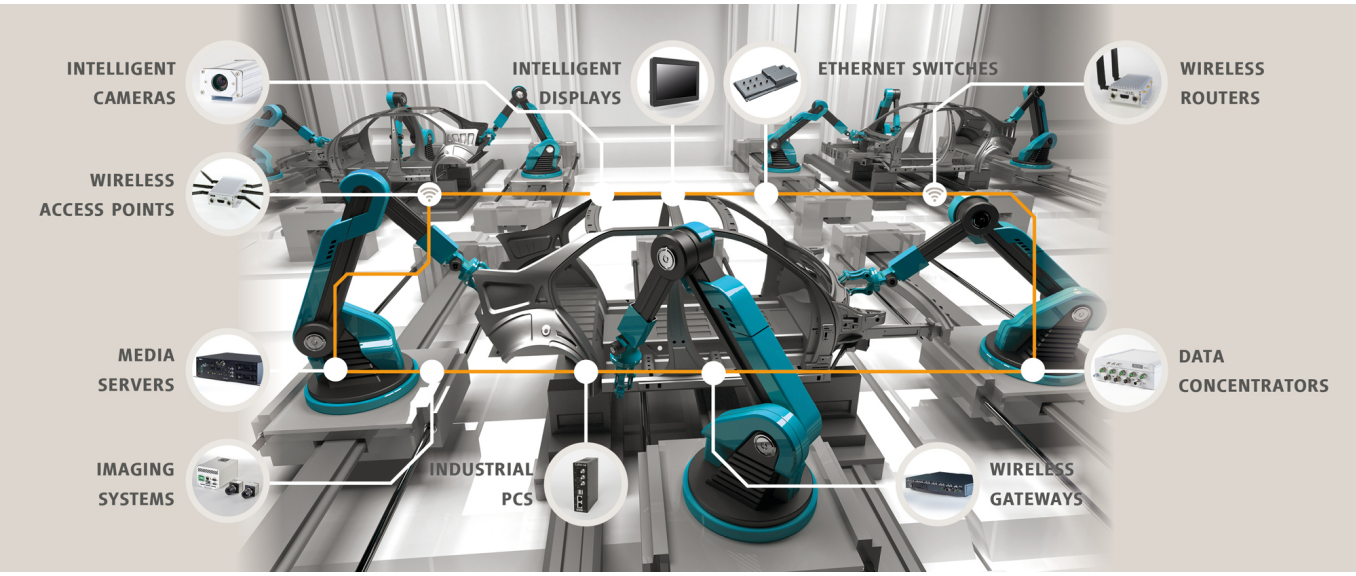
ADVANCED MANUFACTURING LEARNING ACTIVITY



ENGAGE: ***What do you need to know about advanced manufacturing?***

According to manufacturing.gov, Advanced Manufacturing is the use of innovative technologies to create existing products and the creation of new products. Advanced manufacturing can include production activities that depend on information, automation, computation, software, sensing, and networking. Building something new is much more automated now than in the past. Through this unit, its video and hands on resources, you will be introduced to the basic concepts of Advanced Manufacturing and Industry 4.0.

EXPLORE: ***How much do you know about robots?***

According to Thomas Industry, “Robots aren't necessarily replacing the jobs of qualified professionals. While some of the more menial, monotonous, and dangerous jobs are often assigned to robots, some manufacturers find that they're more beneficial in a collaborative setting.” (Nichols, 2018)

Collaborative robots or “cobots”, as they're sometimes known, work alongside humans in all parts of the factory or warehouse. They assist with some of the more challenging jobs, like lifting an engine block to give workers a better angle for attaching parts and tightening bolts. They also transport heavy objects or hazardous materials under the watch of human supervisors. (Nichols, 2018).

Whatever the challenge may be, robots and cobots are here to stay. These mechanical assistants, if programmed correctly, can co-exist with humans in the workplace to reduce physical and often mental workloads.

https://news.thomasnet.com/featured/the-rise-of-robots-in-industry-4-0/

EXTEND: *How fast can you make standard s'more?*

Directions

a) Read the problem and the criteria/constraints
b) Listen and write down any extra criteria or special instructions given by the facilitator
c) Write down individual brainstorming ideas and sketch a possible solution in your notebook
d) Speak to your small group about your ideas and listen to their ideas
e) Write down and sketch the idea your group agrees upon in your notebook
f) Construct your s'more using the robot
g) Write down observations and record the time and distance on the chart provided
h) Talk to your group about possible modifications
i) Make modifications and retest/modify for a total of 6 tests
j) Turn in your test results and all of your tools
k) Take the certification test online
l) Share your results through a brief presentation by speaking in front of others or recording a short video

Problem

The challenge is to assemble a s'more accurately and as fast as possible. You will need roughly three or four class periods and all the pages of this STEM Learning activity to complete this STEM challenge.

Constraints

- The robot must be affixed to the workspace mat and also affixed to a surface using suction cups or screws
- Speed of each step must not be less than 750ms unless approved
- Standard ingredients should be fresh

Materials Supplied

- Robot
- Workspace Mat

Materials Needed

- Computer, phone or tablet
- Standard Graham Crackers
- Chocolate bar with incremental break lines (Hershey's)
- Jumbo Marshmallows
- Stopwatch or timer

ELABORATE: *How can you validate your solution?*

Testing

a) For each attempt made, record the time from start to finish
b) After each attempt, make and write down any necessary modifications you make to the process to assemble the s'more more accurately, faster or both.

Test	Time	Assembled within target?	Observations/Modifications
1			
2			
3			
4			
5			
6			

Communicating Results

Create a brief presentation to share your results with other groups. You can choose to speak in front of others or prepare a short video.

EVALUATE:

Advanced Manufacturing Sample Grading Rubric				
ategory	**Exemplary 40-32**	**Accomplished 31-20**	**Developing 19-12**	**Beginning 11-1**
S'more assembly	The s'more was assembled correctly with quality and completely within the target	The s'more was assembled correctly with less than half outside the target	The s'more was assembled correctly with more than half outside the target	The s'more process was attempted with minimal results
S'more assembly timing	The s'more was assembled correctly with quality and within 30 seconds	The s'more was assembled correctly with quality and within 31-60 seconds	The s'more was assembled within 31-60 seconds	The s'more was assembled in over 60 seconds
Overall S'more assembly	The assembly was well planned, executed in an organized manner, and the results were accurately recorded.	The assembly had evidence of planning, was completed, and results were recorded.	The assembly was attempted and some results were recorded.	Effort was made to assemble and record data.
Presentation	Presents easy-to-follow information that is logical and adequately detailed. All graphics and supplemental information included	Most of the information is included. All graphics and supplemental information is included	Most of the information is included. No graphics or supplemental information included	Most of the information is missing, disordered or is confusing
Clear Communication	The person(s) presenting conveys a clear and concise message about the process taken to design the solution, and its features	The person(s) presenting conveys a message about the process taken to design the solution, and its features	The person(s) presenting conveys an unclear message about the process taken to design the solution, and its features	The person(s) presenting conveys an unclear message about the solution
				TOTAL OUT OF 200 POSSIBLE: _____