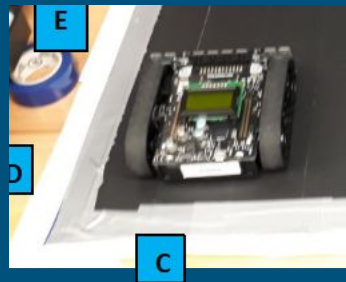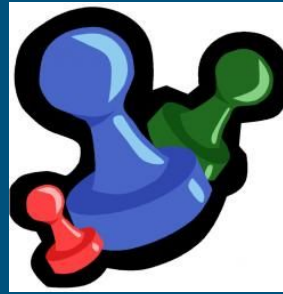# Introduction to Arduino

Jacob Smith- Impact Maker Summer 2019 Brandeis Automation Lab

Hello, welcome to my workshop on Arduino!

About me

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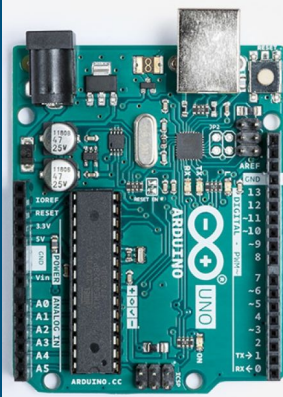-Brandeis University

-Computer Science

-Education

First, I'll introduce myself
My name is Jacob, and I am a rising junior at Brandeis University

I'm studying computer science, and I am also interested in robotics and education.
My other interests include music and games

I want to talk to you today about computer programs are, starting with a classic
example

About Arduino

What is Arduino?

What can I use it for?

How do I get started?

So, let's talk about why we're here. Arduino is an electronics and computer programming platform that is designed for beginners. You can use it to make anything from robots that follow your around to an interactive art exhibit. Let's get started with Arduino.

The main idea of this is that an Arduino is a small computer that you can give instructions to.

Getting Started in Arduino
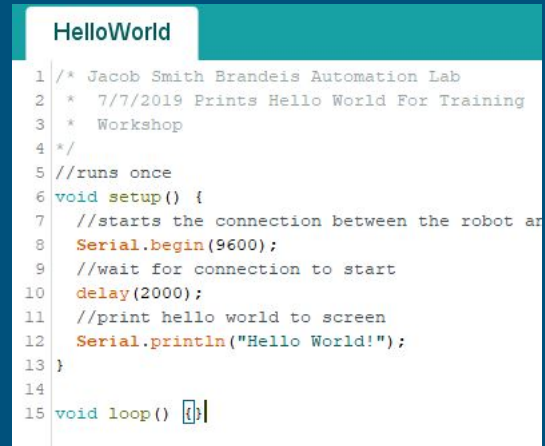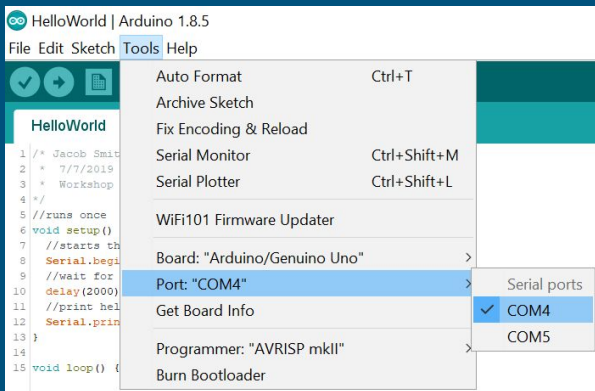
We are going to start with a classic demonstration of computer programming, we will get our Arduino to print the words Hello World to the Screen.
To do that, click tools, select board to be Arudino Uno. Then, pick port to be whatever port says uno. Then, click the arrow to upload the instructions to the Arduino.

Computer Programs are ... Recipes

How would you tell a very literal person to make a peanut butter and jelly sandwich?

We will find that the best way to explain this is in **pseudocode**

Now that we've had the demo, let's talk about some main ideas to be able to write your own instructions well. We call this the discipline of computer programming. To understand how computer programming works, I'm going to give you a classic example. Would anyone like to tell me how to make a peanut butter and jelly sandwhich?

Computer Programs are …   Precise

Non-Programmer

Spread some peanut butter over one piece of bread, spread some jelly over another piece of bread, and then add the two pieces

Programmer

- Locate Bread, Peanut Butter, Jelly, two knives, a plate, and table
- Make peanut butter half
  - Take one slice of bread out
  - Put on place
  - Remove top of peanut butter
  - Put knife in jar, scoop out
  - Spread on bread
- Repeat previous step for jelly half
- Put jelly half on peanut butter half

Hopefully the previous exercise showed you that computers are very particular in how they function. A machine will do exactly what you tell it, which is the best and worst part of computer programming. Here I compare a non technical and technical explanation of how to make a peanut butter and jelly sandwhich.
Notice how the programmer's description is an outline, and how the jelly half is repeated from the peanut butter half.
We call that a method.
Also, note that to be good programmers, we must be precise with language. This leads me to the next thing that computer programs are

Computer Programs are … Foreign Languages

English	Arduino, print the word apple to the screen
	Subject Verb Clause
Arduino	Serial.println ("Apple");
	Variable Method Parameters

This chart compares an English command to a command in Arduino. In the english example, there is a subject, ,a verb, and a clause. The verb does the subject with information from the clause. In Arduino, the command would look like the next line. In computer programming, we may call the subject a variable, the verb the method, and the clause the parameters

Distance Sensor

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-Demonstration

-Upload it yourself

-What would you change?

Ok, now that we have a more sophisticated understanding of programming, I can show you this demonstration. (Show how distance sensor prints to display). Note the commands used to accomplish this task. We have the subject, verb, and clause here too. For the distance sensor the subject is the sensor, the verb is get distance, and the clause can be thought of as the pins.
For the display, the subject is the display, the verb is showMeter, and the clause is the distance to display.

Play around with this for a while, and I want you to note your observations and what you would change with the program

References

This workshop contains material from my computer science classes at Brandeis, and my work with the Brandeis Robotics club.

To see some of these programs in action, see my notebooks here

For a more advanced introduction to computer programming, see here

For more information on Arduino platform see here

Specific Problems you encounter with Arduino can be found on the forums

For help with projects, see the Brandeis makerlab

Here are the references and future sources for this presentation. For anyone who wants to go into computer programming, I recommend a textbook like building java programs. The Arduino forums are where I spend most of my time.

Pictures

All Uncited Pictures are my own

[Slide 1] http://clipart-library.com/clipart/guitar-clipart-9.htm,https://bankkita.com/clipart/get

[Slide 3]

[Slide 4] https://www.pinterest.com/pin/406027722629363656/

Glossary

Method- a way of organizing computer programs by a similar task, such as printing out a long message

PseudoCode- a precise plan for a computer program in english

Programming Language- A set of grammar, syntax, and vocabulary to communicate with a computer, just like a foreign language. Examples include Java, C++ and html.

Variable- a reference to interact with a program, like a name

Finally, here is a glossary of terms to review