Illinois 4-H | Spark Ideas. Ignite Possibilities.

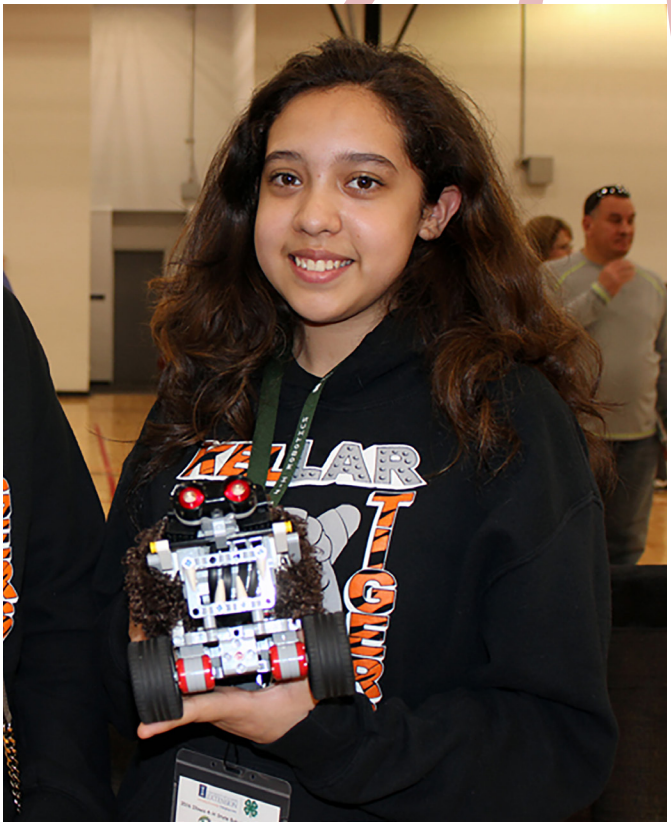
Robots are everywhere today, from the farm, to outer space. They may even be in your kitchen soon! With the 4-H Robotics Project youth explore the engineering design process as they build, program, and test their own robots to solve engineering challenges.

Exploring 4-H Robotics

Spark Activity: Factoring in Friction

Friction can slow down or limit the movement of objects, but friction is also a useful tool when we need traction or gripping power. What we need to find is the right amount of friction for the current use. Do we need wheels and gears that can turn freely on their axes? Do we need wheels that can grip the road to move a robot forward or up a hill? Sometimes we need to both reduce and increase friction! Using simple household items like a small box, cardboard, paper clips, binder clips, clothespins, straws, different kinds of tape, and toy wheels, explore movement and friction by testing a small box on a number of surfaces, looking at static friction and sliding friction. Test rolling friction by adding wheels (cylinders) or rollers as a way to overcome the overall friction of an item. Plan and design a vehicle to maximize its ability to coast based on the effects of friction. You will also consider constraints of capacity, efficiency, complexity, and costs in the design. You will build or assemble a complex "clipmobile" considering and addressing effects of friction and design constraints. You'll find the answers yourself!

Source - Junk Drawer Robotics: Robots on the Move



4-H Project Levels and Goals

Beginner

- Explore many ways robots are used
- Learn about movement and friction
- Learn the elements of mechanics such as the role of levers and gears
- Discover how sensors are used to create responses
- Use the engineering design process to make your robot move forward, backward, and turn
- Attend a robotics competition

Intermediate

- Practice more advanced robot design and precision programming techniques
- Create robotic arms that move and grip objects
- Explore circuits and electronic systems
- Use the engineering design process to build a robot that uses sensors to complete a task
- Participate in a robotics competition

Advanced

- Create an engineering design challenge and build a robot to meet the challenge
- Explore number systems and programming logic
- Explore careers in robotics and related fields
- Job-shadow an engineer or programmer
- Assistant coach a junior robotics team

Put Your Project Into Action

Show Your Skills
- Demonstrate a robot performing a simple task
- Showcase examples of robots in our daily lives
- Create a poster or display showing a problem that could be solved using robots
- Develop a display showing the steps and parts used in creating a robot

Service and Leadership
- Build a robot to pick up trash
- Create a video to teach your club about where robots are used in your community and state
- Learn how robots are changing industry and life in the U.S.
- Design and build an underwater robot to collect water samples to test for water quality
- Demonstrate your robots at a senior living facility, science club, school, or library event
- Teach a robotics workshop
- Become a junior leader or teen teacher

Entrepreneurship
- Research the influence of robotic technology on society
- Talk to local companies that use robots and discover ideas for real-life applications
- Create a robot that can fill a need in your neighborhood, school, or community and take it to market
- Consider how you can improve an existing item

Connecting with a Mentor
- Elementary, high school, or college teachers or students with an interest or expertise in robotics
- Library or museum staff
- Engineers and retired engineers from local businesses

Events
- 4-H local, regional, and state robotics competitions
- Vex Robotics Competition
- First® Robotics Competition
- First® Tech Challenge

Careers for People Interested in Robotics

Robotics Engineer	Software Developer
Robotics Technician	Computer Aided Drafting
Robotics Operator	Mechanical Engineer

Start a Conversation

Do you like building things with your hands?
What problems or solutions could be aided by a robot?
How many different robots can you identify?
What type of a robot would you like to build and program? Why?

Want to learn more?

go.illinois.edu/4Hroboticsproject

Explore more at Illinois 4-H!

4-H.extension.illinois.edu

Illinois Extension
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

College of Agricultural, Consumer and Environmental Sciences

Credits: University of California 4-H project sheet | University of Wyoming 4-H project sheet | University of North Dakota 4-H project sheet | UF/IFAS Extension Florida 4-H project handout | Michigan State University Extension 4-H project sheet | University of Illinois 4-H Robotics | 4-H Spark Sheets are a collaborative effort of 4-H staff, volunteers, alumni, and teens from across Illinois. A big thanks to the many contributors and reviewers!