Help Farmer Brown Code the Farm!

Author: **Rene Perry**

Robotics, Programming and Engineering
STEM Challenge

Help Farmer Brown Code the Farm!

Rene' Perry
Ozobot Certified Educator
STEM Coordinator, Cascade
Elementary Schools

Grades: **6—12**

Coding Methods: **Color Codes, OzoBlockly**

Subjects: **Computer Science, Engineering/Tech, Science**

Robots: **Evo, Bit**

Brief Summary

Programmers and Engineers problem-solve their section of code at the Brown Farm. A storm has created STEM challenges the students network to solve.

Pre-Reader/ESL: **No**

Required Materials

- 1 Evo or Bit per group
- 1 Large Sheets of White Paper per group
- 1 Writing Materials: Markers, Pencils per group
- 1 Rulers (measuring and line tracing) per group
- 1 Farmer Brown Map (color) per group
- 1 10 STEM Farm Challenges per group
- 1 Variety of Building Materials for Engineers (scissors, tape, paper, ipe cleaners...) per group

Lesson Objectives

- Identify errors in code and problem solve. Design, test, and modify prototype model for Bot.

Preparation

Background Knowledge

(None)

Lesson Tips

- Make sure you have at least 2-4 hours and space to keep the Ozobot's and farm prototypes.
- * Read through the Introduction. Become familiar with the idea - and see if you can duplicate or modify to fit your classroom needs.
- Print, divide, and gather all the materials.
- Decide how you want to set up the room to best fit your needs, as each team has a programmer (white paper and markers) and an engineer (small building materials).
- * Each time a team of students complete a farm task, the result will be similar, yet different. Real world examples are included for each engineer to support their build.
- * I included the John Deere web links for their automated farm equipment. See how farmers across the nation are using technology to be better producers and harvesters while protecting their land. Motivate the engineers as to the 'why'.

Direct Instruction (Teacher Facing Instructions):

1   1. Introduce Farmer Brown's Challenge!

A storm passed during the night leaving many challenges for Mr. and Mrs. Brown to solve. Could the robots help the farmers complete the farm chores? Yes, they can!

Divide student's into teams of two - a programmer and an engineer.

2   2. Choose a Farm Challenge. There are ten.

Familiarize yourself with both the programming and engineering challenge.

Have each student choose which task they will complete: the programming challenge (identify the problem, add codes) or design a prototype farm design model for the robot to perform the farm challenge (run the corrected program).

3   3. Brainstorm, Design, Test, and Modify

Each farm task is unique. Choose the materials you will need to complete your task.

Begin. If you need confirmation, network with other engineers in the room. Make observations, ask questions. Continue your work until you have a program that successfully runs and a prototype model for the robot to use while running the newly constructed line drawing.

Give yourself enough time to be make improvements.

4   4. Make the Real World Connection.

Use the web links to make connect the students to real farmers using technology and automation to better themselves, their produce, their profits, and the land.

johndeere.com

Lesson Closure (Optional)

Each student can take home their paper farm program, prototype, and Farmer Brown STEM Challenge.

Student Practice (Student Facing Instructions):

1   "A storm has passed during the night. The Brown Farm, which produces many products for the local cities, sustained some damage. Mr. Brown walked the property and made a list of 10 farms tasks that need to be completed. On the list are the fences that need mending, milk and eggs need to be collected and delivered, the animals need to be fed and those crazy little pigs are loose!

We need to find a partner, choose a Farm Challenge, and get our Ozobot! Before we can start doing anything, we need to read through our specific task and become familiar with it. We can answer a lot of our own questions by reading our Farm Challenge and talking about these topics with our partner. What are their thoughts first?"
Goals:
Analyze information. Identify the problem. Share, discuss, argue, and conclude the same results of the robotic farm challenge.
Attachments: https://drive.google.com/file/d/1oOeigpXCCAdNHx7BBnSynpJBFvPgOehK/view?usp=sharing, https://twitter.com/Gamerd0g/status/1202730924456071168, https://twitter.com/Gamerd0g/status/1202731493866426368, https://twitter.com/Gamerd0g/status/1202737785678942208, https://twitter.com/Gamerd0g/status/1204627970825961472

2   "When you and your partner have agreed on what the programming and engineering challenges are, it is time to start brainstorming solutions!

Sketch out your ideas. Write down your thoughts for later reference. List supplies you might need. Share your ideas with others. How are they solving their challenges? Do they think your idea was solid or did they offer a simpler way to achieve your goal? Compare and contrast all the idea and information down to one good solid plan.

Now, you are ready to draw line programs and build prototypes!"
Goals: Brainstorming ideas. Predicting possible outcomes. Sketching ideas. Discussing, comparing, and choosing the best solution to try.
Attachments: https://twitter.com/Gamerd0g/status/1204630746914160641, https://twitter.com/Gamerd0g/status/1204633914465120256

3   "Once you have a clear plan, it is time for the programmers to get their white papers for their programs, markers, and robots! The engineers need to take their design sketches to the supply table and gather your building materials for your farm equipment prototype models for Ozobot.

Remember, you will need to test and modify your designs. That's normal. Persevere through until the programmers write a farm program for Ozobot and the engineer builds a design model that the robot can use to complete its farm task!"
Goals: Follow the Design Process to complete a task. De-bug, draw (write) and code a successful farm program for Ozobot. Design, build, and test a prototype farm model for Ozobot to use to successfully complete the farm task! Contrast and compare. Perseverance.
Attachments: https://twitter.com/Gamerd0g/status/1205731212087529472, https://twitter.com/Gamerd0g/status/1205733077864964096, https://twitter.com/Gamerd0g/status/1205736109692485634, https://twitter.com/Gamerd0g/status/1206812481491849216, https://twitter.com/Gamerd0g/status/1206814667214999553, https://twitter.com/Gamerd0g/status/1206816148706086914, https://twitter.com/Gamerd0g/status/1206819073356513281, https://twitter.com/Gamerd0g/status/1206820826982449152, https://twitter.com/Gamerd0g/status/1206828575443144705, https://twitter.com/Gamerd0g/status/1207516080500953088, https://twitter.com/Gamerd0g/status/1207517763406745602, https://twitter.com/Gamerd0g/status/1207519478759579648, https://twitter.com/Gamerd0g/status/1207520985630400518, https://twitter.com/Gamerd0g/status/1207531750726914048, https://twitter.com/Gamerd0g/status/1208190544729362434, https://twitter.com/Gamerd0g/status/1208195440094527489, https://twitter.com/Gamerd0g/status/1208200275699232768, https://twitter.com/Gamerd0g/status/1208203826089451520, https://twitter.com/Gamerd0g/status/1208612317522325504, https://twitter.com/Gamerd0g/status/1208614851955716097

4   "People use robotics, technology, and automation everyday in our lives. I am going to connect to John Deere Tractor's website and click on the Tech at Work link. Today as we build, I am going to the video show how families across America are using technology and automation to enhance their farm. By using such state of the art equipment,

farmers can track their yield increasing profits, improve the crop itself, and help preserve the land for future use."
Goals: Real World Connection - robotics and automation can be helpful to people.
Attachments: https://www.deere.com/en/technology-products/precision-ag-technology/, https://twitter.com/Gamerd0g/status/1207525621514915842

5   "If your team has completed de-bugging their line drawing and constructing Ozobot's prototype farm gear, grab an iPad and start programming your Bot using Ozoblockly!

I have printed out a few Farm Task Card. Let's see if you can program Ozobot to pick up his favorite ice cream treat!"
Goals: Programming using Ozoblockly.
Attachments: https://twitter.com/Gamerd0g/status/1206826935122194432, https://twitter.com/Gamerd0g/status/1214602542337781761, https://twitter.com/Gamerd0g/status/1214627453580087297, https://twitter.com/Gamerd0g/status/1216924321479659520, https://twitter.com/Gamerd0g/status/1216926357487177730, https://twitter.com/Gamerd0g/status/1216928252851183617

Lesson Extension (Optional)

1   Sharing Your Findings is part of the design process. Video your Bot on your farm program and upload.

Connect with a local farm. They may be able to speak or make that connection to other STEM fields.
Goals: Share Findings

Supplements

Additional Attachments

(None)

Academic Standards

- NGSS.K-2-ETS1-1