



Cornell University

Why 4-H STEM?



4-H Science, Technology, Engineering, & Math programs to inspire young scientists

One million new scientists; one million new ideas

For more than a century, 4-H has engaged youth in projects on agricultural science, electricity, mechanics, entrepreneurship and natural sciences.

Today, opportunities also exist in subjects like rocketry, robotics, bio-fuels, renewable energy and geospatial science.

To learn more visit:
nys4h.cce.cornell.edu

The 4-H Youth Development program is helping to grow and strengthen the **next generation** of inventors, entrepreneurs, researchers, engineers, and problem-solvers. Recognizing that youth in the U.S. are falling behind in these areas, the national 4-H program has made its Science, Technology, Engineering and Math (STEM) program a top priority, along with its Healthy Lifestyles and Civic Engagement programs.

Recent studies have shown that only 29% of 8th graders are considered proficient in science, in New York (NCES, 2012).

With 4-H and the Cooperative Extension system's **direct connection to the cutting-edge research and resources** of the nation's land-grant universities, as well as its established outreach programs and services, 4-H is strategically positioned to strengthen science, technology, engineering and math skills in youth throughout New York.

National 4-H STEM programs have reached **5.9 million** (Floyd, 2012) youth with hands-on learning experiences that foster exploration, discovery and passion for STEM.



Through 4-H programs in science, technology, engineering and math, youth are learning the joys of discovery and invention.

Our goal is to increase the number of youth reached through the 4-H STEM initiative in New York, including:

- Expanding and improving curriculum options, including our "Science Toolkit" curriculum—full of fascinating and easy to teach activities.
- Continuing to focus on how "4-H Connects Kids to Cornell" by strengthening partnerships with Cornell research in order to enrich STEM opportunities across the state.
- Increasing community partnerships such as a current project with libraries throughout the state.

"Toolkit" curriculum inspires kids to jump into STEM



The "Science Toolkit" curriculum offers **fun, engaging one-hour** activities that can be combined in a six-hour unit to spark students' interests in the fascinating worlds of science, technology, engineering, and math.

Through these **experiential learning and inquiry projects**, youth become more engaged in STEM-related learning experiences, share their experiences with others, show greater interest in these areas at school and, hopefully, enroll in longer-term STEM projects through 4-H (National 4-H Council, 2012).

Science Toolkit topics include astronomy, entomology, animal science, GPS and GIS technology, flight, climate, water, and more!

Activities include a diverse set of hands-on experiences, such as:

- Creating race courses for a "field day" event using GPS units
- Building a paper glider to illustrate how wind currents work
- Dissecting a wasp's nest to learn about colony insects
- Visiting local water bodies to measure types and levels of pollution

The modules are designed so that leaders can "grab and go" with no need for complicated preparation or prior knowledge of the topic.

The experiments and activities use everyday materials and are coded by grade level, so leaders can determine the appropriate activity for their group.

The Toolkit and other science related resources are available on the NYS 4-H Website.

Cornell Cooperative Extension



<http://nys4h.cce.cornell.edu>



Exploring geospatial technologies for community benefit



GeoSeekers 4-H members marking the location of this fire hydrant for the town fire department's use to locate the nearest hydrant in case of an emergency.

Imagine it's 3am and you smell smoke coming from downstairs. The smoke detectors are screaming. The smell is strong, and your first thought is to get everyone out of the house. Once everyone is out, you call 911 and the fire department is on their way. You might expect that the fire department would know the exact location of every available fire hydrant, but that isn't necessarily true in every small town in New York. However, it is true in Manchester (Ontario County) thanks to the dedicated 4-H members in the **GeoSeekers 4-H club**.

The 4-H GeoSeekers was established in 2007 as an opportunity for technology-minded 4-H youth to **explore** geospatial technologies; using GPS receivers and digital mapping software to make a real **difference in**

their community. Each year since 2008, the club has identified valuable projects that benefit the residents and visitors of their county. They've done a variety of projects over the years, including the Manchester Fire Hydrant mapping, as well as agriculture commodities mapping, and historical signage mapping. In 2011, they were invited to partner with the US Fish and Wildlife Service to map invasive species at Montezuma National Wildlife Refuge in Savannah, NY, and during 2014 they will build solar USB chargers in an altitude bin. From 2009-2013, the club has sent one of its members to the ESRI International User Conference in San Diego, CA to represent the work of 4-H across the nation to an audience of over 14,000 professional cartographers.

Club Co-Leaders, Joanne Roe and Jim

Hooper, have worked with the club since the beginning, and have focused on finding opportunities that will not only allow members to grow and learn from the experience, but will also make a real difference in their community. The **civic engagement** of the club has caught the attention of city and county officials, and the club is now receiving specific requests, inviting the club to take on a variety of new projects.

This year, the club has partnered with the Canandaigua Department of Public Works to map all of the street signs within the city limits. The data will be used as part of the federally mandated street sign inventory, and will be part of the city's maintenance plan over the long haul. So far, the club has mapped over 850 signs and are working with city officials to complete the project.

In the 2012-2013 4-H year 156,005 youth were reached through STEM programming (NYS 4-H, 2013).

For more information

To learn more about the NYS STEM initiative, visit:

nys4h.cce.cornell.edu

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Connecting kids through science outreach

Many Cornell University departments are actively engaged in **youth outreach** projects focused on science, technology, engineering, and math. Such projects as ladybug citizen science, climate change backyard measurements, "smart" textile design, invasive plant control, and helping to stop the Emerald Ash Borer are a few of the choices.

As youth get older, they can participate in the annual **Career Explorations** conference at Cornell, where more than 400 youth meet face-to-face with Cornell researchers and interact with them during three days of hands-on experiences.

4-H STEM initiatives will continue to grow and expand these programs, strengthening connections to programs

already reaching youth and working with other departments and research centers to develop new youth outreach opportunities.



4-H Connects Kids to Cornell



4-H members gathered to learn how plant fibers are made into twine at the Career Explorations Program. This opportunity connects them to the Cornell Plantations.



Floyd, D. (2012, October). *National 4-H Council Speech*. Presentation delivered at 4-H Educator's Conference, Orlando, FL.
National 4-H Council. (2012). *Evaluating the 4-H Science Initiative: Youth, Engagement, Attitudes, and Knowledge Survey Results—Year 2*. National Center for Educational Statistics (NCES), U.S. Department of Education. (2012-465). *Science 2011, National Assessment of Education Progress at Grade 8*. Retrieved from: nces.ed.gov/nationsreportcard/pdf/main2011/2012465.pdf
New York State 4-H. (2011). *2010-2011 New York State 4-H over 6 hour enrollment summary*.