# The greenSTEM Network

The greenSTEM Network connects students to the environment by monitoring and mining data from gardens, green roofs, and various types of green stormwater infrastructure.



Using low-cost, DIY sensor kits and open-source code, the greenSTEM Network displays real-time environmental data (such as soil moisture, precipitation, sunlight, and temperature) to help students maintain healthy school gardens, learn about water-related issues, and conduct scientific experiments and analyses. This is a hands-on learning project. Students program, solder, design, build, install, calibrate, and monitor the sensors.

## The Root Kit
The Root Kit monitors soil moisture and temperature and transmits the data in real time to a web display. It consists of the sending unit (on the right), and the receiving unit (on the left). The sending unit is placed outside in the schoolyard and its three soil sensors are buried in the ground. The receiving unit sits anywhere within the school and uses WiFi to upload the data to the website. The total cost of a Root Kit is approximately $250.

An animated tree graphic helps students visualize real-time data on www.greenstemnetwork.org. Each branch of the tree represents a school, and the leaves change color to indicate when students need to water their gardens. As more schools join the network, the tree will grow.

All code developed for this project is "open source": It is freely available for anyone to use or modify.
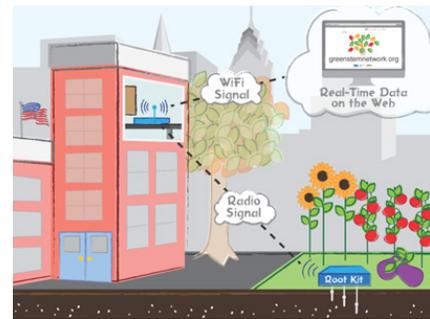


*The Root Kit*

## The greenSTEM Challenge
The greenSTEM Challenge is a student design competition to kick off the project in spring 2014. The goal is to create an inventive, original housing for the environmental sensors. The top design concept from each school will get their design built and installed in a secure location on school grounds.
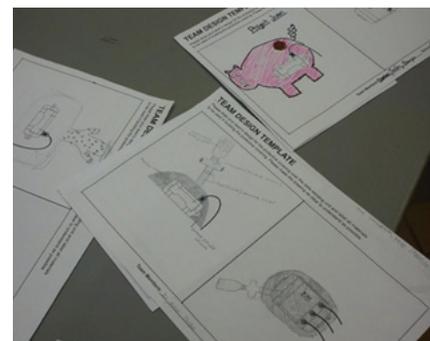
The first greenSTEM Challenge produced three winning student designs: one each from Greenfield, Nebinger and Cook-Wissahickon Elementary schools.



*The greenSTEM Challenge*

## About Us
The greenSTEM Network started as a collaboration between the Philadelphia Water Department and members of Code For Philly at a hackathon co-sponsored by the U.S. State Department and the School District of Philadelphia in February 2013. This unique partnership between a city agency and civic hackers furthers the relationships between technology, education, and environmental stewardship. Grant funding for the greenSTEM Network is provided by NOAA's Coastal Nonpoint Pollution Control Program and administered by the Pennsylvania Department of Environmental Protection.