

### A program of the ONCE FOUNDATION



### Introducing Mass STEM Hub October 10, 2019

Our MISSION is to provide schools with access to and support for applied learning and STEM education that builds knowledge and skills students need to succeed in a rapidly-changing, high-tech world

program of the ONCO



### Our WORK focuses in three areas:

Best in class applied learning + STEM education



Dedicated educator support & resources

Authentic partner engagement

# We work with over 320 schools in Massachusetts across three different programs

2019-20 MSH School Footprint





# Connecting students and teachers to STEM careers & professionals is a key component for student success

Curriculum-aligned experiences allow students & teachers to expand programming beyond the four walls of the classroom, by

- Highlighting real world applications of coursework
- Providing an authentic audience & expert feedback
- Demystifying STEM careers
- Building confidence in using current industry tech

"The **coolest part** is that they give you feedback, and later on you can go back and fix your idea and make it even better... and possibly the **best thing ever**!"

-Student





# PLTW increases student preparedness for and interest in STEM by offering high-quality applied learning K-12







\* Results for PLTW students are for students who completed 3+ PLTW courses, statistically significant impact was also found for students who completed only 1 course.

Sources: Academic Achievement: Schenk et. al (2011), "A Study of the impact of PLTW on achievement outcomes in Iowa", Iowa Dept of Education; Higher Ed Outcomes: Pike et al. (2014), "Using propensity scores to evaluate education programs", Indiana Univ.-Purdue Univ.-Indianapolis.

## We partner with orgs to create meaningful experiences to increase students' STEM mastery and excitement



#### **Student Showcase**

Co-development, in-kind donations, and recruitment of volunteers to host a showcase event where students present their work and receive feedback from an authentic audience



#### Online Industry ChallengeTead

Expert feedback by industry professionals provided on student work submitted online and sponsorship of industry prizes, such as site visit field trips and virtual informational interviews



Opportunity for students or teachers to engage with industry professionals to learn more about work in the field and application to their curriculum in the classroom

#### Sponsorships

Financial sponsorship, underwriting events and new or expanded school programming. Examples: GE Foundation, National Grid, BNY Mellon



### **Civil Engineering and Architecture students presented** Habitat for Humanity houses to Utile architects





utile\_boston Utilians welcomed students from @ehsmass to the office for a design critique on their House Design Projects last week as part of an ongoing partnership with @pltworg and @mass\_stemhub. It was great to see such young designers engaged in the problem solving that surrounds design, from programming and design concepts to site constraints and budgets!

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# MA STEM Week is a great opportunity to start getting involved, in-person and virtually



#### **Grade-specific Challenges**

K-2: Food Waste - designing a device to preserve food
3-5: Energy Waste - designing a solar powered device
6-8: Plastic Waste - designing a device to extract microplastics from bodies of water
9-12: E-waste - design campaigns to educate communities on e-waste reduction

#### Sign up at stemweekchallenge.org

**Showcase judge:** Volunteer as a judge for the STEM Week culminating event where over 600 students will present their work to leaders and industry professionals at the Reggie Lewis Center, Boston \ <u>Morning of Friday,</u> <u>Oct 25</u> | 2.5 hour (9:30am-12:00pm) commitment + travel.

**Virtual project judge:** After STEM Week, review project work submitted online by students across the state to help us choose winners in several categories! Project reviews will be guided by a brief rubric and all be completed online. Oct 28 - Nov 8 3 hour commitment, anytime over the two weeks.



# STEM is all year long – your organization can get involved today for opportunities throughout SY 2019-20

#### Sponsor an Online Industry Challenge

#### Commitment

- Recruit ~10 employee volunteers to judge 30-60 student projects over a 2 week period (10-15 min/project)
- Sponsor prizes for the winners (company tour for a class + transportation stipend, virtual conversation with judge, swag, etc.)

Planned Engineering Challenges (details in appendix):

- Manufacturing a Box (High School; *December*)
- Automation and Robotics Tasks (Middle School; *January*)
- Reverse Engineering & 3D Modeling (High School; *March*)
- Bridge and Truss Designs (High School; *March*)
- Control Systems Recycling Sorter (High School; *May*)
- Civil Engineering & Architecture (High School; TBD *spring*)

#### Host a high school industry workshop

*February* – Opportunity for 100-200 high school students to share projects and troubleshoot with 50 industry professionals.

## Contact Andreina (aparisiamon@mass-stemhub,org) to coordinate



#### Judge a student showcase

Share your expertise with students by connecting with them inperson at a student showcase, learning about their prototype, asking questions about their design process, and providing feedback

#### Commitment

- Individual: 2-5 hours, including travel time, to connect with students during the showcase and (sometimes) over lunch
- Organization: be recognized as a volunteer sponsor by committing 10+ volunteers

#### Planned Showcases

- Jan 29 in Cambridge: Middle School Computer Science
- May 6 in Salem: Middle School Automation & Robotics (video)
- End of May in Boston: High School Capstone Showcase & STEM Signing Day (video)
- June 3 in Boston: Middle School Design & Modeling (video)
- June 9 in Boston: Elementary School Showcase (video)

#### Host an Onsite Teacher Industry Experience

A hands-on experience for 5-12 Project Lead The Way teachers to learn from STEM professionals and each other, increasing confidence and connections between their teaching and opportunities for their students. Taking this experience back to their classrooms, the teacher session has the potential to impact hundreds of students.

Commitment: 3-7 volunteers, 2-4 hours of teacher time onsite

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Appendix



### Select Online Challenge Project Details

#### Automation through Programming Challenge – PLTW Automaton and Robotics Unit

Grade level:	Middle School
Timing:	January
Description:	After students learn about <b>mechanical systems, energy transfer, machine automation, and computer control systems</b> , they apply that knowledge to <b>build and program an automated device</b> that completes one of ten tasks with minimal human intervention using the VEX Bobotics <sup>®</sup> platform. Each student is designated as the team's mechanical electrical, or computer engineer, with the responsibilities for
	the task respective to their role.
You'll be judging	: Student documentation of their process: mechanical engineer's design sketch, electrical engineer's inputs/outputs schematic, computer engineer's code; Photos/video of the developed device

Control Systems Challenge – PLTW Principles of
Engineering Course

#### **Reverse Engineering Challenge – PLTW Principles of Engineering Course**

Grade level: Timing: Description:	High School <i>May</i> After learning about <b>mechanisms. strength of</b>	Grade level: Timing:	High School March
You'll be judging:	structure and materials, automation, and control systems, students apply that knowledge to design, model, and test a device that will separate recyclable materials, combining VEX materials with control and 3D modeling software. Student sorting system design sketch; Process flow and pseudocode/code driving the system; pictures/video of developed sorting system	Description: You'll be judging:	After learning about engineering design and manufacturing, they apply that knowledge <b>to reverse engineer an everyday</b> <b>item</b> of their choosing, breaking it down into the component parts needed to build it, using Autodesk Inventor® to create 3D CAD designs for each part, and performing functional analyses of the parts. product description; project poster with rendered drawings, complete product, descriptions of functional and structural analysis findings



# We need the today's STEM professionals to inspire the next generation of problem solvers



**Engineers, scientists, architects, designers, project managers** can all help students understand what it means to be a STEM professional and how they can have an impact in the future, serving as judges and mentors, **in-person** and **online** 



### Meet the Mass STEM Hub team!













