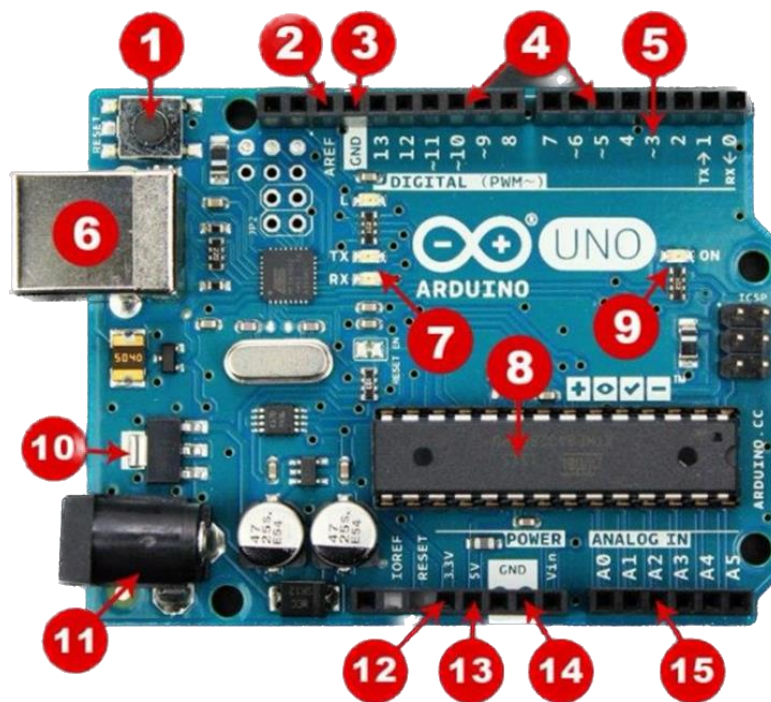## What Is Arduino?

Arduino is an open-source programmable circuit board that can be integrated into a wide variety of makerspace projects both simple and complex. This board contains a microcontroller which is able to be programmed to sense and control objects in the physical world. By responding to sensors and inputs, the Arduino is able to interact with a large array of outputs such as LEDs, motors and displays.

Arduino Uno

One of the most popular Arduino boards out there is the Arduino Uno.


Board Breakdown

Here are the components that make up an Arduino board and what each of their functions are.

1. Reset Button – This will restart any code that is loaded to the Arduino board
2. AREF – Stands for "Analog Reference" and is used to set an external reference voltage
3. Ground Pin – There are a few ground pins on the Arduino and they all work the same
4. Digital Input/Output – Pins 0-13 can be used for digital input or output
5. PWM – The pins marked with the (~) symbol can simulate analog output
6. USB Connection – Used for powering up your Arduino and uploading sketches

7. TX/RX – Transmit and receive data indication LEDs
8. ATmega Microcontroller – This is the brains and is where the programs are stored
9. Power LED Indicator – This LED lights up anytime the board is plugged in a power source
10. Voltage Regulator – This controls the amount of voltage going into the Arduino board
11. DC Power Barrel Jack – This is used for powering your Arduino with a power supply
12. 3.3V Pin – This pin supplies 3.3 volts of power to your projects
13. 5V Pin – This pin supplies 5 volts of power to your projects
14. Ground Pins – There are a few ground pins on the Arduino and they all work the same
15. Analog Pins – These pins can read the signal from an analog sensor and convert it to digital.

Arduino Breadboard

Another very important item when working with Arduino is a solderless breadboard. This device allows you to prototype your Arduino project without having to permanently solder the circuit together. Using a breadboard allows you to create temporary prototypes and experiment with different circuit designs. Inside the holes (tie points) of the plastic housing, are metal clips which are connected to each other by strips of conductive material.
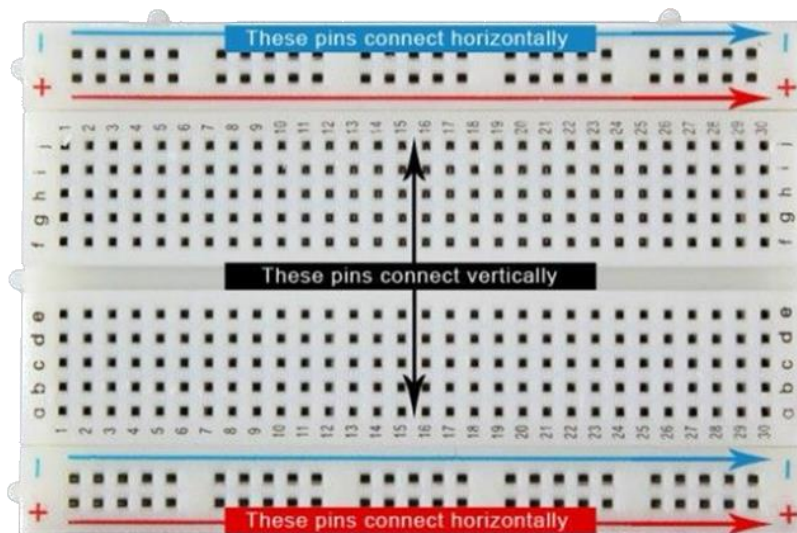
On a side note, the breadboard is not powered on its own and needs power brought to it from the Arduino board using jumper wires. These wires are also used to form the circuit by connecting resistors, switches and other components together. Here is a visual of what a completed Arduino circuit looks like when connected to a breadboard.
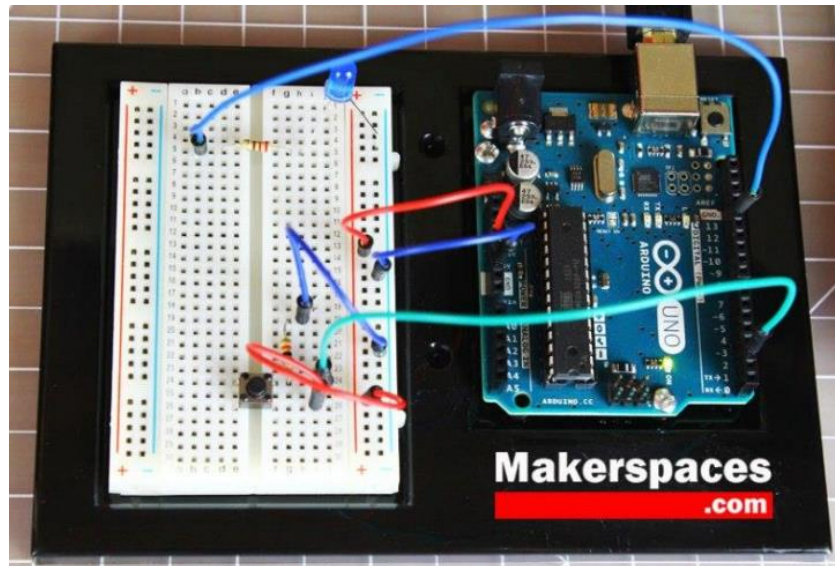
How To Program Arduino

Once the circuit has been created on the breadboard, you'll need to upload the program (known as a sketch) to the Arduino. The sketch is a set of instructions that tells the board what functions it needs to perform. An Arduino board can only hold and perform one sketch at a time. The software used to create Arduino sketches is called the IDE which stands for Integrated Development Environment. The software is free to download and can be found at https://www.arduino.cc/en/Main/Software

Every Arduino sketch has two main parts to the program:

void setup() – Sets things up that have to be done once and then don't happen again.
void loop() – Contains the instructions that get repeated over and over until the board is turned off.

Refference:

https://www.makerspaces.com/wp-content/uploads/2017/02/Arduino-For-Beginners-REV2.pdf