



# Robotics



Robotics blends electronics, computer programming, and mechanical construction to bring ideas to life. Engineers, programmers, and technicians collaborate to design, build, test, and maintain robotic systems used in manufacturing, transportation, healthcare, agriculture, environmental monitoring, and space exploration. In the 4-H Robotics Project, youth move from curiosity to capability as they create simple circuits, write code, and design machines that solve real-world problems. Members learn to think like engineers, planning, testing, improving, and working as a team to turn challenges into solutions. Through hands-on projects, youth build more than robots, they build Beyond Ready skills for the future.

## Beyond Ready

### Ready to Lead

Youth involved in 4-H are **two times more likely to have the goal of becoming a leader**. Through real-world experiences and the guidance of caring mentors, they develop the confidence, communication, and decision-making skills needed to lead in today's changing world.

### Ready to Serve

Youth who participate in 4-H are **three times more likely to engage in community service**. Service learning provides them with purpose and connection at a time when **more than 53% of Gen Z report feeling lonely**. Through 4-H, youth are empowered to serve with compassion and make a meaningful impact.

### Ready to Build

With nearly **10 million unfilled jobs and 77% of employers seeking real-world skills**, 4-H helps youth build what matters. Through hands-on projects and career exploration, youth gain adaptability, problem-solving, and workforce readiness.

### Ready to Conquer

**While 52% of young people feel like they're failing at life goals**, 4-H youth rise with resilience. Backed by research and supported by caring adults, they learn to overcome challenges, set goals, and take charge of their future with confidence.

***Building a Ready Generation in a World of Change!***

### Starting Out Beginner:

- Refer to Curriculum & Resources section for additional information.
- Explore simple mechanical systems using common household items with [Junk Drawer Robotics](#).
- Try the [Eco-Bot Challenge Kit](#).
- Explore electronics using [Paper Circuits](#).
- Learn about [electricity and simple circuits](#).
- Learn about coding using [Scratch](#).

### Learning More Intermediate:

- Explore coding, 3-D design, and circuits with [Tinkercad](#).
- Explore coding robotic systems with microcontrollers [Smart Circuits](#).
- Learn about robotics in [industry](#).
- Learn about [robotics in healthcare](#).
- Explore [robotics in space](#).
- Try robotics and programming challenges with [LEGO EV3](#) or [LEGO Spike](#).

### Expanding Horizons Advanced:

- Create your own robotic neighborhood with coding, sensors, and microcontrollers [Lights On in the Neighborhood](#).
- Consider participating in robotic competitions including [VEX IQ](#) and [first robotics](#).
- Explore building your own devices.
- Learn how artificial intelligence can be built into embedded robotic systems.

## Robotics

### Expand Your Experience!

#### Healthy Living:

- Learn about general [electrical safety](#).
- Explore benefits of [robotics in healthcare](#).
- Use a microcontroller and sensors to [create an ECG](#).

#### Science and Agriculture:

- Use a moisture sensor and microcontroller to monitor plant hydration.
- Use a pump and microcontroller to create an automated plant waterer.
- Learn how robotics and sensor data are used in precision agriculture.

#### Community Vitality:

- Share and demonstrate robotics projects at schools, fairs, and community events.
- Use robots to help solve problems in your school or town.
- Work with community helpers (teachers, firefighters, farmers, or businesses) to test your robot ideas.

#### Communication and the Arts:

- Use a microcontroller and LEDs to create a fun community display about robotics.
- Teach younger youth about simple paper circuits.
- Tell about your robotics adventures through photography, poster displays, or social media.

### Career Exploration:

- Job shadow an engineer and learn about career opportunities in robotics.
- Research careers that use robotics in healthcare, agriculture, manufacturing, and transportation.
- Explore college and trade school programs for careers as a robotics technician.
- Learn what skills and certifications are needed for robotics and automation jobs.
- Create a real/conceptual robotics product or service business and participate in a YEC (Youth Entrepreneurship Challenge) competition.
- Explore cybersecurity jobs in the robotics career field.

### Contact Information

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### Resources & Events:

- Build confidence, resilience, and real-world skills through hands-on activities.
- Share what you have learned at a Club Day presentation.
- Participate in 4-H camps and events (4-H Discovery Days, etc.).
- Join a school or community robotics team.
- Enter a poster or robotics project at your county fair.
- Display your robotics project at a local library.
- [Kansas Clover Classroom Challenges](#)

### Curriculum & Resources:

- [Kansas 4-H Website - Robotics Project](#)
- [Junk Drawer Robotics Clover Classroom Challenge](#)
- [Eco-Bot Challenge Kit](#)
- [Explore a Power Park Book 1: Paper Circuits](#)
- [Design a Power Park: Smart Circuits Book 2](#)
- [Robotics Essentials](#)
- [Electric Excitement Curriculum Series](#)
- [Tinkercad](#)
- [Ohio 4-H Youth Development Robotics](#)
- [Scratch](#)

### 4-H Record Keeping:

Learning to keep accurate records is a life skill.

- [Setting 4-H Project Goals \(4H1100\)](#)
- [Kansas 4-H Record Keeping](#)
- Complete a Robotics Journal that tracks:
  - Electronics activities
  - Coding activities
  - Building of robotics systems
- Participation in robotics programs and competitions

### Project Exhibit Ideas:

- Create a poster on paper circuits
- Create a junk drawer robot
- Create a unique microcontroller-based robotic system
- Build and code a LEGO-based robotic system
- Build and code a robotics kit
- Create a robotics learning game
- Display a robot troubleshooting log showing problems and how you fixed them

