



4-H MAKING AND TINKERING PROJECT



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 how this project 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.

Youth will plan, design, and make technology-based projects, emphasizing playful tinkering, problem solving, and engineering design. Maker projects tend to be hi-tech, like programming microcontrollers or using 3D printers, while tinkering projects may involve wood, plastic, textiles/fabric, and hot glue. Both making and tinkering involve open-ended design and construction associated with play, experimentation, and troubleshooting. Youth will

- engage in engineering, including designing, prototyping, testing, and redesigning
- strengthen their growth mindset by troubleshooting and fixing their projects
- identify community issues and then collaborate with peers to design a solution to positively impact their community

Starting Out *Beginner*

- Start by tinkering and playful experimentation with sound, magnetism, mechanics, electric circuits, and motors.
- Design and build a flashlight from cardboard, bulbs, and batteries.
- Explore mechanical elements, such as cams, levers, and links by building a cardboard automaton.
- Build and test a craft stick car with wheels, gears, and motor.

Learning More *Intermediate*

- Visit a local Maker Space or Maker Fair.
- Find and build a project from Instructables.com.
- Design and construct a sewable circuit pillow, shirt, or cap with LilyPad.
- Play with Makey Makeys to turn everyday objects into touchpads.
- Expand your making and tinkering into a new domain, like sewing, cooking, crafting, or coding.
- Learn to use a 3D printer.

Exploring Depth *Advanced*

- Design and build a device that requires a microcontroller you need to program (e.g., Arduino, Raspberry Pi, or BeagleBone)
- Submit a project and its plans to Instructables.com.
- Work on projects requiring CNC mills or routers, or laser cutters.
- Produce a video showcasing every step of designing, building, and testing your project.

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



Expand Your Experiences!

Science, Technology, Engineering, and Mathematics

- After completing a build project, collaborate with others to find ways to improve it.
- Build your own measurement tools to help in future projects.
- Explore how using mathematics can improve your projects.

Healthy Living

- Find a project that will improve your health, like building a fitness tracker.
- Lead a health-related tinkering project with a group of youth.
- Program a microcontroller to sense CO₂ in the air and warn when it rises too high.

Civic Engagement

- Discover maker or tinkering institutions in your community. Share them with others.
- Identify community needs and plan a project to address the issue.
- Design and build a lending library with LEDs for your neighborhood.

Leadership

- Become a Junior or Teen Leader in a making and tinkering project.
- Plan, prepare, and present an Engineering Presentation at a 4-H presentation day.
- Lead a build project at a 4-H Club meeting for younger members.

College and Career Readiness

- Go on a field trip of an engineering company or organization.
- Visit a local community college or university engineering department.
- Find what classes you need in high school to prepare for an engineering college major.

Resources

- eXtension Maker Community
www.extedtechs.org/makers/
- Community Science Workshop Network
<http://cswnetwork.org/>
- Exploratorium Tinkering Studio
www.exploratorium.edu/tinkering/projects
- Maker Education
<http://makered.org/>
- Maker Camp
<https://makercamp.com/>
- 4-H and the Maker Movement
<https://www.joe.org/joe/2015october/comm1.php>

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Connections & Events

National Maker Youth Summit,
4hcenter.org/tours-programs/national-youth-summits/.

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

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

Contact your UC Cooperative Extension office to determine additional opportunities available, such as a field day.

Curriculum

- Community Science Workshop Network
cswnetwork.org/projectlibrary/
- Exploratorium Tinkering
www.exploratorium.edu/tinkering/projects
- Maker Education Library
<http://makered.org/resources/>
- Instructables
<http://www.instructables.com/>
- Cardboard Automaton
<https://www.amazon.com/Cardboard-Automaton-Workshop-Engineering-Technology/dp/1533686033>

4-H Record Books

4-H Record Books give members an opportunity to record events and reflect on their experiences. For each project, members document their 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
<http://ucanr.edu/orb/>.



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