



Intro to Arduino

Overview - Hardware. Software. Cool Projects.

Grades:	5-7
Time:	50 minutes (PDQ's + Experiment) 50 Minutes (Code Challenge + Collaboration)
Subject:	Technology and application of of Science
Topics:	Computer Science, Electronics

Overview

Intro to Arduino gives you a look at the wild and often wacky world of Arduino, explore projects that people have created and learn a little about how you might do a project yourself. Get ready and let's check it out!

Learn science. Explore your world. Uncover a problem. Create a Solution. Improve your planet. Learn. Create. Succeed.

Background

If you're interested in making cool things that jump, jiggle, move and wiggle you may already know about Arduino. Arduino started in 2003 as a college student project intending to create something that would be easy for people to produce devices that could interact with the world. Using an inexpensive microcontroller and simple sensors and motors it suddenly became possible for people with almost no technical knowledge to suddenly become inventors!

Now, some 16 years later, Arduino has evolved into a global phenomenon that is used in schools, maker spaces, garages, dorm rooms, and professional settings in locations all over the world. Watch the short video next, check out the materials needed, review a few important terms you should know and let's do a few projects!

What You'll Need

- The activities in this module only require you to have some kind of Internet connected device and a browser!
- Chromebook, smart phone, supercomputer – whatever you have on hand to search the Internet is all you need!

Important Terms

Take the time to know these important terms that will help make you a Master Maker and Arduino Artist!

- **Open Source:** A model of sharing inventions and information for others to use, improve and share again.
- **Hardware:** The “physical” part of a computer or device. If you can thump it on a table, it’s probably **hardware**.
- **Software:** The computer program or “instructions you write” for the **hardware**. It’s not something you can thump on the table, but the **hardware** is worthless without it.
- **Sketch:** A “**sketch**” in Arduino lingo refers to a computer program you’ve written in the IDE to run your Arduino **hardware**.
- **Code:** The actual lines of instruction in your computer program (**sketch**) are **code**. **Code** is written in different languages such as Arduino. **Code** is also a verb – “I’m going to **code** for a few hours – see you later!”
- **Processor:** The brains of your **hardware** that takes the instructions you write and **executes** them.
- **Microcontroller:** A circuit board with a **processor** and other cool parts that allow you to control motors and listen to sensors.
- **Atmel:** A pretty cool company that builds the **processors** that live on Arduino microcontrollers.
- **Arduino Uno:** One of the many Arduino boards in the Arduino family and probably the most used.
- **Arduino IDE:** IDE stands for Integrated Development Environment which is a mouthful, but it just means you have all the tools you need to write fun instructions for your Arduino microcontroller to follow.
- **Compile:** Your Arduino IDE takes your instructions and “compiles” them into a lump of numbers that your **processor** can understand.
- **Upload:** You write your instructions in the IDE, then you send them on over to your Arduino when you “**upload**” your cool program.
- **Execute:** Very simple – it means “do it!”
- **Input:** Things that go “into” a computing system are **input**. When you type on your phone you are “**inputting**” information.
- **Output:** Something that comes out of your computing system, like the display on a smartphone, is “**output**.”

Prep (5 mins) _____

- Read the background information, study the terms, and explore the additional resource links.

Ready to get started? Let's go!

Next stop – PDQ1 – that means Pretty Darn Quick.

Educator Resources

Prep (30 mins) _____

- Read the background information, study the terms, and watch the introductory video on Arduino. https://databot.us.com/wp-content/uploads/2019/02/What-is-Arduino_.mp4
- Do the PDQs and Experiment and review the accompanying educator information.
- Review the Coding and Collaboration extensions if of interest.

Objectives _____

Understand & Recognize:

- “Arduino” as a **hardware** and **software** platform for making projects.
- “Community” in the sense of people connected through a common interest such as making cool projects with Arduino.
- “Open Source” as a model of creating and sharing information.
- “Input” and “output” in both **hardware** and **software** based on looking at Arduino projects.
- “Computer programming” or “coding” means writing instructions for **hardware** to follow.

Misconceptions _____

- Arduino is frequently considered only a type of **hardware**, because of the prevalence of Arduino project boards. In reality, it is both a **hardware** AND **software** development platform.
- **Open source** is frequently defined quickly as “free” **software** or **hardware** designs, but this is not necessarily true. All free **software** is not necessarily **open source**, and the real core of the issue is in the type of license that is being applied to the **software** or **hardware** or content.

Guiding Questions

Open Source Discussion

- Have you ever used Wikipedia? – it has an [open source](#) type license called Creative Commons.
- Have you ever heard of Blender? Blender is an [open source](#) 3D rendering package that is very powerful. A short search on Youtube will yield many results of short animated films that were done in Blender – they are amazing.
- Do you think [Open Source](#) a good approach to building things like [software](#) or [hardware](#)? How can you make money on something like your [software](#) if you [open source](#) it?
- What are the advantages of [Open Source](#)?
- What are the disadvantages of [Open Source](#)?

Arduino Discussion

- What would you like to create with Arduino?
- Why do you think Arduino has become so popular around the world?

Additional Resources:

Arduino Resources

Because of the size and energy behind the Arduino community there are extraordinary amounts of resources available, both free and paid. The official Arduino website has compiled a fantastic list of starting materials that you can review at the following link – it's a great place to start:

<https://playground.arduino.cc/Main/ManualsAndCurriculum>

Open Source

The concept of [Open Source](#) is an important one for educators to have a clear understanding so they can accurately share it with students. For [Open Source](#) basics, the following is a great place to start:

<https://opensource.com/resources/what-open-source>

References:

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