TEACHING CHALLENGE-BASED ROBOTICS

MARSHMALLOW CATAPULT CHALLENGE

Colorado State University Extension

OVERVIEW

In the Marshmallow Catapult Challenge, youth build robots that can launch a miniature marshmallow the furthest distance from a starting line.

Approximate Challenge Time: 2 hours (1 ½ hours build/program, 30 minutes competition)

SUPPLIES

- LEGO Mindstorms EV3 robotics kits (1 per team)
- Painter's tape
- Tape measure
- Mini marshmallows

If you want to challenge your teams to include additional non-EV3 items, feel free to provide things like rubber bands, string, ribbons, caps, lids, tape, and other materials for their use. Use of these materials can allow for youth to build more diverse catapults (including trebuchets) and can help them get practice combining kit and non-kit items.

CHALLENGE INSTRUCTIONS

Build

Allow teams approximately 1 ½ hours to build a robot that can stay behind a fixed starting line and launch a mini marshmallow the furthest distance. Teams can use any standard pieces and motors that are included in their EV3 kit. If you are using this for an introductory challenge, don't permit the use of any of the included sensors. However, if you are working with more advanced teams, consider allowing sensor use.

Teams will need to use the large or medium motors, or a combination of both, to get the force to launch their marshmallows.

Competition

1. Using painter's tape, tape down a launching start line on the floor. The line should be a minimum of 2 feet long, and should be longer if you plan to have multiple robots launch at the same time.
2. Have one or more teams place their robot behind the starting tape line and queue up their programs. If you are going to have more than one team launch at once, mark their marshmallows with different colors of marker so they are easy to identify.

3. Countdown from 3 and have teams run their programs to launch their marshmallows.
4. Use the tape measure to measure the distance, in a perpendicular line, from the starting line to the ending rest position of the marshmallow. Log all of the distances on the scoring sheets.
5. Run a second round of scored launches for each team, as time permits.
6. Consult the scoresheet, and award placing based on the furthest distance each team was able to launch during the event.

If your space permits, it's more fun to launch multiple catapults at the same time. Be sure to allow an adequate distance for teams to launch. I like to provide around 20 feet, though most teams will typically launch between 5 to 10 feet. Consider taking points off or disqualifying teams whose robot bases are not able to stay behind the starting line during the launch process.