

INVENTORY ROBOT

STEM CLUB ACTIVITY

CHALLENGE

This month, your challenge is to design, build, program, test, and share a robot that can complete a step in the supply chain process.

- Beginning: Make a transportation robot that can deliver a homemade craft from you to a friend.
- Intermediate: Make a retrieval robot that can fetch a specific item from a group of different items based on user input.
- Advanced: Make an inventory-tracking robot that can monitor how many of each different item you have in stock.

REAL-WORLD CONNECTION

Have you ever wondered what happens after you purchase something? Store managers must keep track of their inventory. Inventory is a list of how much of each product a store has in stock. If they run low on an item, they might need to order more supplies from a large warehouse. With the increase in demand for quick delivery times, warehouses are using robots to make this process faster, cheaper, and safer. Fetch Robotics is a company that makes warehouse robots. You can watch a video about these robots here <https://fetchrobotics.com/fetch-robotics-blog/dispelling-top-myths-around-warehouse-robots/>. These robots can retrieve items off the warehouse shelves, transport them around the warehouse, and keep track of how many of each item is left. By allowing robots to take care of the dangerous heavy lifting and repetitive tasks, people can focus on the tasks we are good at—creative thinking and innovation. People typically take care of quality control—making sure the right items get placed in the right shipping containers and thinking of new ways to improve the process overall.

DO

1. Begin by choosing your materials. Will you use the LEGO® MINDSTORMS® EV3? Hummingbird Bit? Ozobot? Edison robot? Scratch programming and craft supplies?

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 and/or masking tape
- Scissors
- Optional craft supplies such as cardboard, construction paper, markers/colored pencils/crayons, tubes, disposable cups, popsicle sticks, craft foam sheets

2. Design your robot, keeping in mind what function you would like it to perform. These are called “design requirements.” Some suggested design requirements for this challenge are:
 - The robot must be able to support the weight of the item.
 - The robot must be able to accept and make decisions based on user input.
 - The robot must be able to display the name and quantity of each item.
3. You might want to sketch out some robot designs next. Discuss your ideas with your team and decide on a design. Consider combining elements of each person’s ideas into a hybrid design. Here are some ideas to get you started.
 - Carry a homemade paper pop-up card from you to a friend.
 - According to a button pressed, retrieve the corresponding origami animal.
 - Display a continuously updating list of the name and quantity of each type of paper airplane.
4. 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 only 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 Fetch Robotics robot?
2. Why is it important to make inventory tracking faster, safer, and more reliable?
3. What robot building and/or programming techniques can you apply to future robots you design?



CAREER CONNECTION: INDUSTRIAL ENGINEER

Industrial engineers make processes cheaper, safer, faster, and more reliable, including organizing items in a warehouse. For more information about Iowa State University’s Industrial Engineering program, visit <https://www.imse.iastate.edu>.



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

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