

COOKING ROBOT

STEM CLUB ACTIVITY

CHALLENGE

Your challenge is to design, build, program, test, and share a robot that can cook, prepare, or transport a meal.

- Beginning: Make a delivery robot that can bring a snack on a plate from you to a friend.
- Intermediate: Make a food preparation robot that can perform a repetitive action -such as chopping or whisking- to help you cook a meal.
- Advanced: Make a robotic vending machine that dispenses the food of your choice.

REAL-WORLD CONNECTION

Would you ever consider dining at a restaurant where a robot makes your food? Creator, a robotic restaurant in San Francisco (<https://www.youtube.com/watch?v=1Kfd3VHiVhY>), has a robot that cooks and assembles hamburgers. Thanks to this robot, all their burgers are freshly made to order, with fewer people handling the ingredients before the customer receives their food, which makes it a cleaner process. Additionally, the robot takes up less space, which means the restaurant owners don't need to spend as much money on rent. Instead, the owner invests in better ingredients for their burgers and higher salaries for their employees.

DO

1. Begin by choosing your materials. Will you use the LEGO Mindstorms EV3? Hummingbird Bit? Ozobot? Edison robot? Scratch programming and craft supplies?
2. Next, design your robot, keeping in mind your goals for what you would like it to do. These are called "design requirements." Some suggested design requirements for this challenge are:
 - Robot must be able to keep food clean.
 - Robot must be able to support the weight of the food.
 - Robot must be able to stay balanced while moving.

GRADES: 4-8

SKILL LEVEL: Beginning, Intermediate, and Advanced options

GROUP SIZE: 1-3 students per robot

TIME: 2-3 hours

IOWA COMPUTER SCIENCE STANDARDS: 1B-AP-15 Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

NEXT GENERATION SCIENCE STANDARDS: MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

MATERIALS:

- Computer with internet access
- Robotics kit: LEGO® MINDSTORMS® EV3, Hummingbird Bit Premium Kit or Ozobot or Edison Robot
- Glue gun or masking tape
- Scissors
- Optional craft supplies: cardboard, construction paper, markers/colored pencils/crayons, tubes, disposable cups, popsicle sticks, craft foam sheets, or other craft supplies
- Disposable plate, utensils

3. Next, you might want to sketch out some robot designs. Discuss your design ideas within your team and decide which design you would like to go with. Consider combining elements of each person's design into a hybrid design. Make sure you come up with a strategy for keeping the food clean. Here are some ideas to get you started:
 - Cut up a banana and serve breakfast in bed to your family
 - Deliver a 4-H clover-shaped cookie to a neighbor
 - Attach a whisk to your robot and make mashed potatoes for a Thanksgiving meal
4. If you have a club member who can't join you in person, they could join the robot's video call as the "observation specialist" and make observations on what the robot is seeing.
5. Build and program your robot to carry out your plan.
 - If you are using LEGO Mindstorms EV3, Hummingbird Bit, Ozobot, or Edison, consider using craft supplies as building materials for your robot as well.
 - If you are using craft supplies, program your own animation in Scratch to go along with your craft supply robot.



REFLECT

1. What did you enjoy about this activity?
2. What challenges did you face along the way, and how did you solve them?
3. Did your robot end up different from your original plan?



APPLY

1. How is the robot you made similar to the Creator restaurant robot?
2. Why is it important to make sure food handling techniques are safe?
3. What robot building and/or programming techniques did you learn that you can apply to future robots you design?



CAREER CONNECTION: FOOD SCIENCE

Food scientists design systems to produce, process, and preserve food from the time it is harvested to the time it gets to your table. For more information about Iowa State University's Food Science major, visit <https://catalog.iastate.edu/collegeofagricultureandlifesciences/foodscience/>.



We welcome your feedback! Please use this QR code or link to contact us. <https://form.jotform.com/isu4h/ResourceFeedback>

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