



**IEEE**

**Ottawa  
Section**



**IEEE Ottawa Robotics Competition  
Compétition de robotique d'Ottawa d'IEEE**

## Getting Started With Arduino

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### Connecting the Wires

#### Motors

The wires for the motor are connected to the motor shield, which is the board on top of the Arduino. There are four ports labelled M0+, M0-, M1+, M1- (depending on the motor shield you might have another two ports for power, ignore these). Each motor has two wires that need to be connected to these ports. The easiest way to figure out the polarity of the motors is to plug them in randomly and if the motor is spinning in the wrong direction then swap around the wires. Just make sure that wires from one motor are going to only M0 or M1 or else you will get weird results.

#### Sensors

The sensors are the smaller boards at the front of the robot. You have two IR sensors and an Ultrasonic Sensor. These will need to be connected to the Arduino for power and data.

#### Analogue vs. Digital

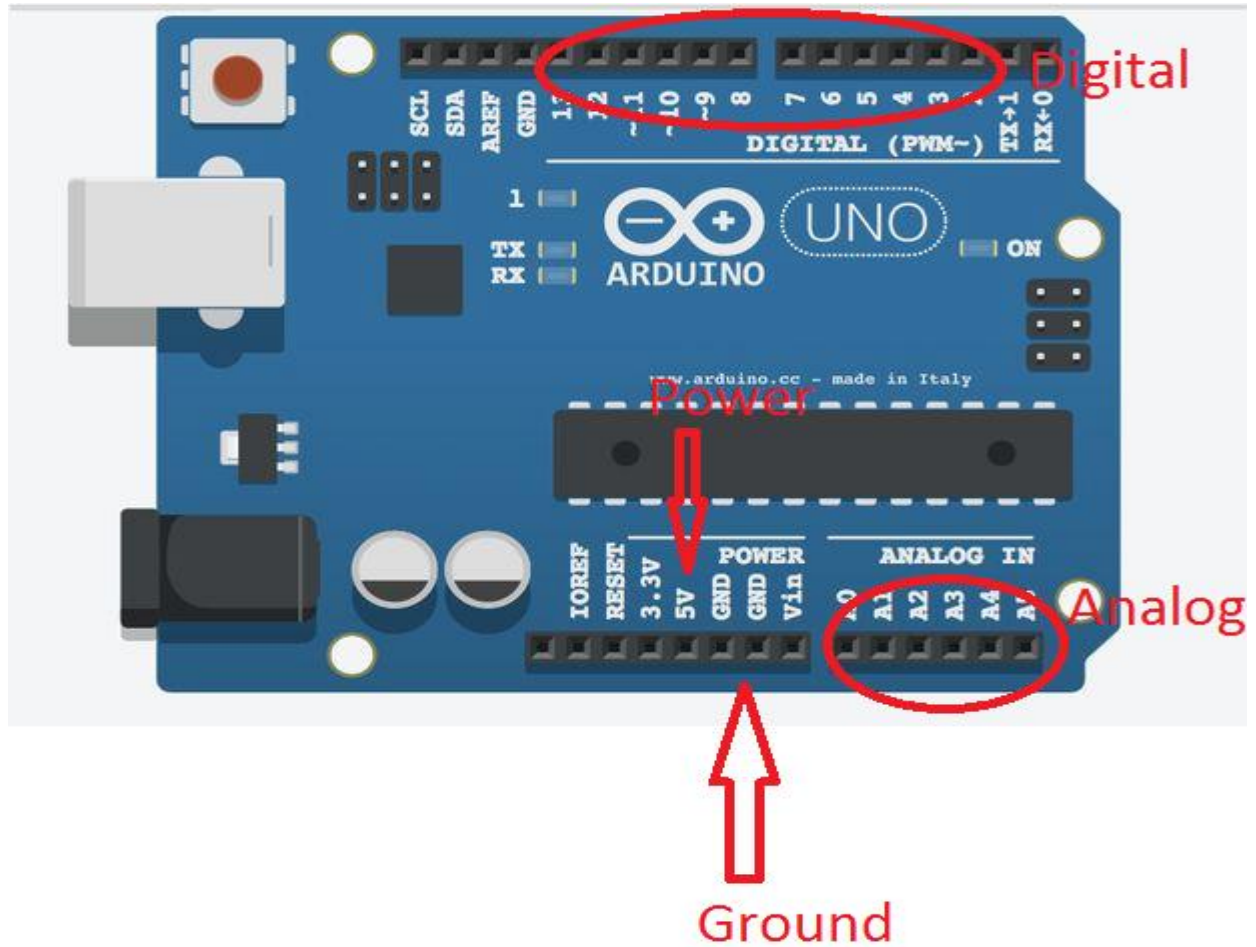
The Arduino contains two types of pins, analogue and digital. Analogue ports can essentially measure voltage which can be used in programming (0 V—value of zero, 5 V—value of 1023) these are used with the IR sensors because they measure the reflectance of a surface. Digital ports can only measure if something is high or low. The ultrasonic sensor determines distance by measuring the time it takes for an ultrasonic sound to return, which is a digital signal. How this works is not important and you can just use the library on our website.

#### Arduino Pins

On an Arduino, certain pins acts as digital inputs and outputs, and others act as analogue inputs (Arduino cannot output analogue signals). When using the digital pins, don't use pins 0 and 1 as those are used to upload the sketches and you might get weird results if you do.

The Arduino also has a 5 V supply (be careful not to use the 3.3 V) and a ground to supply power to your device. Since you only have one 5 V pin and two grounds, you will need to connect your sensors through the breadboard.

## Arduino Pins



### Infrared (IR) Sensor

The IR sensor has three wires: power, ground, and out (they should be labelled on the little board in small white lettering). Connect the out to one of the analogue pins.

### Ultrasonic Sensor

The ultrasonic sensor has four wires, power, ground, trig and echo. Trig and Echo should be connected to digital pins.

## Getting Ready to Program

### Installing the Software

To program your Arduino download and install the Arduino IDE from:

<https://www.arduino.cc/en/Main/Software>

Connect the USB cable from the Arduino to the computer and launch the software. In Tools—> Board make sure you have Arduino UNO selected. If you have trouble connecting to the COM port restart the IDE and unplug and re-plug the Arduino, this usually resolves the issue.

### Loading the ORC Libraries

To get the libraries to that will help with this challenge go to:

<http://www.orc.ieeeottawa.ca/arduino-challenge/>

and download Arduino Library files as well as the documentation which will provide detailed explanations as to how to use the libraries.

To install the libraries extract the archive and put the folder in the Arduino Libraries folder (Check where that is in the File—> Preferences: Sketchbook Location)

### Extra Tutorials

Here are some great tutorials for getting started with Arduinos

<https://www.arduino.cc/en/Guide/HomePage>

This is where you should start. It has a complete introductory guide, from getting started to all the advanced concepts.

<https://learn.adafruit.com/category/learn-arduino>

Not a great place to start as there isn't really a clear path but a great place to learn some things after you get the basics

<https://learn.sparkfun.com/tutorials>

Some very interesting tutorials, a lot of them are almost advertisements for their products; however, it is fairly interesting to look at all the things that you can attach to the Arduino.

Also, in the Arduino IDE go to File—> Examples to find examples on pretty much every topic.