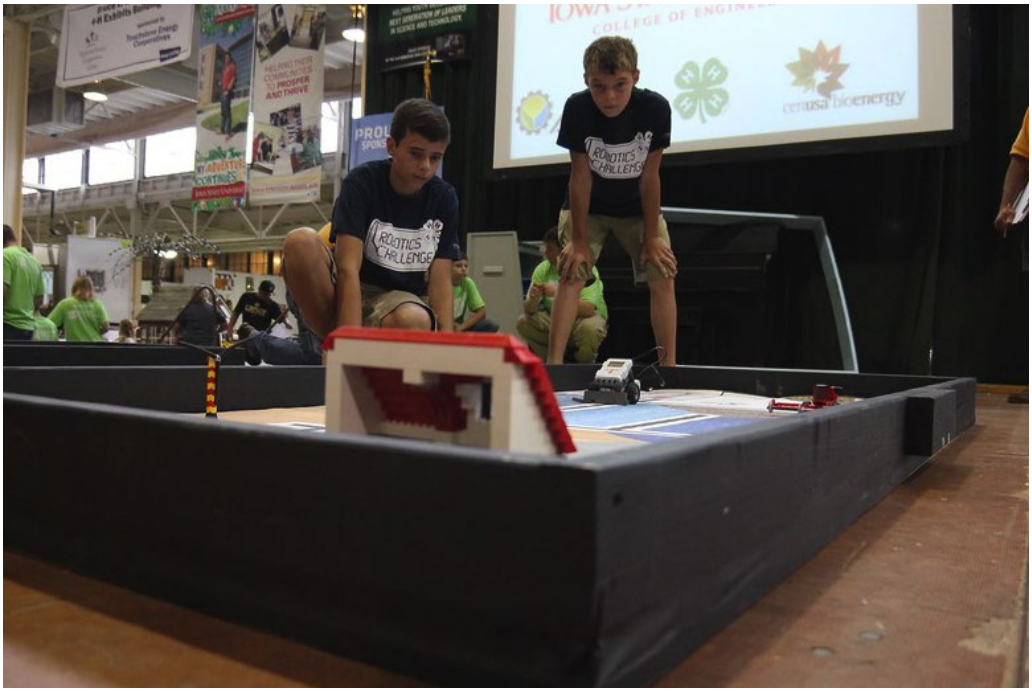
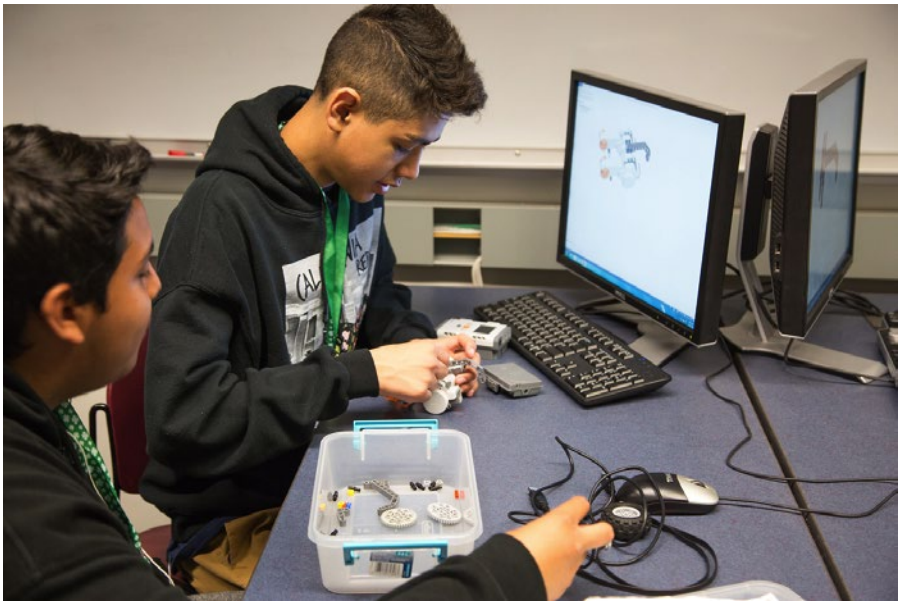
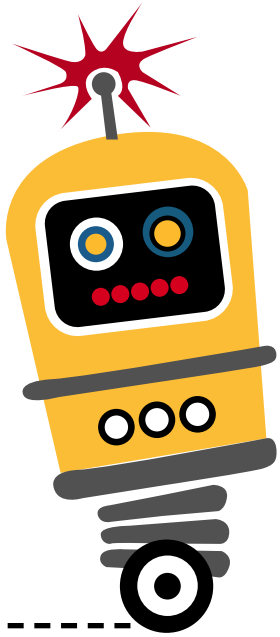
IOWA 4-H
ROBOTICS
CHALLENGE

www.extension.iastate.edu/4h







IOWA STATE UNIVERSITY
Extension and Outreach

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Pilot Introduction

Welcome to the 4-H Robotics pilot! We are so glad that you and your team are joining us for this great learning experience!

Requested pilot help from adult leaders:

1. Please make notes about the pilot missions. What would you like to add? What could be explained better? Your notes will help make this document better!
2. Please take photos and provide youth feedback or quotes.
3. Scan and send a PDF of the team's journal if posible before the Iowa State Fair.
4. Send team roster to us as soon as you can with adult leader(s) name(s), contact information for the adults(s) and youth names. We will use the group enrollment form your county fills out for additional information.

A note about level of robotic challenge:

This experience is designed for youth with entry to beginning level robotic skills. If your group has more experience, we encourage you to contact Casey Wenstrand at caseyw@iastate.edu for help with modifications—or additional information.

Program Data

Thank you for assisting the Iowa 4-H Youth Development Program with evaluation and program data collection. For all programs conducted in Iowa, there are two resources for you to utilize. First, there is a common measures survey. Please make copies of this survey and have the youth participants fill it out immediately following the program. These forms should be returned to the Data Manager at the Iowa 4-H campus office at 1259 Stange Road in Ames.
Second, county youth program staff at ISU Extension and Outreach offices should complete a program data collection form following every program.
https://iastate.box.com/v/4HP7020

Team Values

Team Come up with Team Values:

It is important to be sure each team outline their philosophies through Team Values. Each team should work together to come up with 3-6 values.

Team Journals:

This is to help the team understand that engineers and scientists write everything down and don't get rid of their plans for both failed attempts and postive attempts. This is why the teams are asked to keep a journal that will have Pre-Questions, Post-Questions, and the mission programs in them.

Pre-Quesions:

These questions will help to better engage the youth for each challenge.

Post-Questions:

These are an evaluation toll to gauge the relevance of the mission and the level of the mission.

Mission Programs:

Teams should include a final copy of each program. The reviews of the journals would also advise teams include the process of each mission.

Mission 1: Space Travel

Focus: Color Sensor Use

Materials Provided: Mat, 4 Planet Photos
Materials Needed: EV3 Robot, Journals, Random Building Materials
**Build robot for use by the team. There are some suggested builds in the shared CyBox.*

Pre-Mission Activities:

Space Game (What do you need to survive?). Build an object activity and follow this with creating a list of team values.

1. Play the Moon Landing Game found in CyBox.
2. Introduce the journals and materials (any objects in the room or provided by adult leader) for making space objects. Then have each team member draw a model of an object that could be taken into space. This object should help space travelers in some way. Objects can be made out of anything that can be found in the environment (ex: pipe cleaners, craft items, Legos, etc.).
3. Use the drawing as a guide, each team member then makes the object to take into space.
4. Present the object you made to the group. Be sure to name and describe how the object will be used in space. Take a photo to share!
5. As a team, decide which object the team will take into space.
6. Last, make a list of team values. For example:
    a. It's not what we win, but what we learn that's important.
    b. We have fun alongside our teammates.
    c. We are stronger when we work respectfully together.

Pre-Mission Journal Activity:

Describe the object that the team picked to take to space. Share your thoughts as to why it might be a good choice.

Mission: Do

Suggested Time Completion: 2 Minutes
Mission Setup: Set planet pictures at A6, B4, D2, and D7.
First Mission: Visit 4 planets and then return home.
Extra Misson: Visit 4 planets and then return home. Oh no! You forgot a team member at the stop on the second planet. Return to that planet to get your team member. Then return home safely!

Post-Mission Journal Entry: Reflect

1. Describe how you and your team worked together. What worked well? What might you change about the process the team used?
2. Optional Pilot Feedback: Any ideas for another mission?

Post-Mission Discussion: Apply

Discuss as a group. How did teamwork help with this mission? Why is teamwork important? What communication styles were used?

Mission 2: Space Travel

Focus: Using a 3rd Arm

Materials Provided: Mat, Cup-Stacking Kit (Cups, Rubber Bands, String), Pictures of Space Junk, Picture of Mars.

Materials Needed: EV3 Robot, Journals, Computer with Internet Access

Pre-Mission Journal Activity:

Pick an article about space or real-life missions as a team. Then answer the following questions in your journal. Here is a link to some articles:
http://www.scholastic.com/browse/collection.jsp?id=227

What caught your interest?

What was the main idea or the important point(s) of the article?

Is there anything you want to know more about now after reading the article?

How are you feeling about our next team's mission?

Pre-Mission Activity:

Have the team work through building a pyramid out of cups, using only the tools provided (string tied to the rubber bands). See reference for more information:
http://ngcproject.org/sites/default/files/9.6_stack_em_up_activity.pdf?fbclid=IwAR2APSIs9Hj1v6ysBWjBrfimi24kaxkl6RmoXaGeq6hM_8RAevlkNPJp6i8

Mission: Do

Suggested Time Completion: 2 Minutes

Mission Setup: Mars is located in B5. Space Junk ais located at A4, B2, C4, C7, D1, D6

First Mission: Travel to Mars. Watch out for the space junk! Return the sample from Mars.

Extra Misson: Collect more than one sample from different areas of the planet.

Post-Mission Journal Entry: Reflect

1. Describe who emerged as a leader. What are important qualities for a leader to have? What worked well? What might you change about the process the team used?
2. Optional Pilot Feedback: Any ideas for another mission?

Post-Mission Discussion: Apply

Discuss as a group. Did extracting a sample intrigue you? What different forms can leadership take? Or how can leadership look different? Why is it important that we all get a chance at being a leader?

Mission 3: Clean Up Space Junk

Focus: Retrieval of Objects

Materials Provided: Mat, Plastic Eggs, Spoons
Materials Needed: EV3 Robot, Journals

Group Warmup:

Egg race on a spoon. Split into teams. Form two lines. Person in the front runs to a designated spot and back while holding an egg on a spoon. Tag the next person in line.

Pre-Mission Activity:

1. Hold a group discussion about space junk. Here is a reference for more information: http://www.funkidslive.com/learn/deep-sapce-high/marvellous-missions/debris/#
2. Reflect on how to be effective communicators and leaders. Reference journals as needed. Then as a team, pick one person to be the placer and blindfold them. Then the rest of the team gives directions to the placer. Direct that person to place the "space junk" on the mat in the designated spot. Take turns being the placer!

Pre-Mission Journal Activity:

Describe how it felt to rely on your team to give instructions on where to place the space junk. How does trust relate to teamwork?

Mission: Do

Suggested Time Completion: 2-3 minutes
Mission Setup: Planet is located at C4. Space Junk (plastic eggs) is located at A7, B2, B4, B5, C5, D7
First Mission: Retrieve 3 of the 6 items (space junk) without the planet's orbit pulling it in.
Extra Misson: Retrieve the last 3 items.

Post-Mission Journal Entry: Reflect

1. Describe the program and the steps taken to retrieve the space junk. Use coding language when possible.
2. Reflect on the last two missions and describe any challenges that came up.

Post-Mission Discussion: Apply

Real-life challenges also can be addressed through a step-by-step process (similar to the step-by-step coding process). Discuss with your team how problems can be addressed with a similiar process.

Mission 4: Systems

Focus: Retrieval of items from a center starting point, Systems

Materials Provided: Mat, If-Then Game Cards
Materials Needed: EV3 Robot, Journals

Pre-Mission Activity:

1. Satellites are often used to support communication. For more information, visit: https://earthobservatory.nasa.gov/blogs/eokids/60-years-of-looking-at-earth-from-above/
2. Play the If-Then Game provided in CyBox.

Pre-Mission Journal Activity:

Think about cause and effect. Describe how you see cause and effect during your team's missions.

Mission: Do

Suggested Time Completion: 2-3 minutes
Mission Setup: Planet is located at C1, C4, and B6. Space Junk (plastic eggs) is located at A7, B2, B4, C5, and D7. Satellites (red cups) are located at D1, C6, and B7.
First Mission: Retrieve 2 of the 4 satellites that are stuck to space junk without pushing the space junk into a planet's orbit.
Extra Misson: Retrieve the final 2 satellites that are stuck in space junk without pushing the space junk into a planet's orbit.

Post-Mission Journal Entry: Reflect

When coding and programming robots, there are complex systems that are used, such as the software on the laptop and the robot itself. Please describe and draw a model of the complexity of the system you are using.

Post-Mission Discussion Entry: Apply

1. It's not always easy to communicate well. Talk about times when communication was not the most effective.
2. Think about your robot. Why is it important that you code the robot's program accurately? How does this impact your mission?

2019 Robotics Challenge

Program Cover Sheet

The information collected in this document will be used to keep collected survey data organized for data entry. The cover sheet should be completed by the 4-H staff associated with the program. For each new program, complete a new cover sheet. The information will be entered into Qualtrics at the State 4-H office.

What is the name of this program?

In what County did this program take place?

What delivery mode was used when implementing this program?

Day Camp (Has a main focus on outdoor recreation and/or the environment, and youth return home for the evening. If it does not have an outdoor focus, it is NOT a camp)

Overnight Camp (Main focus is outdoor recreation and/or the environment. Includes one or more nights in provided housing to foster group interdependence)

Club

Afterschool (Has a primary goal of providing supervision and a safe, engaging learning environment for youth when they are NOT in school. This can take place before school, after school, weekends, during breaks, late start, early out, etc.)

School Enrichment (Takes place in school or school field trip during school hours)

Special Interest/Short Term (Takes place outside of school hours, does not have a primary goal of outdoor/environment, does not provide out-of-school care/supervision)

Who administered this survey? Please provide a name and email. (This will be helpful if any questions arise about this segment of data)

Iowa 4-H Common Measures

Dear Participant:

You have been given this survey because you have participated in a 4-H program or project and 4-H would like to learn about you and your experiences in 4-H.

Your answers are important and they will be kept private. But, if you don't want to fill out the survey, you don't have to or if there is a question you don't want to answer, you can leave it blank.

There are no right or wrong answers, so please answer all questions honestly.

Thank you for your help!

Your 4-H Experience

How many years of 4-H have you completed?

- ❏ Less than 1 year
- ❏ 1 year
- ❏ 2 years
- ❏ 3 years
- ❏ 4 years
- ❏ 5 or more years
- ❏ I'm not in 4-H

Is 4-H a place where adults care about you?

- ❏ Yes
- ❏ Usually
- ❏ Not Really
- ❏ No

Is 4-H a place where you feel left out?

- ❏ Yes
- ❏ Usually
- ❏ Not Really
- ❏ No

Is 4-H a place where others like you?

- ❏ Yes
- ❏ Usually
- ❏ Not Really
- ❏ No

Is 4-H a place where you feel safe?

- ❏ Yes
- ❏ Usually
- ❏ Not Really
- ❏ No

Is 4-H a place where you get to figure things out for yourself?

- ❏ Yes
- ❏ Usually
- ❏ Not Really
- ❏ No

Is 4-H a place where it's okay for you to make mistakes?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you get to teach others what you've learned?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you get to do things that you like?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you're encouraged to plan for your future?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you get to choose what you want to do?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where adults make the decisions?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you have a chance to be a leader?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Is 4-H a place where you learn about ways to help your community?

- ❑ Yes
- ❑ Usually
- ❑ Not Really
- ❑ No

Is 4-H a place where you feel you belong?

- ❑ Yes
- ❑ Usually
- ❑ Not Really
- ❑ No

Is 4-H a place where you get to help make group decisions?

- ❑ Yes
- ❑ Usually
- ❑ Not Really
- ❑ No

Your Interest in Engineering

How much do you like engineering?

- ❑ A lot
- ❑ A little
- ❑ Not at all

Would you like a job that uses engineering?

- ❑ Yes
- ❑ Sort of
- ❑ No

Do you ask questions about how things work?

- ❑ Yes
- ❑ Usually
- ❑ Not Really
- ❑ No

Do you try new things to see how they will work?

- ❑ Yes
- ❑ Usually
- ❑ Not Really
- ❑ No

Do you look at how things are the same or different?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Do you compare how different things work?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Do you take things apart to see how they work?

❏ Yes
❏ Usually
❏ Not Really
❏ No

Do you come up with ideas for how to build new things?

❏ Yes
❏ Usually
❏ Not Really
❏ No

At 4-H, did you learn new things about engineering?

❏ Yes
❏ Sort of
❏ No

At 4-H, did you talk about how science can be used to help solve everyday problems?

❏ Yes
❏ Sort of
❏ No

Have you shared your science-related project with others?

❏ Yes
❏ Sort of
❏ No

Your Engineering Skills and Attitudes

Do you know how to define an engineering design problem?

- ❏ Yes
- ❏ Sort of
- ❏ No

Do you know how to identify potential solutions to a design problem?

- ❏ Yes
- ❏ Sort of
- ❏ No

Do you know how to evaluate test results to identify the best solution?

- ❏ Yes
- ❏ Sort of
- ❏ No

Do you know how to communicate a design solution to others?

- ❏ Yes
- ❏ Sort of
- ❏ No

For the following questions, please mark how much you agree with each sentence.

I like engineering.

- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

I would like a job that involves using engineering.

- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

I would like to study engineering after high school.

- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

About You

How old are you?

_____ years old

What grade are you in? If it is summer break, which grade will you be starting in the fall?

_____ grade

Which of the following best describes your gender?

- ❏ Male (boy)
- ❏ Female (girl)

Which of the following best describes your race?

- ❏ Asian
- ❏ Black or African American
- ❏ Hispanic or Latino
- ❏ Native American
- ❏ Native Hawaiian/Other Pacific Islander
- ❏ White or Caucasian
- ❏ More than one race
- ❏ I don't know

How many hours do you typically spend on 4-H activities each week?

- ❏ Less than 1 hour
- ❏ 1 hour
- ❏ 2 hours
- ❏ 3 hours
- ❏ 4 hours
- ❏ 5 or more hours

Are you involved in 4-H at the county level?

- ❏ Yes
- ❏ No

Are you involved in 4-H at the state level?

- ❏ Yes
- ❏ No

Are you involved in 4-H at the national level?

- ❏ Yes
- ❏ No

Which of the following best describe how you are involved in 4-H? For each, circle one answer.

Clubs Yes No

Camps Yes No

Afterschool programs Yes No

In-school programs Yes No

Local fairs/events Yes No

Community service projects Yes No

Working on projects at home Yes No

Other Yes No

Thank you very much!

Please return this form as directed.