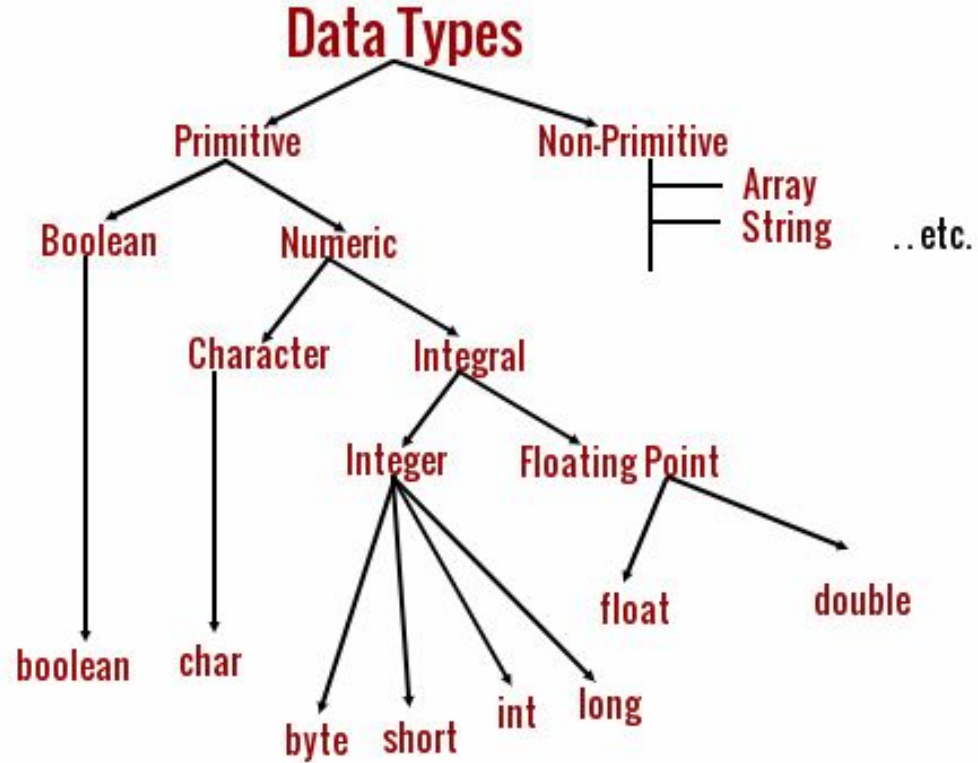
$$3x - 4 = 11$$

Variable



```
int age = 20;
```

datatype variable_name value



Operator	Description
&&	AND
	OR
!	NOT
!=	NOT EQUAL TO
&	BITWISE AND
	BITWISE OR
^	BITWISE XOR
&=	AND EQUAL
=	OR EQUAL
^=	XOR EQUAL

