4-H ROBOTICS

18 USC 707

MODULE 1: Comprehensive Robotics Overview

ACKNOWLEDGEMENTS

Regardless of which module or combination of modules you might be using, there is valuable information in **Getting Started** and we recommend you review it as an important part of any preparation for delivering this training.

MODULE 1:
Comprehensive Robotics Overview

OUTCOMES:

Participants will be able to:

- List three ways in which 4-H robotics is relevant and appealing to today's youth

- Articulate at least three ways in which robotics can enrich their local 4-H program

- Identify at least two manners in which robotics can be used as a vehicle for youth development

TIME: 2 HOURS

- **Welcome**
  (*5 minutes*)

- **Getting Acquainted**
  (*20 minutes*)

- **Start at the Beginning**
  (*30 minutes*)

- **Road to Robotics**
  (*15 minutes*)

- **Robotics for Real**
  (*30 minutes*)

- **Robots, 4-H and You: Partners in Youth Development!**
  (*20 minutes*)

OVERVIEW:

Introduction to the Experience (Steps 1–2):
Participants are welcomed and share initial thoughts and ideas about 4-H Robotics programs.

Start at the Beginning (Step 3):
Participants engage their imagination by building with a variety of toys. Participants discuss the elements of exploration and play that are a part of robotics programs.

Road to Robotics (Step 4):
Participants explore the array of robotics platforms and programs available.

Robotics Demonstration (Step 5):
Participants view a variety of robotics demonstrations in a round-robin format.

Partners in Youth Development (Step 6):
Participants are introduced to the benefits and opportunities robotics offers when used in 4-H programming.

MATERIALS:

- Laptop computer

- Projector with speakers, projection screen

- Tables and chairs for participants with ample working space for computers and building sets

- 5–10 sets of building toys (such as LEGO®, TRIO, Lincoln Logs, K'NEX, or wooden blocks), enough for each group of 3–5 participants to have one set of toys

- Additional laptop computers with loaded software for each robotics platform or activity you plan to demonstrate

- Robotics kit for each platform or activity you plan to demonstrate

- Additional tables for each planned demonstration

- Assistant facilitator for each demonstration

- Module 1: Road to Robotics (PowerPoint Presentation)

For additional resources visit **www.4-H.org/robotics**

HANDOUTS:

- Robotics Program Entry Point Comparison Chart Handout (2 pages)

- Clover Countdown: Top 10 Reasons 4-H Educators Will Love Robotics Suggestions Handout (2 pages)

- Case Studies: Youth Development Success and Robotics Handout (5 pages)

TRAINER NOTES:

STEP 1: Welcome *(5 minutes)*

Welcome to Module One of the *4-H Robotics Year-Round Training Guide*. In this module you will become acquainted with 4-H Robotics programs and will discuss their relevance and importance to youth development. At the end of this training, you'll be familiar with the different ways robotics can be part of your 4-H program and understand how robotics can help you promote positive youth development to young people.

My name is _____ and I'll be your guide in this module.

All facilitators can introduce themselves at this time.

We want you to enjoy your time with us and want you to feel comfortable in doing so. Please feel free to go to the restroom or move around the room as needed. While we dive into the world of technology, we ask that you silence yours by turning off electronic devices for the length of our training time.

Point out any other useful information such as the location of restrooms and water at this time.

STEP 2: Getting Acquainted *(10 minutes)*

As we work together to explore the world of 4-H Robotics, I want to make sure I understand your background and what you're looking to gain from this training. I'd like to start off by hearing about your ideas and experiences.

Ask any of the following questions, or add your own:

- What words, images, or ideas come to mind when you hear the words "4-H Robotics Club"?

- How many of you have experienced or led robotics activities?

- Why are you considering adding robotics to the programs and clubs you currently offer?

- How do you think robotics might help you fulfill the 4-H mission of *empowering youth to reach their full potential by working and learning in partnership with caring adults?*

Let's start to examine some of the opportunities available to you through 4-H Robotics.

STEP 3: ACTIVITY
Start at the Beginning
30 minutes
(20 minutes action, 10 minutes discussion)

Before the activity begins, set up stations around room; each table should have one set of building toys (for example, one set of LEGO® blocks or Lincoln Logs, etc.).

What do you think of when you hear the word "robot"? *(Possible answers include complicated machines, computer programming, or the engineering concepts that make robotics possible.)*

Do you encounter robots in your daily life? What kind of robots? *(Possible answers include factories, surgical robots, vending machines, military or police work.)*

For some of us, robots are not familiar subjects. We understand that, and we want you to know that regardless of your education or background, you can lead youth to discover robotics through 4-H.

Have participants divide into groups by choosing which kit they would like to work with. There should be no limit to how many individuals join in each group. When all participants are at a table, continue.

For this activity, there are only three things you need to know: One: there are no rules in this activity. Two: I will not be answering any questions until the activity is completed. Three: Your job is to construct whatever you wish using the materials you are supplied. You have fifteen minutes to do your job—go!

For the next 15 minutes, circulate through the groups and observe, offering encouragement as needed. Take note of any specific occurrences that you want to mention during the discussion and debriefing.

When the time limit is reached, stop the groups.

Our time is up. For the next five minutes, please tour the construction sites and see what has been built at each station. Then return to your table.

After participants have visited each construction site and returned to their tables, continue with the discussion.

Now that we've had a chance to appreciate all the creativity in the room, I would like to hear your thoughts on this activity. I'm going to ask some questions to help us reflect and share your ideas.

TRAINER TIP: The questions listed are guidelines only. The best questions will arise from what actually takes place during your training. Feel free to use whatever discussion questions best guide your participants to a thorough reflection of the activity. You do not need to ask every question in order to reflect on the training experience.

This step should generate responses leading to the "Share" step of the Experiential Learning Model. In this step, the questions and discussions should focus on what happened during the experience.

Ask a few of the *Share* questions:

- What did you enjoy the most about the activity?
- What did you do?
- Did you find that it was difficult to get started? Why?
- What part of the experience was the easiest?
- What did you observe during this activity?

This step should generate information leading to the "Process" step. In this step, the questions and discussion focus on the process of the experience or activity. Participants are asked to think about how the experience was conducted or how the activity was performed.

Ask a few of the *Process* **questions:**

- How did you know what to do?

- How did your group work together?

- What problems or issues developed as you completed the activity?

- How did you or your group deal with these problems?

- What life skills emerged with this activity?

- Why is the life skill you practiced important?

This step should generate information leading to the *"Generalize"* **step. In this step, the discussion becomes more personal and focuses on what the experience meant to the participant and what was learned from it.**

Ask a few of the *Generalize* **questions:**

- In what ways do you think this activity would engage young people?

- How do you think youth might approach this activity?

- What do you think 4-H members might learn from this activity?

- How could you use this activity to introduce robotics to youth?

This step should generate information leading to the *"Apply"* **step. In this step, participants can discuss concrete ways of transitioning their learning into activities and programs for youth.**

Ask a few of the *Apply* **questions:**

- How can you relate what you learned to managing a robotics program?

- How can you use what you have learned to help others who are also starting a robotics club?

- How can you apply what you have learned to excite adults about participating in a robotics program?

Letting your creativity guide you to explore, learn, and play is not only enjoyable—it also gives you an idea of how youth approach robotics. The **Experiential Learning Model** (which guided the questions we just discussed) is how we, as leaders, help youth learn from any hands-on experience. Simple activities such as this one can be the launch pad for your robotics program—and an entry point for the youth in your program.

STEP 4: *Road to Robotics* (*10 minutes*)

We're going to introduce you to some other 4-H Robotics entry points with this slideshow.

> *Distribute the Robotics Program Entry Point Comparison*
> *Chart Handout so participants can follow along and make notes as needed.*

The slideshow offers some basic information about many robotics platforms/kits outlined on the Robotics Program Entry Point Comparison Chart Handout. This chart is simply to help you keep track of the many robotics opportunities that are out there, waiting for youth to explore them! We've included the name of each curriculum or kit; the age group it is appropriate for; start-up costs and requirements; and, if applicable, a website address where you can learn more. As you watch the presentation, feel free to make notes on your chart. We can discuss any questions you have after the presentation.

> *Start the Road to Robotics*
> *PowerPoint presentation.*

Your goals and program resources will determine the path that you take in developing your new robotics program, and where you choose to

enter the spectrum of robotics opportunities. Keep in mind that you can start small and grow your program as you gain experience, volunteers, and community support.

Ask for and answer all questions about the presentation or Road to Robotics slideshow and the Robotics Program Entry Point Comparison Chart Handout.

STEP 5: ACTIVITY
Robotics for Real
(30 minutes)

Divide time as needed to allow participants to visit as many stations as possible.

> MODULE 1: Comprehensive Robotics Overview | 4-H ROBOTICS
>
> **Robotics for Real**
>
> *Hands-on Demonstrations*

TRAINER TIP: Be sure to arrange the room so that participants can gather around demonstrations, but also move safely between demonstration areas!

Before the Activity Begins: you will need to have a few stations set up around the room. The type and number of stations will depend on your resources. Provide participants with at least five minutes to experience each station that you plan to demonstrate. If you do not have robots available, continue to STEP 7.

If possible, try to demonstrate LEGO® WeDo™, LEGO®MINDSTORMS®, and any other robotics project or platform that may be available to you. This exercise is an excellent opportunity to enlist the help of teen leaders!

Now that you have been introduced to the various robotics entry points, it's time to meet the robots themselves. Each station has one type of robot, and the facilitators will be giving you a brief demonstration of that robot's capabilities.

For the next ____ minutes, we're going to rotate through these stations. Please feel free to ask questions at the station and make notes on your Robotics Entry Points Comparison Chart Handout.

Break participants into groups—the same number of groups as the number of demonstration areas you have. Guide groups to rotate in the most efficient way for your training room set-up. At the end of the activity, bring the whole group back together. Lead a discussion using the following questions to guide you.

- What was something that caught your eye at each station?

- What surprised you? What interested you?

- Which of these stations would you be most interested in using in your own program?

- Which of these stations might appeal to youth in your community. Why?

- How might you use this activity in your own program—with youth, staff, and/or volunteers?

- What life skills do you think youth might learn from these activities?

- Does anyone have any questions about the demonstrations?

Answer any questions.

After meeting the robots and trying your hand at building and/or programming your own, I hope you're getting excited about adding robotics to your 4-H program. But in case you're still not sure, here are a few more things to think about.

STEP 6:   Robots, 4-H and You: Partners in Youth Development
(15 minutes)

Clover Countdown

Top 10 Reasons
4-H Educators
Will **Love** Robotics
Suggestions

Give each participant a Top Ten Reasons 4-H Educators Will Love Robotics Suggestions Handout.

This list was compiled by educators and volunteers just like you, who have successfully started up a robotics program. Take a few minutes to look over these points.

Have participants read each of the Top Ten Reasons out loud.

- Do any of these points speak to your situation and program? How so?

- What questions does this information raise for you?

- Can you add any other aspects of robotics that you're excited about? What about things that might be exciting for youth in your program?

- How do you think this list could be a resource for you when you return to your community?

Over the course of this training, we've taken a first look at robotics programs for youth. We've examined some ways for you to start a robotics program, and talked about why robotics is a good fit for 4-H delivery modes. But you may be wondering—how does robotics deliver 4-H?

Distribute the Case Studies Handout and review it with participants.

Those are just a few examples of what a robotics program can provide for youth in your community. In later training modules, we'll discuss how robotics can fit into traditional 4-H activities, such as communications contests or leadership experiences. As 4-H volunteers and professionals, you can probably already imagine numerous ways that robotics programs can promote science, engineering, technology and life skills learning.

Transition

If you are presenting another module directly after Module 1, adapt the following to fit your training schedule.

You have just experienced the first of nine *4-H Year-Round Training Guide* modules for 4-H faculty and volunteers interested in launching robotics club programs.
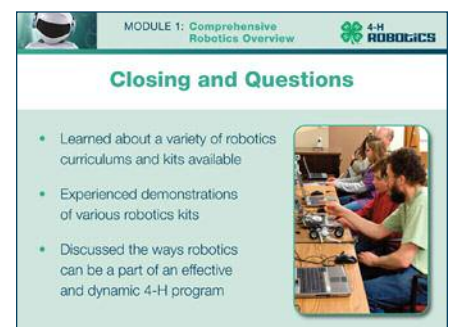
In this module, we explored and discussed:

- Why 4-H robotics is relevant and appealing for youth

- Ways in which robotics programs can enrich your community 4-H activities

- How robotics activities can be used as a tool to help you enact positive youth development

Does anyone have any questions or anything to add?

Answer any questions and discuss any ideas or concerns that are shared.

If you choose to develop a 4-H Robotics program in your area, there are eight more training modules available to you.

Module 2: Recruitment and Partnerships

Module 3: Community Resource Cultivation

Module 4: LEGO® WeDo™ Introduction

Module 5: Using Technology to Deliver a Robotics Program
(*Virtual Robotics*)

Module 6: Experiencing Engineering Design (*Junk Yard Robotics*)

Module 7: An Experiential Model of Building Robots
(*Robotics Platform*)

Module 8: Scientific Inquiry and Programming Robots (*Robotics Platforms*)

Module 9: Expansion, Enrichment, Endurance: Your Year-Round Robotics Program

Provide participants with information about upcoming training opportunities and answer any remaining questions. This concludes Module 1: 4-H Robotics Comprehensive Overview.

Robotics Program Entry Point Comparison Chart

Robotics Opportunities and Platforms	For Ages	Computer/ Computer Programming Required	Website for More Information	Cost to Start Program — Due to changing price structures we have provided website links for each product for you to check on price updates.	How Many Do We Need?
4-H ROBOTICS: Engineering for Today and Tomorrow					
Virtual Robotics	8–18	Yes/No	**www.4-H.org/robotics**	• Curriculum DVD: **$9.95/each**	1 per club/team/classroom
Junk Drawer Robotics	8–18	No/No	**www.4-H.org/robotics**	• Leader's Guides (3 levels): **$7.95 - $9.95/each** • Youth Notebooks: **$6.95/each** • Facilitator Materials Kit: **$149.00** • Level 1 Materials Kit: **$199.00**	1 per club/team/classroom Kit is for ten (10) youth
Robotics Platforms	8–18	Yes/Yes	**www.4-H.org/robotics**	• Curriculum DVD: **$9.95**	1 per club/team/classroom
NOTE: Annual 4-H Curriculum pre-press sale can lower curriculum cost by 25%.					
LEGO® WeDO™	7+	Yes/Yes	**www.legoeducation.us**	• LEGO® Education WeDo™ Robotics Construction Set: **$130/kit** • LEGO® Education WeDo™ Software v1.2 & Activity Pack: **$90/single license** • Software Site License: **$300/onetime fee**	1 kit per 2–3 youth
LEGO® MINDSTORMS® NXT	8+	Yes/Yes	**www.legoeducation.us**	LEGO® MINDSTORMS® Education NXT • Base Set: **$280/kit** • Software 2.1: **$80/each (single license)** • Software Site License: **$340/onetime fee** Carnegie Mellon MINDSTORM NXT • Video Trainer: **$270/each**	1 kit per 2–3 youth
LEGO® MINDSTORMS®	10+	Yes/Yes	**www.education.lego.com**	• EV3 Core Set: **$399.95/each** • EV3 Core Set with Software Pack: **$433.95/each** • EV3 Expansion Kit: **$99.95/each** • Classroom Packs available for various class sizes	1 kit per 2–3 youth
FIRST® LEGO® League (FLL®)	9–14	Yes/Yes	**www.usfirst.org/fll**	Kit, registration fee, and necessary materials: **$1,000/each**	1 kit per team (2–10 youth)

Robotics Program Entry Point Comparison Chart *(continued)*

Robotics Opportunities and Platforms	For Ages	Computer/ Computer Programming Required	Website for More Information	Cost to Start Program Due to changing price structures we have provided website links for each product for you to check on price updates.	How Many Do We Need?
FIRST® Tech Challenge (FTC®)	13–18	Yes/Yes	www.usfirst.org/ftc	Kit, registration fee, and necessary materials: **$3,000/each***	1 kit per team (2–10 youth)
FIRST® Robotics Challenge (FRC®)	13–18	Yes/Yes	www.usfirst.org/frc	Kit, registration fee, and necessary materials: **$30,000/each***	1 kit per team (25 or more youth, no maximum)
SuGO	8–16	Yes/Yes	http://www.sugobot.com/sugo-store	• LEGO® MINDSTORMS® Kit: ***see page 1.12*** • SuGO Field Kit: **$110/kit (Allow$40-$50** ***shipping for large field kits)*** • SuGO Sensor Upgrade: **$70/kit +** ***LEGO® MINDSTORMS® NXT Kit***	1 field kit per club 1 robot per 3–4 youth
SeaPerch	10–18	No/No	www.seaperch.org	• SeaPerch Youth Kit: **$169/each*** (without battery: **$134/each***) • Teacher Tool Bag: **$235/each***	1 kit per 2–3 youth 1 teacher's kit per 10 Sea Perch kits
VEX® Robot Starter	10–13	Yes/Yes	www.vexrobotics.com	• **$399–$499/kit** • **$75–$750/software**	1 kit per 2–3 youth
VEX® Classroom Kit	10–18	Yes/Yes	www.vexrobotics.com	• **$800–$1,000/kit** • **$75–$750/software**	1 classroom kit per 2–5 youth
TETRIX®	13–18	Yes/Yes	www.tetrixrobotics.com	• TETRIX Education Base Set: **$626/each** • NI LabVIEW for LEGO® MINDSTORMS Software: **(Single: $100, Site License: $550)**	One base set + additional parts for up to 10 youth
Parallax	12–18	Yes/Yes	www.parallax.com	BoeBot Robot Kit: **$160/each**	1 kit per 2–3 youth
Pololu 3pi	14–18	Yes/Yes	www.pololu.com	Pololu 3pi Robot Kit: **$100/each**	1 kit per 2–3 youth
Bioloid	14–18	Yes/Yes	www.trossenrobotics.com	• Bioloid Beginner Robot Kit: **$350/each** • Bioloid Premium Robot Kit: **$1,200/each**	1 kit per 2–3 youth
CEENBoT™	12–18	Yes/Yes	www.ceenbotinc.com/store	**$300–$567/each kit**	1 kit per 2–3 youth

*Teams may be able to secure sponsorship from businesses or schools. SeaPerch grants are available on their website.

Clover Countdown
Top 10 Reasons 4-H Educators Will Love Robotics Suggestions

10:
Everyone likes to play with robots.

It's true! Once you introduce the fun and challenge of building, programming and playing with robotics to youth, you'll be amazed at the age range of young people who are interested. Plus, a robotics program can be as simple or as challenging as each individual 4-H member needs it to be.

9:
Community partners will be anxious to join your progress.

Getting young people excited about science, engineering, and technology is something any volunteer can support. When volunteers see that 4-H is a dynamic and relevant program that addresses the needs of our youth, our communities, and our nation —it's easy to get them to support the program!

8:
Reenergize yourself as a 4-H educator.

Robotics builds community partnerships. More than ever before, Americans are realizing how crucial it is to foster excellence in science and engineering in young people. Organizations in your community may jump at the chance to support the work you are doing with robotics. After all, you are encouraging young people to embrace and engage in science!

7:
Science, technology, engineering, and math are fun.

Hands-on learning is the 4-H way and experiential learning is an integral part of robotics. In the 4-H format, youth will not just hear about computers, science and engineering—they'll have technology at their fingertips. The strengths of the 4-H delivery methods perfectly support the needs of youth when learning about science.

6:
Living on a farm is optional.

Robotics provides a new and contemporary image for 4-H. Youth of all ages and backgrounds can take part in robotics programs, regardless of their location or family situation. While kits and ready-made curriculums make robotics simple to share with youth, the end result will be impressive to you, your community partners, and potential funders!

Clover Countdown
Top 10 Reasons 4-H Educators Will Love Robotics Suggestions

5:
You don't outgrow robots: teen leadership opportunities

Robotics is adaptable for ages five to adult. Regardless of experience level, tech-savvy, or education, there is a robotics curriculum or project for everyone. This project can grow with a young person from their Cloverbud days until they become a 4-H alumni, and be just as challenging and rewarding every step of the way!

4:
Workforce readiness: scientists wanted!

Robotics introduces youth to exciting potential careers and can connect them to contacts in professional fields that may lead to internships or careers later in life. Even if a robotics program member doesn't choose to become a scientist or engineer, the confidence and sense of accomplishment they learn through robotics will follow them on any path they take in life.

3:
What better way to get a rocket scientist for a 4-H volunteer?

Launch your robotics program and you may find potential volunteers that you never expected to meet. Some programs have been lucky enough to find volunteers that have incredible experience and knowledge to share and robotics programs are the key to linking these people to your 4-H members.

2:
Funders will be knocking on your door.

Robotics is a dynamic and impressive program that can lead youth members to incredible achievements! Many existing programs have found that accessing funding is easier than they expected. Funders want to work with programs that are relevant and effective at reaching their goals. Done right, 4-H Robotics is both!

1:
Kids learn a lot– and love doing it!

Case Studies
Youth Development Success and Robotics

Spotlight on Maryland 4-H Robotics Program

Within only six months of implementing the practices from this toolkit:

The number of trained volunteers available to assist with 4-H Robotics programs has increased from 3 to 79 volunteers. This represents a 2500% increase in new volunteers working with the 4-H program. 4-H faculty have conducted training to help new volunteers become confident and capable leaders of youth in 4-H Robotics programs.

The number of youth presently participating in 4-H Robotics programs statewide has increased from 64 to 316 youth members. This represents a 394% increase in new youth members enrolling in the 4-H program through robotics clubs.

The Maryland 4-H Program has reached 228 youth through outside programming such as camps, after-school programs and workshops.

The state has gained 17 new clubs dedicated to robotics, and increased the sustainability of these clubs through new partners, collaborators and donors that support local 4-H Robotics programs. (New partners include county chambers of commerce, universities, county technology councils, local boards of education and national corporations.)

The increased interest in new youth and volunteers solely through the implementation of the robotics program demonstrates that the 4-H program is reaching a new audience of families who are vested in 4-H Science Programming and Robotics.

4-H youth participating in robotics clubs/programs have an increased interest (awareness, attitudes, understanding and aspirations) in science and math and improved related knowledge, skills and abilities for use in their lives and future careers.

Case Studies (continued)
Youth Development Success and Robotics

Spotlight on Idaho 4-H Robotics Program

Using Robotics to Increase Access to Higher Education in Idaho:

In 2006, Idaho 4-H created Idaho Robotics Opportunities for K-12 Students (Idaho ROKS). The program is designed to be a continuum of robotics activities for youth starting in kindergarten or (LEGO® WeDo™), through middle school (LEGO® MINDSTORMS®), and into high school (LEGO® TETRIX®).

The primary goal of Idaho ROKS is to increase the numbers of Idaho youth matriculating to higher education. The University of Idaho 4-H Program is also a partner with *FIRST® (For Inspiration and Recognition of Science and Technology)*.

This partnership with *FIRST®* has enabled the Idaho 4-H program to expand 4-H robotics activities beyond the traditional 4-H program into schools, home schools, and out-of-school programs.

In addition, Idaho 4-H has developed partnerships with Girl Scouts, Boy Scouts, and the Boys & Girls Clubs to build robotics activities through their programs.

This year, through the Idaho ROKS program, Idaho 4-H supported LEGO® WeDo™ activities in 20 of the 44 counties engaging more than 300 youth (age 6-9) in robotics.

In the middle school program, Idaho ROKS supported 154 *FIRST®* LEGO® League (FLL®) teams with about 1,200 youth (age 9-14), seven FLL® qualifying tournaments and one state championship.

Twenty-one of the FLL® teams were 4-H Club teams.

For the high school program, Idaho ROKS supported 14 Idaho *FIRST®* Tech Challenge (FTC®) teams and hosted the Idaho FTC® State Championship tournament.

Case Studies (continued)
Youth Development Success and Robotics

Spotlight on Washington 4-H Robotics Program

Expanding 4-H through Robotics

Jennifer Leach, the 4-H educator in Cowlitz County, Washington, is excited about the expansion of the traditional 4-H program of "beef, sheep and swine" to include the new robotics project.

The robot had to be weighed, so she called the group in charge of the Cowlitz County Fair farm animal sale to see if the team could bring the robot to the fairgrounds for a weigh-in. Instead they brought the electronic market scales to the robot and were able to see the robot and meet the youth.

After the Portland regional competition, the team was excitedly planning for the next year. "We need a mascot!" "We need buttons!" "We need pneumatics!" "We need a website!" The volunteers were also planning for next year—how to be better organized, how to recruit more girls, and how to bring in engineering mentors to expand beyond the scope of a fire fighter, a dock boss, and a surveyor.

The combination of the traditional 4-H program along with the new 4-H project has opened doors with different partners in the community.

Spotlight on Connecticut 4-H Robotics Program

Growing 4-H Robotics Program

The Connecticut 4-H Science Robotics program provides youth throughout the state with opportunities to become involved in science, engineering, technology and math in new and exciting ways. This year the robotics program has expanded into six of the eight Connecticut counties, involving youth in urban, rural and suburban areas, who might not have normally joined 4-H.

Currently there are nine 4-H *FIRST*® FRC® teams that have a total of over 160 youth participants and 25 adult mentors. All of the teams are 4-H Clubs as well; many of the teams are currently formulating plans to demonstrate their robots in the upcoming 4-H fairs.

Case Studies (continued)
Youth Development Success and Robotics

Connecticut 4-H Robotics Program *(continued)*

In addition, three elementary and middle school 4-H Robotics Clubs have been established in after-school programs throughout the state bringing even more youth and adult mentors into the program. These groups are using materials from the new 4-H Robotics curriculum as well as the LEGO® MINDSTORMS® Robotics platform. Trainings have been held for volunteers, 4-H staff, and interested parents to become familiar with these materials and to provide support for starting even more groups throughout the summer and next fall.

Spotlight on Missouri 4-H Robotics Program
Positive Youth Development

"Robotics is an excellent framework for teaching about and creating community-based youth development," says Bill Pabst, 4-H Youth Development Specialist from Missouri. Youth, parents, staff and funders are all interested in robotics. Participation in the Missouri 4-H Robotics program has more than doubled in each of the last four years and the quality of the local programs increases as the number of participants rises.

According to Bill, "It is easy to slip in a good dose of 4-H and youth development into the robotics program. I'm most proud of how the conversation usually starts with 'my child is interested in robots' and evolves into 'how can we develop a 4-H robotics program for our county?'"

Along the way, parents understand the value of a comprehensive program that provides not only a range of opportunities to learn about robots, but also provides opportunities to develop communication skills, leadership and sharing.

Bill says, "We are seeing strong youth/adult partnerships as members and volunteers learn together. We are seeing strong youth leadership as youth set goals and teach the younger members. We are seeing youth working together to learn about basic science, engineering and technology as they build and develop more complex devices. Most think they are inventing robots, but we know that they are inventing their own and our future."

Case Studies (continued)
Youth Development Success and Robotics

Spotlight on Montana 4-H Robotics Program

Books and Robots

Gregg Switzer introduced robotics to a third-grade class on the Crow Indian Reservation in South East Montana using LEGO® WeDo™ kits. This was completely new and exciting to them! It was the first time most of the kids had seen LEGO® Kits and their first time using a laptop and a track pad.

Within half an hour, they were able to navigate the WeDo™ program to make sounds, spin motors and "see" their hands with the motion sensor. They followed Switzer's step-by-step plans to assemble a "spinner bot" that spins a disk of heavy weight paper while they color it with a marker. They were hooked!

Switzer and the youth worked together to build up LEGO® WeDo™ critters that come to life when programmed to act out a story. This fresh idea, *Books and Robots*, ties literature with robotics in a way that encourages kids to listen carefully to a simple story, like "The Gruffalo" by Julia Donaldson, and cue their robots to move and make sounds at just the right time.

The students patiently re-read the story over and over, using their little actors which seem to undergo constant and sometimes elaborate modifications between readings.

Switzer is working on "robot build plans" to go with Crow stories so they can practice the stories in both English and Crow. The biggest challenge is getting them to stop when the class time is up!

For more information about *Books and Robots*, please visit **www.406robotics.org**