

STEAMhack™

Chain Reaction Challenge!

at the 2019 DEPS/ITEA Experimentation
Engineering Workshop Conference

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What is a STEAM-Hack Chain Reaction Challenge?

The STEAMhack™ Chain Reaction Challenge is a speed-building event where teams of 3 – 5 students receive a kit of materials and 4 hours to build the most impressive chain reaction-style machine based on their team’s pre-contest design. Machines and teams will be judged based on functionality, creativity, spirit of whimsy & fun, and teamwork.

Problem Statement

To design and build a chain reaction machine that **(2019 new problem)**:

will “Feed a Pet” where the machine needs to dispense “food” (marbles or beads in the kit or pet food they buy) based on the “pet” triggering the chain reaction)

Materials

Each team will receive a box with the following materials: Balloons, binder clips, bouncy balls, bowls, cars, clothespins, construction paper, popsicle sticks, cups, dominoes, drinking straws, fishing line, golf balls, hot wheels tracks, index cards, markers, masking tape, mousetraps, paper clips, pencils, pencil sharpener, safety pins, rubber bands, ruler, skewers, toothpicks, twine, ½” plastic pipe and fittings, square and round dowels, washers, clear pipe, electrical conduit, 1-1/4” plastic pipe fittings, wood shims, steel balls, zip ties, duct tape, scissors, knife, clear plastic bowls, marbles, pipe cleaners, pulleys, ice cream scoop, ladle, bug tongs, metal bucket, wind up mouse, 1” x 2” wood, tennis ball, drywall corner bead, metal bowl, canning funnel, foam dice, and ping pong balls.

Rules & Judging

1. Teams are encouraged to brainstorm possible solutions prior to the event, this may involve team discussions and/or schematic representations of possible designs.
2. The kit materials listed above will not be available until the day of the competition; participants will *not* be permitted to bring in outside building materials to the venue, however, team notes and drafted plans will be allowed.
3. Participants will be given only 3 hours to “hack together” a finished contraption design (using the given materials) which they will present to the judges.
4. Following the build phase, a panel of judges will visit each team in sequential order, at which point the team under evaluation will:
 - a. Introduce themselves and the machine they’ve built
 - b. Explain the specific steps of the machine
 - c. Convey a storyline and/or theme associated with the machine steps
 - d. Complete a, b, and c in under 5 minutes (the judges will have stopwatches)
5. Once the introductions and explanations have been completed, judges will signal the team to proceed with the first of 2 machine runs (the machine should already be queued up and ready to go before the judges arrive).
6. After the machine is started, it will have 5 minutes to complete the task.
7. Human intervention during the machine run will result in point deductions

8. Following the first run, the team will scramble to reset their machine to prepare for a second run. Points are awarded for expediting this process, so communication and teamwork are key. Team members will signal the judges when they've completed their reset and are no longer in physical contact with the machine. Judges will then give permission to commence the second run.
9. Rules and judging for the second run are the same as the first. Team judging phase will be complete following the end of the second run.
10. Machines must be confined to a 10 ft x 5 ft footprint which will be taped off by event coordinators preceding the competition. Items exiting the predetermined contraption space will result in point deductions.
11. For further rule clarification or other pre-competition questions please contact our event coordinators:

Steve Woffinden

Steve.Woffinden@gd-ms.com

Kathi Swagerty

KSwagerty@airacad.com

The following tables outline the specific categories and point totals that judges will be using to evaluate teams and their finished designs. In order to score maximum points, team members should familiarize themselves with this information.

<u>MACHINE RUN SCORING</u>				
<i>Criteria</i>	<i>Run 1</i>	<i>Run 2</i>	<i>Point Calculation</i>	<i>Total Points</i>
Total time required for Machine Introduction and Walk-through			0 – 5 minutes = 15 pts. 5+ minutes = 0 pts.	
Did the machine complete the given task? (feed a pet)	Yes No	Yes No	15 points per successful run	
Number of human interventions during each machine run			30 – 4n points, where n = total number of interventions	
Total time required to reset machine in between runs (time with			0 – 3 minutes = 15 pts. 3 – 6 minutes = 7 pts. 6+ minutes = 0 pts.	

stopwatch)			
Does the machine and its components remain within the designated space?	Yes No	Yes No	-2 points per violation
Other Rule violations			-5 points per violation

Total Machine Run Points		
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MACHINE CONSTRUCTION SCORING

<i>Criteria</i>	<i>Point Calculation</i>	<i>Total Points</i>
Number of machine steps	Steps / 2 (rounded down) = total points	
Number of repeated steps in the machine	-3 points for every 2 duplicate steps	

Total Machine Construction Points		
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TEAM & VISUAL DYNAMICS SCORING

<i>Category</i>	<i>Criteria</i>	<i>Score</i>
Teamwork	Overall group attitude and enthusiasm (on a scale of 1 – 5; 5 being most positive)	1 2 3 4 5
	Contribution (1 – 5; award 5 if all members are engaged and participating during build, walk-through, and machine run)	1 2 3 4 5
Story and Theme	A storyline pertaining to the machine run is articulated during the walk-through (1 – 5; 5 for most cohesive and detailed)	1 2 3 4 5
	A recognizable theme is present in the team’s finished design (1 – 5; 5 for greatest perceived effort)	1 2 3 4 5

Total Team & Visual Dynamics Points	Multiply score total by 2, for a total of 40 points possible	
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Hints and Helpful Information

A possible machine design process...

1. Decide what animal to feed
2. Brainstorm and decide how the animal could start the machine
3. Brainstorm and decide how the food will be delivered to the animal
4. Draw a diagram of the overall sequence of the machine
5. Finally, in the spirit of “Uncle Rube” see if there are extraneous steps that could be added in the sequence to make the machine more entertaining and complex

Q: What is a step?

A: A step in a machine is a transfer of energy from one object to another. Identical transfers of energy in succession will be counted as one step.

Example: A sequence of dominos hitting each other will be counted as 1 step.

Q: What is a touch/human intervention?

A: Any physical touching or action to continue the operation of the machine after the machine begins a Contest run. Multiple touches/human interventions on the same step in the same Contest run count as a single touch.

Example: Your machine stops because one step does not trigger another step. A team member interacts with the machine through a physical touch or other device to trigger any steps that follow.

Logistics

Date: **TBD**

Location: **TBD**

7:30am	Teams report to Hotel , go to the DEPS/ITEA Conference Registration desk.
7:30 – 8:00am	Breakfast; teams transition to the competition room by 8am.
8:00am	Briefing and instructions by ASU lead, Jay Fernandez. Release of materials.
11:00 – 12:00pm	All building stops at 11am, judging takes place until 12pm.
12:00pm	Lunch, Presentation of awards (Teams will sit with sponsors in luncheon with conference attendees).

Prizes

\$1000 for first place

\$750 for second place

\$250 for non-placing Participation

Registration Questions

High schools contact:

Pat Cannon

505-720-2450

pcannon@aegistg.com

Middle schools contact:

Ed Trzcienski

505-504-5376

edward@aegistg.com

Sponsors

ITEA – www.itea.org

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