

Hacking STEM project overview

Step 1: Build & Learn



Materials List | Instructions

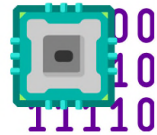
Build scientific instruments with your class using every day materials while bringing science and engineering concepts to life—the lessons will show you how. Every Hacking STEM lesson includes instructions for each stage of the project—from a complete materials list per student to step-by-step instructions for guiding students through the building process. Each lesson contains the following resources:

- **Instructions (PDF):** A step-by-step guide for building the project. Includes detailed instructions and a list of things you need.
- **OneNote notebook:** Contains lessons, materials, and activities to support teaching this unit. Mapped to the NGSS and ISTE standards.
- **Customized Excel workbook:** A customized Excel workbook that visualizes real-time data generated by the project. Requires the Data Streamer add-in.
- **Materials list:** A spreadsheet with links to online resources to help you bring these projects to your classroom.
- **Code for the project (.ino file):** Pre-built code for your microcontroller to help you and your students visualize live data.

Was this information helpful?

1. Use the Materials List spreadsheet, locate the materials needed per student.
2. Refer to the Instructions PDF and follow each step with your students. Instructions are broken into different sections for building analog and digital devices, as well as for how to connect to the microcontroller, upload microcontroller code, and visualize data in Excel.

Step 2: Connect Your Tools



Instructions | Microcontroller Code

After you've completed building the structure of your device, it's time to digitize your device and connect to a computer. Refer to your Instructions to learn how to breadboard and connect to your microcontroller.

Once connected, upload the microcontroller code onto your device. This supplies it with the ability to receive data from the right pins. The microcontroller code can be found in **Code for the project** and will download in the form of an .ino file

Step 3: Visualize the Data



Workbook | *Data Streamer

The final step of the project is to download the customized Excel workbook and begin streaming and visualizing data. Data is constantly being streamed into Excel via Data Streamer, but you'll need the customized Excel workbook included with this project to visualize the data. The Excel workbook compiles the incoming data and converts it into easy-to-understand graphs.

*Data Streamer requires a computer running Windows 10 and Excel 2016 desktop version

Additional resources:

Seattle-area middle school educators James Burke and Jason Ewert are Hacking STEM with everyday materials, one [21st-century lesson plan at a time](#).

Hacking STEM technical requirements:

- **Windows 10:** This project requires a PC running Windows 10. Update your version of Windows here.
- **Microsoft Excel 2016 (Desktop):** Students and teachers are eligible for free Office 365 Education, which includes online Word, Excel, PowerPoint, and OneNote.
- **Data Streamer Add-in:** Modernize your existing copy of Microsoft Excel with this free add-in to support real-time data streaming from your projects
- **Arduino IDE:** The free Integrated Development Environment enables you to write code that connects your project to an Arduino microcontroller.

Learn more

[Lesson Plan Overview and Layout](#)

[Review Hacking STEM project resources](#)

[Uploading board code & Arduino IDE](#)



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