



Innovation Exploration Kit™, I Can Invent® Series

BOT ANN-E™



Discover your tech abilities as you program your very own Bot ANN-E! Explore the many uses of robots, use design engineering to create a futuristic farm, and then put Bot ANN-E to the test. Imagine all the landscapes, cities, and worlds your Bot might navigate!

Read prior to using the product.

SAFETY AND HYGIENE



WARNING:

Choking hazard—small parts.
Not for children under 3 years.

- All activities require adult supervision.
- Ages 5+.
- Read and follow all instructions.
- For safety and hygiene purposes, please be sure all children wash their hands after each activity.
- Demonstrate how to properly hold and use scissors. Do not run with scissors.
- Do not allow children to put materials in or near anyone's eyes, mouths, and ears.
- Do not play with or place plastic bags near the face or mouth.
- Ventilate the room when using markers.
- Batteries are only to be installed under adult supervision.
- Insert batteries with the correct polarity.
- Remove the batteries during long periods of non-use. Always remove exhausted batteries from the robot. Battery leakage and corrosion can cause damage.
- Never short-circuit the battery terminals.
- Do not mix old and new batteries. Do not mix different types of batteries: alkaline, standard (carbon-zinc), or rechargeable (nickel cadmium).
- Dispose of batteries safely. Do not dispose of batteries in fire. The batteries may explode or leak.

INSTRUCTIONS

MUSIC, VIDEOS, and POSTERS
can be found online at



[invent.org/
i-can-invent/
Bot-ANN-E](https://invent.org/i-can-invent/Bot-ANN-E)

Use this password to access your
Bot ANN-E experience:

coding

MATERIALS

- AAA batteries
- Bot ANN-E (Automated Nature Nurturing Equipment) (programmable robot)
- Bot ANN-E sheet
- Cardboard connectors
- Copy paper
- Cord lock
- Duct tape
- Farm animal figure
- Federico Faggin figure
- Inventor Log
- Markers
- Masking tape
- Pencil
- Red beads
- Safety saw
- Scissors
- String
- White beads

EXPLORE BINARY CODE



Robots are machines that can do simple or complex actions using code.

Robots rely on **programming**—a computer language that gives the machine instructions on what to do.

Robots have mechanical functions and can be programmed to complete tasks.

Computer scientists and communication specialists often use **binary code** to program machines.

Binary code is a coding system that uses 0s and 1s to represent a letter, digit, or other character. It is used to program electronics and tell devices what to do.

Make your own personalized bracelet using binary code!

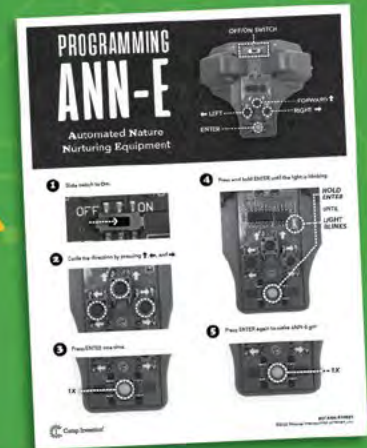
1. Look for your first and last initial on the Binary Bracelet Decoder below to find your pattern. Add beads on the string as you go, using the red beads for 0s and the white beads for 1s.
2. Insert both ends of the string through the cord lock to secure your bracelet, and then cut off any excess string. If your string starts to fray, wrap the end with a small piece of tape.

BINARY BRACELET DECODER

A 00001	E 00101	I 01001	M 01101	Q 10001	U 10101	Y 11001
B 00010	F 00110	J 01010	N 01110	R 10010	V 10110	Z 11010
C 00011	G 00111	K 01011	O 01111	S 10011	W 10111	
D 00100	H 01000	L 01100	P 10000	T 10100	X 11000	

KEY: RED = 0 WHITE =1

PROGRAM YOUR BOT ANN-E



- 1.** You're ready to start programming!
Check out the Bot ANN-E sheet and watch the "ANN-E Programming" video to learn how to code and operate your robots.

- Open the battery compartment on the bottom of Bot ANN-E and insert two AAA batteries.
- Turn on your Bot by sliding the switch to On.
- Push the direction arrows for the desired number of paces.
- Press the ENTER button.
- Hold the ENTER button until it blinks.
- Press the ENTER button to make it go.



- 2.** Now that you've programmed ANN-E, give it a test drive.



There is no reverse button. Press either the left or right button multiple times to turn ANN-E around.

The most frequently missed step is hitting ENTER after the directional arrows. Make sure this is done before you press and hold ENTER.

DO NOT FORGET TO PRESS ENTER

TROUBLESHOOTING TIPS

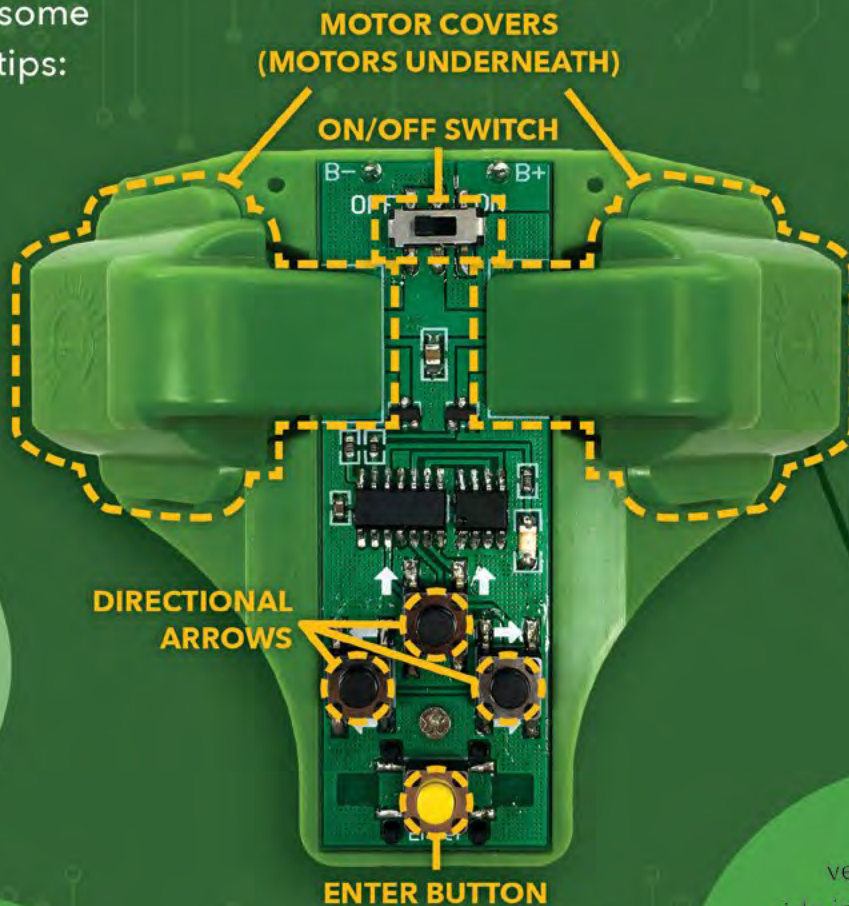
Is your Bot having some trouble? Try these tips:

Turn ANN-E off and then back on again. Repeat a few times.

Make sure the motor covers are properly attached. Gently push so that they click into place.

After programming with the directional arrows, click ENTER, and then press and hold ENTER until it is flashing. Press ENTER again to make it perform the program.

Check the plastic casing on the motor axle to make sure it's pulled away from ANN-E's body and the axle can spin freely.



Try operating ANN-E on another surface. Different textures can change how the motor axles rotate.

If ANN-E veers off to the side instead of traveling straight, gently pull down the plastic casing on the motor axle in the opposite direction ANN-E is veering. The casing should extend just over the top of the axle—less than 1/8 of an inch. Adjust as needed.

CREATE A FARM SCENE

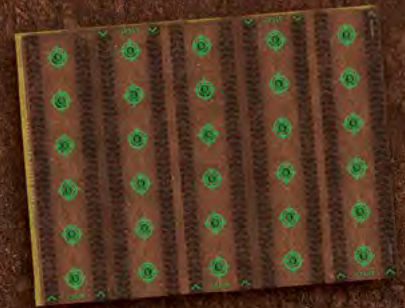
Many modern farms use robots! Some robots might plant vegetables or sort seeds. Engineers have been making tractors that can even drive themselves.

1. Now that you have seen how ANN-E moves, it's time to design a farm scene to navigate!

Start by grabbing nine sheets of paper and taping them together along the seams to create one smooth surface.

Flip the attached papers over so that the tape is on the underside.

Alternatively, download and print copies of the Farm Plot poster.



2. Create your farm! Using the pencil and markers, draw rows or patches of a different type of crop on each sheet.



What types of fruits, vegetables, or grains will your farm grow? Will they be your favorites or ones that are popular at the store?

- 3.** Take your farm from 2D to 3D! Add the farm animal figure and other toys or objects made from recyclables to create a detailed scene.

Add the National Inventors Hall of Fame® (NIHF) Inductee Federico Faggin ('Fuhjeen') figure!



MEET A HALL OF FAMER

Federico Faggin coined the **Microprocessor**, which is the "brain" behind electronic devices we use every day, such as computers, cell phones, and televisions.

Learn more about Faggin here:
invent.org/inductees/federico-faggin



Add color to your crops and make them as detailed as you can by researching the possibilities, including what grows best together.



GET READY TO TEND YOUR FARM

1. Program ANN-E to travel to each area of the farm to disperse seeds and water the crops. If your farm has animals, you can program ANN-E to deliver their food or push objects, such as blocks, to corral them.

2. Play one of the "Farm Music" videos as your Bot ANN-E moves through the farm.



3. Think about the following questions and facts:



Would you like a career in programming or robotics? Why or why not?

Have you ever visited a farm or seen a farm on TV? If so, what was it like? What was your favorite part?



Much like Bot ANN-E, self-driving tractors are becoming a reality for modern farms. A farmer can run several tractors at once without a driver, greatly increasing a farm's efficiency and production.



What kind of technology could you invent to use on a farm?



The tractors are controlled by a computer that shows a simulation of the crop rows and allows the self-driving tractors to run 24 hours a day!



CREATE A POLLINATING DEVICE

1. Watch the "Pollination" video and consider how you might design a prototype (nonworking model) of a flying pollinating device.



Check out the Wing poster for high-flying inspiration from some of nature's pollinators.

2. Sketch ideas in your Inventor Log, then build your prototype with recyclables and craft items from around the house.



CREATE A CITYSCAPE

1.

For ANN-E's next challenge, design a cityscape for your Bot to travel through. Consider designing features like:



Shopping centers and restaurants



Statues, bridges, and monuments



Museums, theaters, and sports complexes



Buildings and skyscrapers

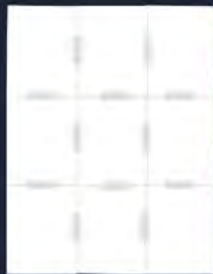
2.

Sketch your ideas in your Inventor Log.



3.

Grab nine sheets of paper. Tape the sheets together along the seams to create one smooth surface for ANN-E to navigate.



4.

Flip the attached papers over so that the tape is on the underside.



5.

Draw the roadway that ANN-E will travel.

6.

Use duct tape, recyclables, and craft materials from home to take your city from 2D to 3D.

7.


Program ANN-E and have the Bot travel through the city to see all of the sights!

CREATE AN OBSTACLE COURSE!



1. Design an obstacle course for ANN-E to navigate. Use your Inventor Log to sketch your design. →
2. Find cardboard objects, like cereal boxes, and cut them into smaller pieces using the safety saw.



3. Connect the cardboard pieces together using the L-shaped cardboard connectors. 
4. Think about how you might bend a piece of cardboard in half to make a tunnel or bridge.
5. Use the cardboard pieces along with recyclables and other materials found around your home to create obstacles for the course.
6. Put all of your obstacles together to create your course!
7. Challenge your family to program Bot ANN-E to complete the obstacle course.

ADD A SPINNING OBSTACLE!

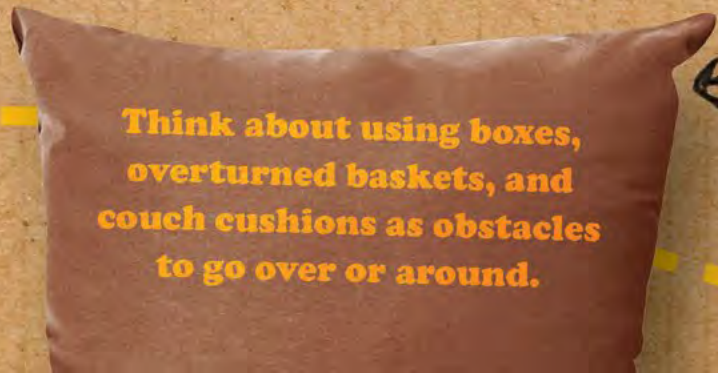
Centripetal force is the outside force that acts in an inward direction on an object that is moving in a circular path. It keeps items from flying off of a spinning object.



Use your obstacle course as a model to build a kid-sized course for you and your family to explore.



What will you program your Bot ANN-E to do next? Think big and test your ideas!



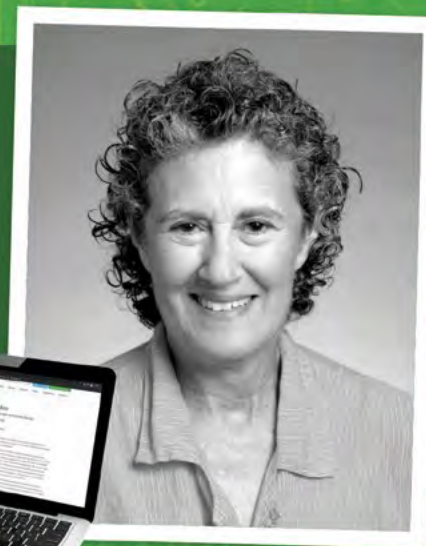
Think about using boxes, overturned baskets, and couch cushions as obstacles to go over or around.

MORE TO EXPLORE

NIHF Inductee **Barbara Liskov** is a computer scientist and inventor who uses code. She designs Programming Languages that help make computer programs more reliable, secure, and efficient.

Code can be found in many places in the world. Music, video games, and even synchronized light shows are made with code.

Learn more about Barbara Liskov at invent.org/inductees/barbara-liskov



For more hands-on STEM activities, visit invent.org/at-home-learning-resources

Is creativity one of your superpowers?
Activate it by coloring in your cardboard box!



National Inventors
Hall of Fame®



Camp Invention®

Camp Invention is an educational program from the National Inventors Hall of Fame.

Learn more at invent.org.

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