<u>Hands-On STEM Projects Your Students Will Love with Karon Weber and Ankur Anand</u>

Website: www.microsoft.com/en-us/education/education-workshop
LinkedIn Community page: aka.ms/HSTEM-Community
Twitter: @Hacking_STEM
Instagram: @HackingSTEM
Facebook: @HackingSTEM
LinkedIn: Microsoft Hacking STEM

A little bit about Hacking STEM
- ❏ To engage the leaders of tomorrow, teachers need access to the right materials today. These materials need to be easily obtainable, affordable and reflect the academic standards that bring real-world scenarios into the classroom. Microsoft has created Hacking STEM program to help teachers modernize their current STEM curriculum through inquiry and project-based lesson plans and develop future-ready skills in the classroom.
- ❏ The Hacking STEM portfolio enables students to build affordable scientific instruments that visualize real-time data across space, earth, life, and physical sciences curriculum. Each project encourages computational and design thinking and integrates phenomenon-based learning experiences to solve real-world problems.

How Hacking STEM got started
- ● Microsoft Hackathon *"At the Microsoft global Hackathon, customers break something to make something"*
  - ○ 2019 Hackathon blog post
- ● Hackathon project turned a salad spinner into a wind turbine which generates electromagnetic energy. The hacked salad spinner sends realtime data into Excel and can be read and analyzed.

○ Check out the full windmill lesson plan at
www.microsoft.com/en-us/education/education-workshop/windmill.aspx

Free Lesson Plans for bringing Hacking STEM to your class
- https://www.microsoft.com/en-us/education/education-workshop
  ○ Lesson plans are available in multiple languages.
- How to get the materials:
  ○ You are provided a shopping list to be able to purchase the materials for each lesson.
  ○ Hacking STEM has partnered with [Carolina to offer kits for purchase](#).

Lesson Example: [Using Computational Thinking to Understand Earthquakes](#)
- The lesson begins with students learning about S&P waves.
- Students see how scientists work to solve a real-world problem and create models and analyze data in the classroom.
- Materials developed in partnership with the California Academy of Sciences & KQED
- Students build a seismograph to visualize earthquake data and explore modern engineering techniques used to mitigate earthquake damage. Then, they engage in an Excel big data activity to understand plate tectonics. *(From microsoft.com/en-us/education/education-workshop/seismograph.aspx)*
  ○ [Get the Lesson Plan](#)
  ○ [Get the kit from Carolina](#)
- What is a [Microbit](#)?
  ○ It is a pocket-sized computer 70 times smaller and 18 times faster than the original BBC Micro computers used in schools. It has 25 red LED lights that can flash messages and be used to create games. There are two programmable buttons that can be used to control games or pause and skip songs on a playlist. *([From support.microbit.org](#))*

Lesson Example: [Building Machines That Emulate Humans](#)
- Students build robotic models from cardboard and straws to understand the anatomy and biomechanics of the human hand. Then, they conduct trials visualizing data in Excel to generate new ideas for improving its performance. *(From www.microsoft.com/en-us/education/education-workshop/robotic-hand.aspx)*
  ○ [Get the lesson plan](#)
  ○ [Get the kit from Carolina](#)
- Students identified ways to take the project further and created a robotic dragon.

Lesson Example: [Building models to understand and mitigate brain injury](#)
- Students learn about the regions of the brain and their function. Then, they build a model to visualize in real-time what happens when the brain collides with the skull. Next, they design methods to protect and mitigate the effects of collisions. Finally, students are encouraged to take the **[Think Taylor #TTPledge](#)** and commit to being educated, honest and supportive of anyone suffering from a concussion. (From [www.microsoft.com/en-us/education/education-workshop/brain-impact-simulator.aspx](#))
  - [Get the lesson plan](#)
  - [Get the kit from Carolina](#)

Lesson Example: [Astro Socks](#)
- In space, the astronauts' feet are like hands. They use them to grip and grasp surfaces to stabilize themselves in microgravity. This often leads to discomfort on the tops of their feet. In this lesson students study the tasks that astronauts perform while on the International Space Station. They evaluate designs of performance footwear, gather user requirements and study foot anatomy. Then, they design and build a prototype to mitigate the pressure on their feet. By running trials using their sensorized sock, they test the effectiveness of their design in a simulated microgravity environment. Finally, they write and record an advertisement to explain their design. *(From [education.microsoft.com/en-us/hackingStem/lesson/3cqfrhc4](#))*
- Materials developed in partnership with the [NASA STEM on Station team](#).
  - [Get the lesson plan](#) (for Middle and High School)
  - [Get the materials kit](#)

Projects coming in the future
- Hacking STEM works directly with educators and students as they create these lessons.
  - Examples:
    - Student wants to find the best way to ship hydrangeas without their color changing.
    - Student wants to find out why a kid (goat) is being rejected by their mother.

Support for teachers who want to do this but aren't sure how to begin.
- PD in a box coming soon.
- Try it out yourself before you try it in your classroom.

- ○ Don't start with the robotic hand. Try out one of the bite-sized activities on the [activity library page.](#)

How can we bring these materials to our classrooms?
- Partner with a local company to bring these activities to your classroom.
- Apply for grants from organizations like [DonorsChoose](#).

Resources:
- Hacking STEM homepage: [Aka.ms/hackingstem](#)
- Data Streamer homepage:[vAka.ms/data-streamer](#)
- NASA partnership landing page: [Aka.ms/20yrsinspace](#)