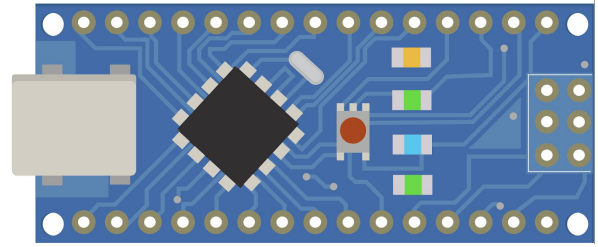


Intro to Arduino

Experiment - Arduino Saves the World!



Grades: 5-7

Time: 20 - 30 minutes

Subject: Engineering, technology and application of science

Topics: Computer Science, Electronics

Overview

Brainstorm ways to create robotic-electronic projects that can help improve our world! Going through a design process that focuses on sharing information through the Open Source model, and think about people around the world and what kinds of inventions can improve people's lives.

Background

Arduino is both an Open Source hardware AND software platform that enables creators, inventors, students and just about anyone to learn basic electronics and coding to make projects. A very cool aspect of Open Source is it "shares" by design.

If you create or invent something and then "Open Source" it to the world, it becomes freely available for everyone to use. People in the Open Source community "share" and "share alike" to create things that are mutually beneficial. Brainstorm some ways to create something that you would share with the world to make it a little bit (or a lot) better.

Objectives

Understand and 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.

What You'll Need

- The only materials you need for this project are pencil paper and a lot of imagination.

Important Terms

- **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!”
- **INPUT:** Things that go “into” a computing system are input. When you type on your phone you are “inputting” information.
- **OUTPUT:** Something that come out of. your computing system, like the display on a smartphone, is “output.”

Prep (5 mins)

- No prep necessary!

Experiment (15 - 25 mins)

This activity assumes you have no actual Arduino hardware OR software to work with. You will use your imagination to design your very own Arduino oddball project that you will contribute back to the Arduino community to share.

- *Brainstorm your project and how it will help someone, somewhere. Then sketch your Arduino creation on a piece of paper and label the INPUT and OUTPUTs of the project. Your project and creation must meet the following criteria.*
- *Use at least one sensor to detect external conditions. It could be temperature, light, motion, CO2, sound etc.*
- *Have at least one output that reacts to the external conditions being monitored.*
- *Your creation must serve a useful purpose. Write this purpose clearly for others to understand.*

- Write an *IF – THEN* statement that applies to your invention and how it works. For example, *IF the temperature is below freezing THEN turn on a heat lamp to protect a plant. An IF-THEN statement is frequently used by coders when they are creating computer programs. This is how you tell your Arduino what you want it to do!*
- *Have fun and come up with something strange and wonderful that improves the planet we live on in some way!*

Wrap it up!

Imagine sharing this project now with people around the world in an Open Source community. What kinds of people will benefit from your invention? Where will it do the most good?

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You've mastered some great challenges in this Module!

Great job! Now for a new kind of adventure, the next step is a Collaboration. Learn how to take control through programming. Good luck!

Next Step, Collaboration!

Educator Resources

Prep (10 minutes)

- To facilitate this activity it is recommended you have reviewed the Overview content and background information as well as done PDQ 1 and 2 of this module. It will help you guide this activity more successfully.
- This activity can be done by students even if they have not done other projects in this module, but the additional background is helpful.

Objectives

Understand & Recognize:

That sound is transmitted in waves.

- “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.
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Misconceptions

- Coding is not creative. Not true! Solving problems efficiently and elegantly requires great creativity.
- When you design a project like this you are laying the foundation for a computer program. The program is the instruction set to execute your solution and it requires a lot of creativity to do it well!

Guiding Questions

- Can anyone think of an open source type project that was created that has been beneficial to people all over the world? Wikipedia is a good example of people sharing and collaborating on something of benefit to all.
- What kinds of inventions might be beneficial to people everywhere, not just in one part of the world?
- Can you think of an invention that would be useful to people in only one very specific place?

Additional Resources:

The 10 Most Exciting Open Source Projects of 2018

<http://blog.honeypot.io/most-exciting-open-source-projects-2018/>

Applying open source to everything: An idea

<https://medium.com/@amandoabreu/applying-open-source-to-everything-an-idea-51f7de5d07f9>

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