



**The 4-H Robotics project provides hands-on experiences in designing, programming and building robots.**



The Junk Drawer Robotics curriculum challenges participants to build robots from everyday household items. The Virtual Robotics teaches basic science and robotics concepts online through meaningful and engaging mediums including videos, simulations, animations and more. The Robotics Platforms modules can be used with a variety of commercial kits, including NXT, TETRIX, CEENBoT, and Vex.

- Develop programming skills to control robots to carry out specific tasks.
- Develop skills in the design process to solve design challenges.
- Develop and practice engineering skills while working with robots.
- Increase understanding of mechanics and the underlying physics.
- Develop a new design, new application and innovative uses for robots.

## Here's what you can do all year!

Starting Out Basic/Level 1	Learning More Intermediate/Level 2	Expanding Horizons Advanced/Levels 3
<ul style="list-style-type: none"> <li>• Complete a building challenge that involves manufacturing processes and design shapes.</li> <li>• Plan, design and build a catapult.</li> <li>• Design, draw and build a robot arm.</li> <li>• Design and add a power source to a robotic arm.</li> <li>• Design and build a gripper for a robotic arm.</li> <li>• Build a robot from everyday items.</li> </ul>	<ul style="list-style-type: none"> <li>• Compare and select materials based on how they affect sliding and rolling friction.</li> <li>• Design a vehicle that will roll easily and overcome friction.</li> <li>• Demonstrate an understanding of electrical circuits.</li> <li>• Design plans for and build a simple electrical motor-operated robot.</li> <li>• Design and construct a rover (ROV).</li> </ul>	<ul style="list-style-type: none"> <li>• Build simple operating electrical circuits.</li> <li>• Plan, design, create and share what you learn about DPDT switches.</li> <li>• Understand how a robot uses a visual sensor.</li> <li>• Build a robot that can sense and follow along walls or objects.</li> <li>• Learn to read and write a number in binary.</li> <li>• Describe and compare analog and digital.</li> </ul>

**Pass it on!**  
Now that you know how, share it with others. Here are ideas to get you started.

### Communication

- Demonstrate how to make a simple robot.
- Hold a workshop to teach others how to build a robot.
- Develop a presentation to describe how robots can be used to help people, businesses or schools.

### Citizenship

- Bring robots to an elderly care center and show the residents how to make the robots work.
- Hold a workshop to teach your club about where robots are used.
- Build a robot to pick up trash.

### Leadership

- Visit a business that uses robots.
- Show club members how to build their own robot.
- Get involved in a local inventors group.

### Entrepreneurship

- See a need, design a robot to solve the problem and then produce and market the idea.
- Consider how you could improve an existing item.



Science, Engineering and Technology

# 4-H Robotics

North Dakota 4-H Project Sheet

**Here are other opportunities to explore robotics:**



- Talk to companies that use robotics. They may have ideas for projects and info on ways robotics are used in real-world situations.
- Seek out robotics competitions for youth. They're lots of fun and give you goals to work toward.
- Interested in a career in robotics? Schedule a visit with North Dakota State University to explore industrial and manufacturing engineering: <http://www.ndsu.edu/ime/>.

## Exhibit Ideas

- Build a robot to do a simple task.
- Robots are everywhere! Find examples and make a poster/display.
- Research what companies use robots and how.
- Use recycled materials to make a robot.
- Develop a display that describes a robotic solution to a need/problem you have seen or encountered.

### 4-H Resources

- [National 4-H Robotics Curriculum](#)  
(Junk, Virtual, & Platform)
- 2012 National Youth Science Day Experiment: [4-H Ecobot Challenge](#)
- [Educational Trunks](#)
  - ◆ LEGO®NXT Robotics
  - ◆ LEGO® WeDo Robotics
  - ◆ LEGO® Crazy Action Contraption
- OHIO NXT Curriculum  
(order through your county extension office)
  - ◆ Robotics 1: Nest Technology
  - ◆ Robotics 2: Next Steps

### Other Resources

- [NASA Robotics Alliance Project](#)
- Let's Make Robots  
<http://letsmakerobots.com/>
- Robotics Online  
[www.robotics.org/](http://www.robotics.org/)
- [Arrick Robotic Resources](#)
- Youth Inventor Ideas  
[www.popsi.com/diy/article/2012-05/you-built-what-swing-pong-table](http://www.popsi.com/diy/article/2012-05/you-built-what-swing-pong-table)
- [Engineer Your Life](#)

### Recordkeeping

- [4-H Project Plan](#)
- [Planning for My Project Adventure](#)  
(Ages 8-10)
- [4-H Plan of Action](#)  
(Ages 11-18)
- [ND 4-H Participation Summary for 11- to 19-year-olds](#)



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