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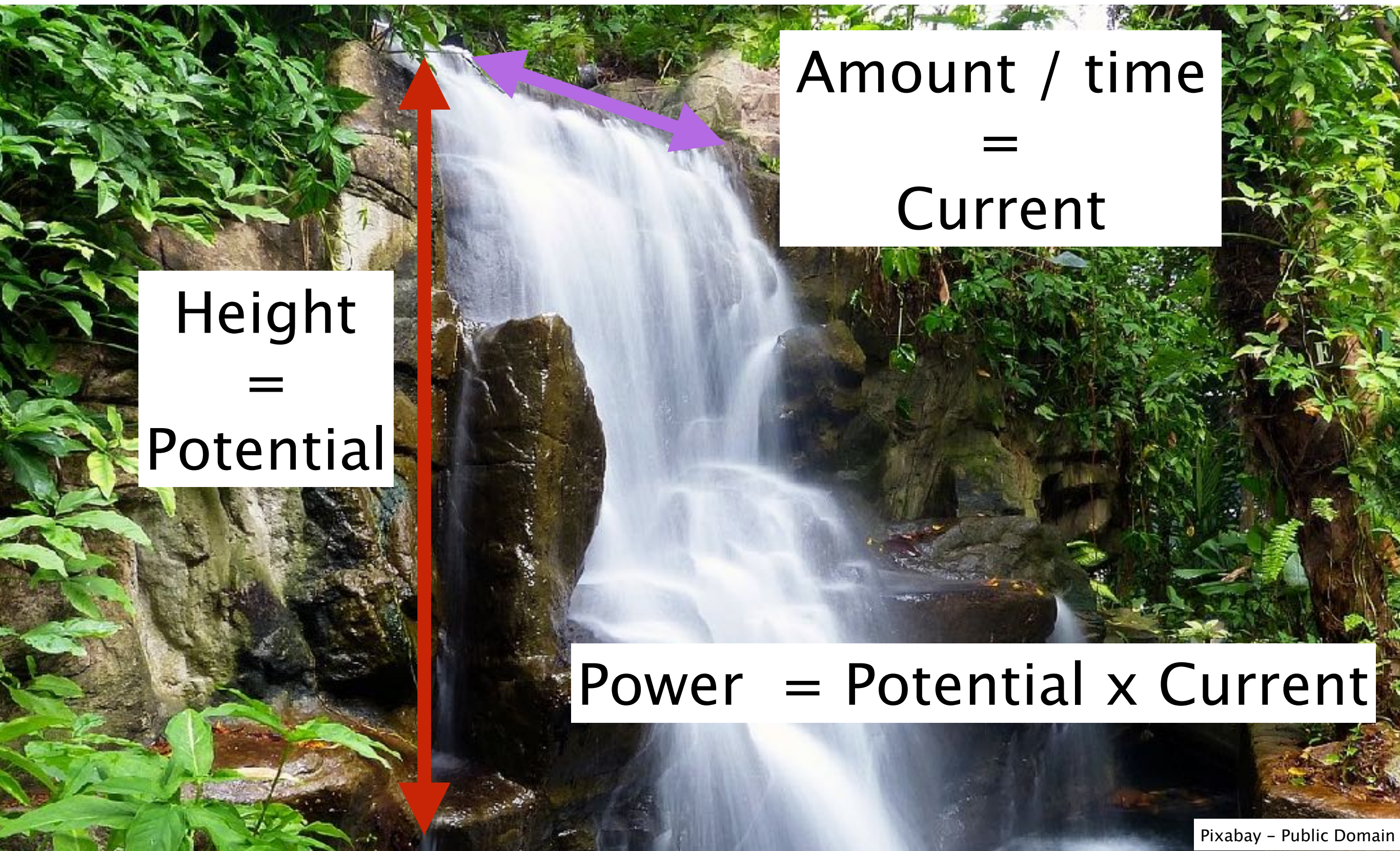


# BioHack Academy Arduino





# Electricity vs Waterfall



Amount / time  
=  
Current

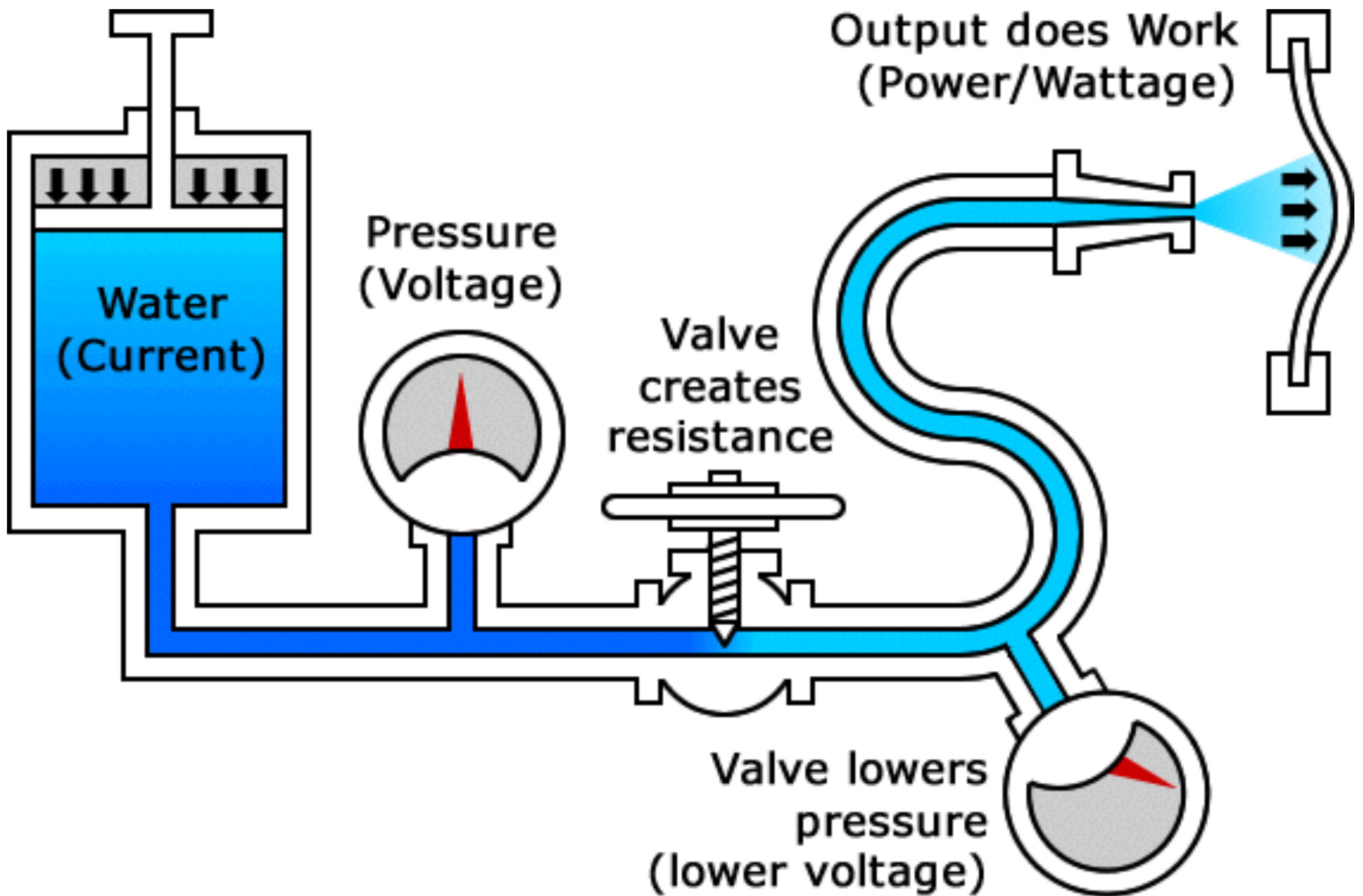
Height  
=  
Potential

Power = Potential x Current



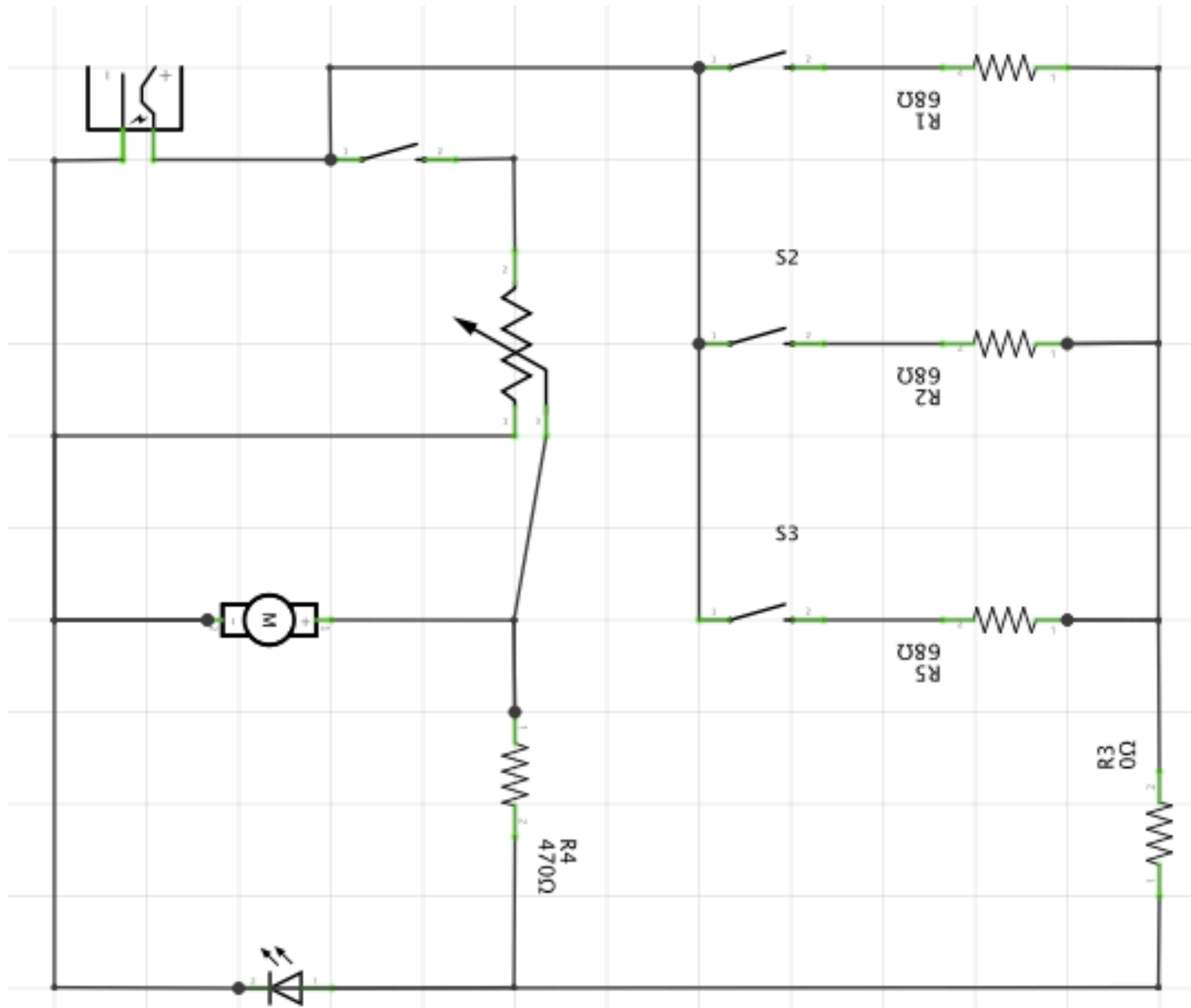


# Water pipe metaphor



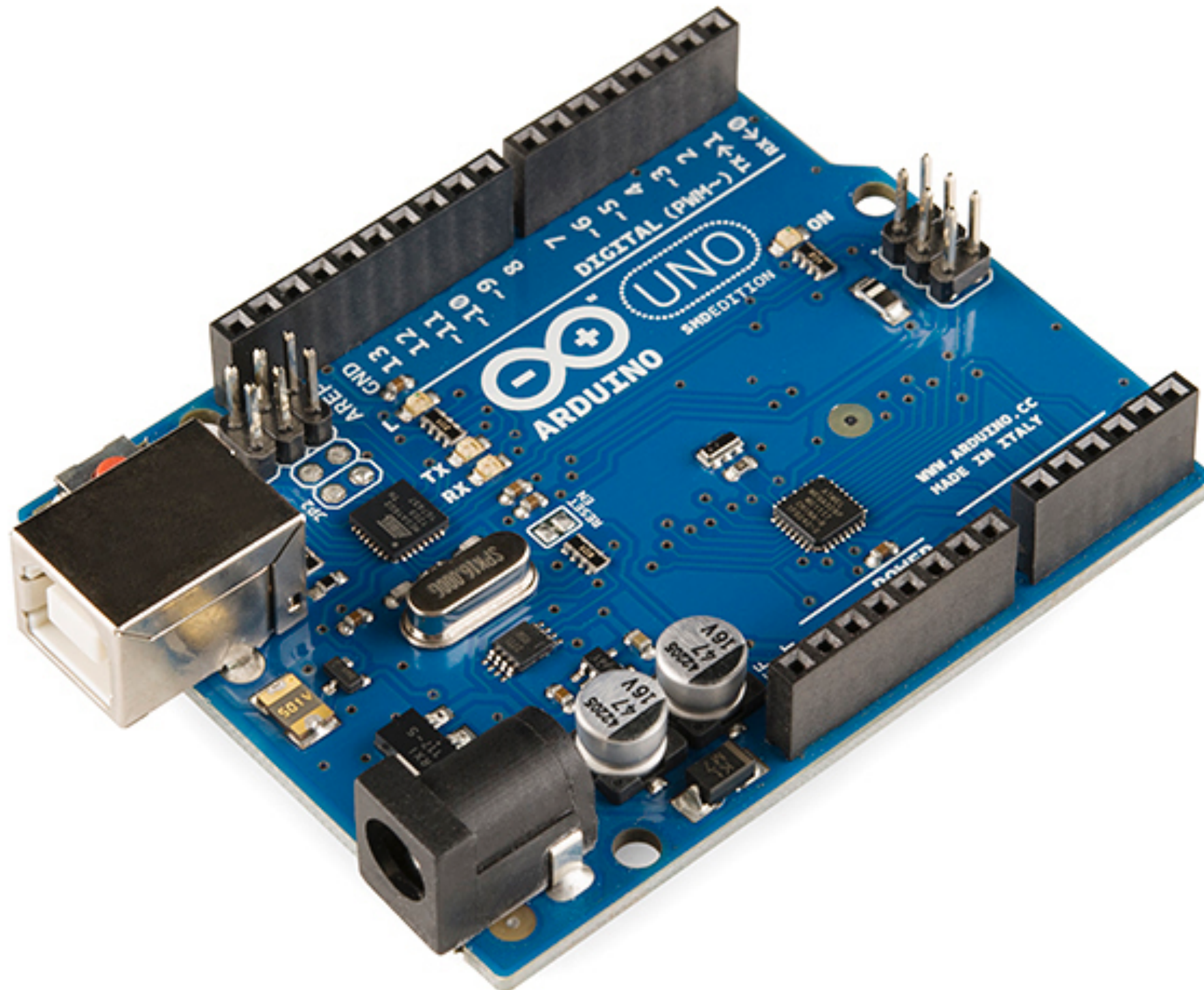


# Wiring scheme of the Stirrer





# Arduino





# Digital electronics

0

Off

LOW

GND

False

1

On

HIGH

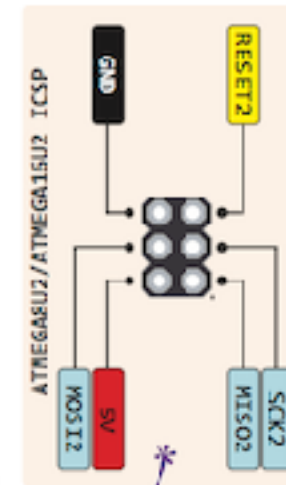
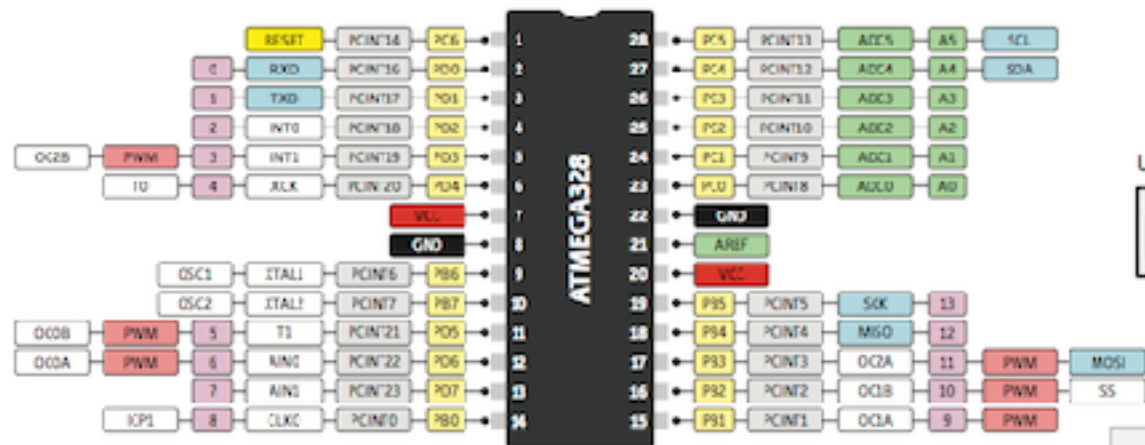
V<sub>cc</sub>

True





# Arduino is Open Source



## THE DEFINITIVE ARDUINO UNO PINOUT DIAGRAM

- ⚠ Absolute max per pin 40mA recommended 20mA
- ⚡ Absolute max 200mA for entire package

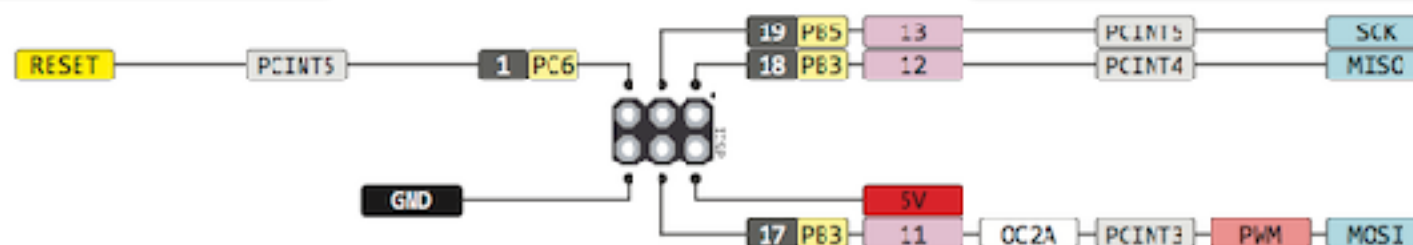


Cut to disable the auto-reset

Power

Analog

Digital



- Power
- Control
- Physical Pin
- Port Pin
- Pin Function
- Digital Pin
- Analog Related Pin
- PWM Pin
- Serial Pin
- TSF
- Source Total 150mA



# Programming

- Arduino IDE
- Setup() function
- Loop() function

The screenshot shows the Arduino IDE window titled 'sketch\_feb04a | Arduino 1.5.8'. The interface includes a toolbar with icons for checking, running, saving, and uploading. Below the toolbar is a tab labeled 'sketch\_feb04a §'. The main text area contains the following code:

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

At the bottom of the window, there is a status bar showing '2' on the left and 'Arduino Uno on /dev/cu.usbserial-AM01VCF6' on the right.





# Output

## Blinking an LED

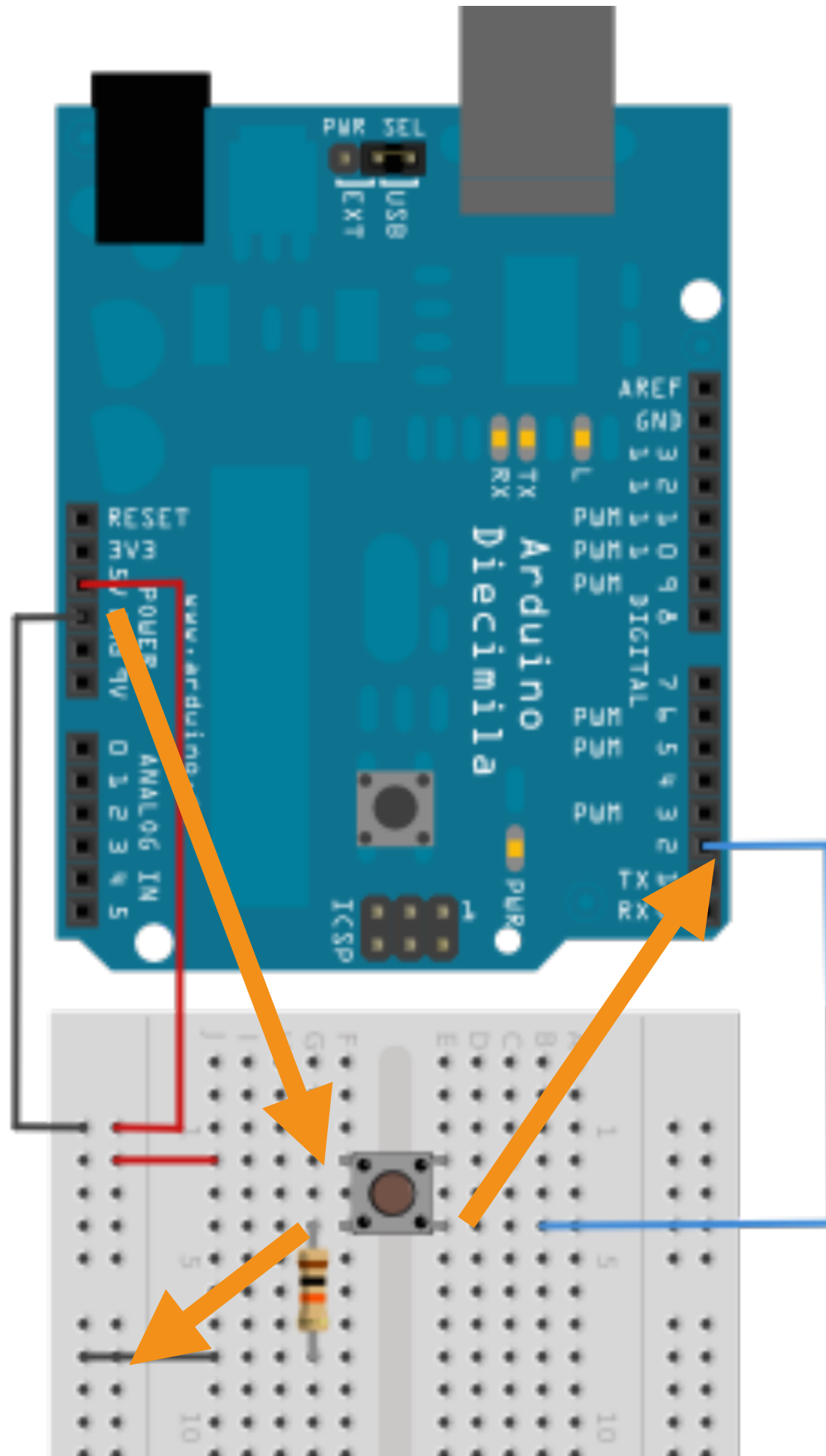
- pinMode()
- digitalWrite()
- delay()

```
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(9, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000);           // wait for a second
  digitalWrite(9, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);           // wait for a second
}
```



# Button







# Input

```
// digital pin 2 has a pushbutton attached to it. Give it a name:  
int pushButton = 2;
```

```
// the setup routine runs once when you press reset:
```

```
void setup() {  
  // initialize serial communication at 9600 bits per second:  
  Serial.begin(9600);  
  // make the pushbutton's pin an input:  
  pinMode(pushButton, INPUT);  
}
```

```
// the loop routine runs over and over again forever:
```

```
void loop() {  
  // read the input pin:  
  int buttonState = digitalRead(pushButton);  
  // print out the state of the button:  
  Serial.println(buttonState);  
  delay(1);          // delay in between reads for stability  
}
```

---



# Variables

- char: 1 byte character value
- byte: 8-bit unsigned number, from 0 to 255
- int: store 6-bit (2-byte) value, from -32,768 to 32,767
- unsigned int
- long: store 32 bits (4 bytes), from -2,147,483,648 to 2,147,483,647.
- unsigned long
- float: number that has a decimal point, 32 bits (4 bytes) from  $-3.4028235E+38$  to  $3.4028235E+38$
- boolean: (8 bit) – simple logical true/false





# Function definition

```
[return type] [function name] ({arguments})  
{  
[ Code to execute ]  
}
```

```
int multiply(int num1, int num2)  
{  
int result;  
result = num1 * num2;  
return result;  
}
```



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