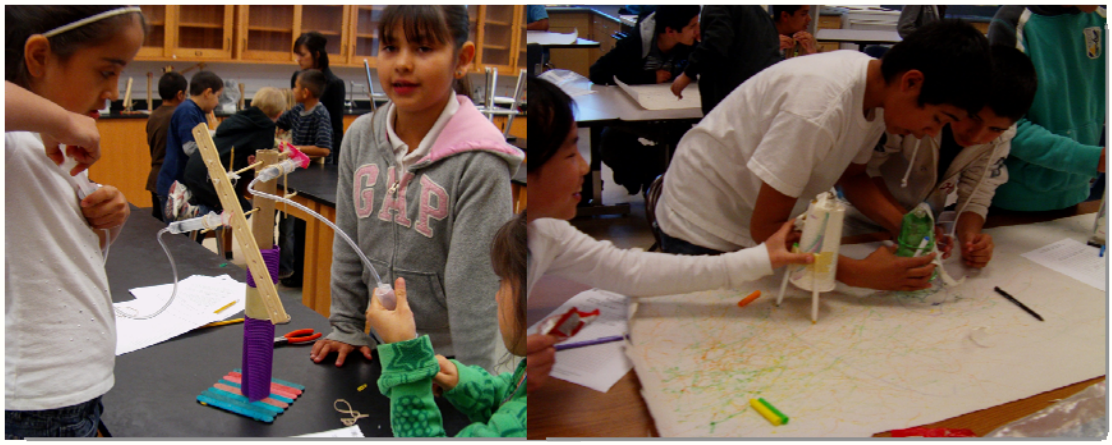
CALIFORNIA 4-H PROJECT SHEET

4-H ROBOTICS PROJECT



Robotic elements can help improve human quality of life. Whether robots are used to explore dangerous environments, diffuse bombs, as replacement limbs, or just make life easier, the use of robots is becoming increasingly more common. In the robotics project, youth will learn about the interconnections of science, engineering, and technology.

- Learn about the basics of robotics, including platform, drive, and control systems.
- Engage in scientific inquiry around motions, forces, chemistry, electricity, etc.
- Design robotic solutions to engineering challenges.
- Build, construct, and test robotic contraptions, and redesign.

Starting Out *Beginner*	Learning More *Intermediate*	Exploring Depth *Advanced*
• Learn about the vast types of robots being used in the world. • Explore the differences between form and function. • Engage in the engineering design process with simple challenges. • Learn about motion, forces, and electricity. • Record designs and reflection in an engineering notebook.	• Explore 3-D space. Build robotic arms that can move and grip without direct physical control. • Employ the engineering design process by designing, building, and testing a contraption to meet a design challenge. • Learn about engineering constraints and tradeoffs. • Build a robotic rover. • Experiment with buoyancy and building an underwater robot.	• Explore mechantronics, the connection between electrical and mechanical systems. • Learn about number systems and programming logic. • Program a robotic controller for automatic guidance. • Participate in robotics competitions. • Employ a variety of sensors on your robot.

The activities above are ideas to inspire further project development. This is not a complete list.

4-H THRIVE

Help Youth:

Light Their Spark

A spark is something youth are passionate about; it really fires them up and gives them joy and energy. Help youth find what it is that excites them.

Flex Their Brain

The brain grows stronger when we try new things and master new skills. Encourage youth effort and persistence to help them reach higher levels of success.

Reach Their Goals

Help youth use the GPS system to achieve their goals.

Goal Selection: Choose one meaningful, realistic and demanding goal.

Pursue Strategies: Create a step-by-step plan to make daily choices that support your goal.

Shift Gears: Change strategies if you're having difficulties reaching your goal. Seek help from others. What are youth going to do when things get in their way?

Reflect

Ask project members how they can use their passion for this project to be more confident, competent and caring. Discuss ways they can use their skills to make a contribution in the community, improve their character or establish connections.

Expand Your Experiences!

Science, Engineering, and Technology

- Experiment with friction by testing various rover wheels on different surfaces. Record results.
- Design and build an underwater ROV to collect water samples for water quality testing.
- Find a way to use robots in 4-H animal science or agricultural projects.
- Attach a GPS unit to a robotic rover and use it for GIS mapping.

Healthy Living

- Find out more about how robots are used in medical procedures and surgery.
- Explore how robotic sensors can test the nutritional value of food.
- Build a robotic rover to lead a workout routine.

Citizenship

- Design a service learning project that uses robotics elements in its implementation.
- Learn more about how robots have changed industry and the nature of work in the U.S.
- Find out more about federal laws that govern the use of robots.
- Program a robot to lead the flag salute.

Leadership

- Become a role model for others by taking the position of junior/teen leader.
- Lead a robotics workshop for younger members.
- Plan and implement a robotics educational event in your community.

Resources

- 4-H Robotics Resources http://www.4-h.org/resource-library/curriculum/4-h-robotics/facilitator-resources/
- FIRST http://www.usfirst.org/
- California 4-H Robotics http://www.ca4h.org/Projects/SET/Tech/JDR/
- LEGO® Mindstorms® NXT www.mindstorms.lego.com
- GEAR-Tech-21 http://4hset.unl.edu/itest/index.php
- VEX® Robotics Design System http://www.vexrobotics.com/
- UC Davis C-STEM Center http://c-stem.ucdavis.edu/

Connections & Events

Presentation Days – Share what you've learned with others through a robotics-related presentation.

Field Days – At these events, 4-H members may participate in a variety of contests related to their project area.

Contact your county 4-H office to determine additional opportunities available, such as a field day.

Curriculum

4-H Robotics: Engineering for Today and Tomorrow

- Virtual Robotics—http://www.4-h.org/resource-library/curriculum/4-h-robotics/virtual-robotics/
- Junk Drawer Robotics—http://www.4-h.org/resource-library/curriculum/4-h-robotics/junk-drawer-robotics/
- Robotics Platforms—http://www.4-h.org/resource-library/curriculum/4-h-robotics/robotics-platforms/

4-H Record Book

4-H Record Books give members an opportunity to record events and reflect on their experiences. For each project, members document their personal experiences, learning and development.

4-H Record Books also teach members record management skills and encourage them to set goals and develop a plan to meet those goals.

To access the 4-H Record Book online, visit www.ca4h.org/4hbook.