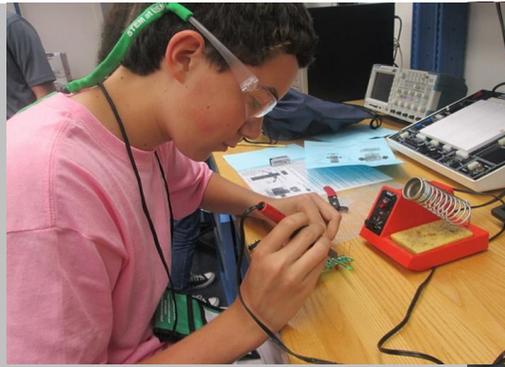


# stem

Summer STEM 2013

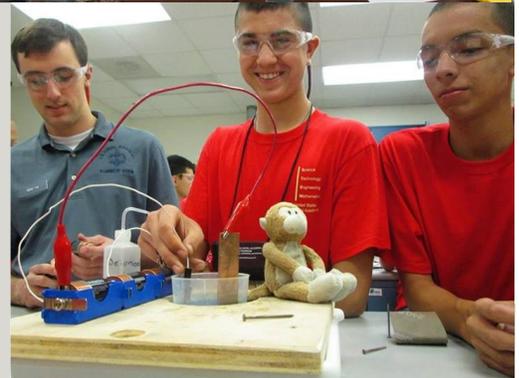
science  
technology  
engineering  
mathematics



The USNA Summer STEM programs are held each year in June for students and in July for teachers. The focus in June is on students grades 8-11 from all over the country. Three weeklong sessions were offered for 200-250 students each week, participating in "Extreme Technology: Annapolis Edition." About 40 faculty and staff along with about 80 midshipmen led innovative, hands on modules in engineering, science, and technology.

A girls – only day camp version was held the third week in June for local middle school girls. "Fly into your Future" focused on flight and aerodynamics.

In July, about 80 teachers came to USNA, 40 each week for two weeks, to develop their skills in project-based learning methods and incorporating engineering and technology into their classrooms.



# GET IT

Girls Experiencing Technology through Innovative Topics

& **GO** *Girls Only*

USNA Girls Technology Camp is designed, not just to encourage girls to pursue engineering and technology in high school and college, but to provide the tools and motivation for girls to engage in engineering as a life long career. Girls are introduced to a broad spectrum of science and engineering concepts through high-energy, hands-on activities. They also get to meet engineering heroines from the past and visit with practicing female engineers and scientists of today.



# STEM Educator Training

The USNA hosts two STEM workshops each summer to provide relevant and meaningful informal learning experiences for middle school and high school teachers. These workshops allow teachers from all over the country, as well as DoDEA schools abroad, the opportunity to discover, explore, and test ideas and, most importantly, learn how science and technology impact real-world research and challenges.







How does the heart work? Students investigated the biology and engineering of one of the most vital organs in the human body. Blood pressures were taken and graphed in order to compare active and resting states. Systolic and diastolic numbers were compared and analyzed. The students explored structure by dissecting a sheep's heart and comparing it to the human version.



I ❤️ My Heart



Sarah Durkin and Gillian Richards



# Helos

Using a large foam wing, students learned what factors affect lift on a fixed wing, then considered how these factors change when applied to a rotating wing. Aerodynamic concepts unique to helicopter rotors such as phase lag and dissymmetry of lift were described and demonstrated using rotating paper plates and whirly gigs. Students constructed their own rotors from balsa wood to experience autorotation and blade flapping, fundamental concepts in rotor aeromechanics.



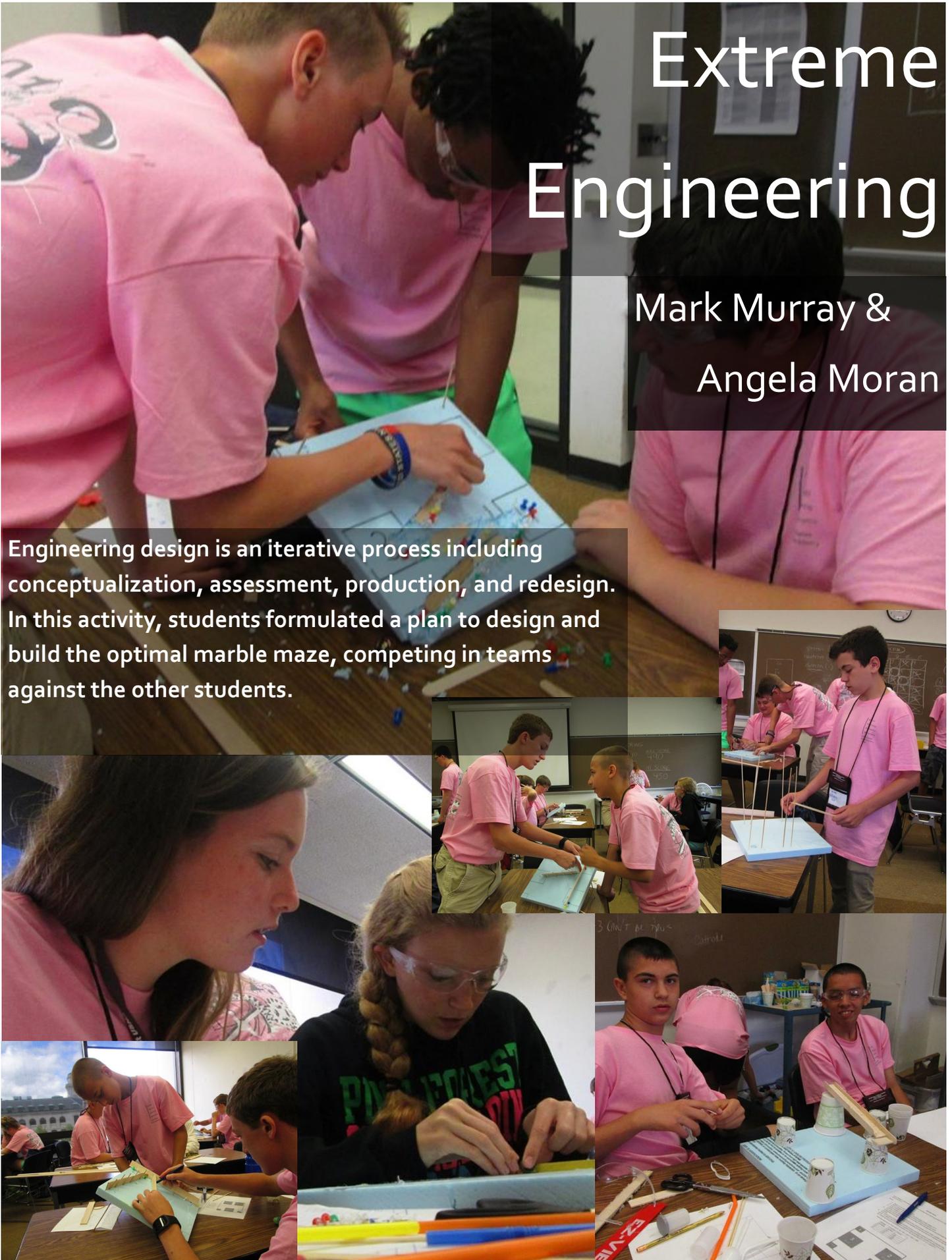
## Gwen Gray & Scott Davids



# Extreme Engineering

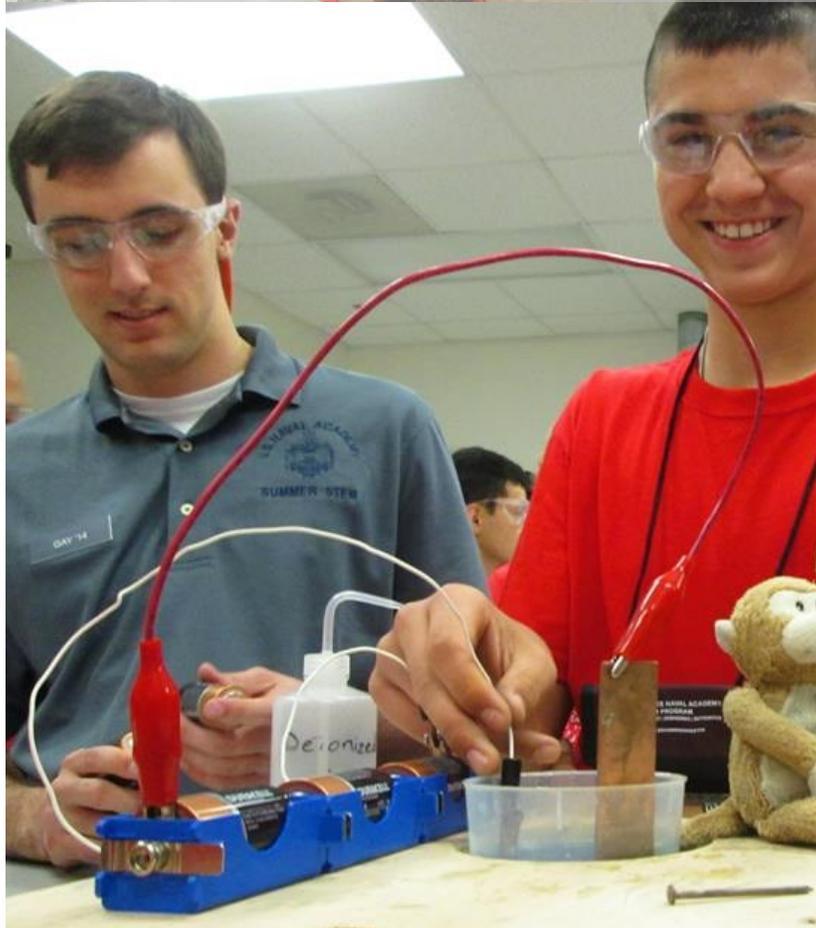
Mark Murray & Angela Moran

Engineering design is an iterative process including conceptualization, assessment, production, and redesign. In this activity, students formulated a plan to design and build the optimal marble maze, competing in teams against the other students.



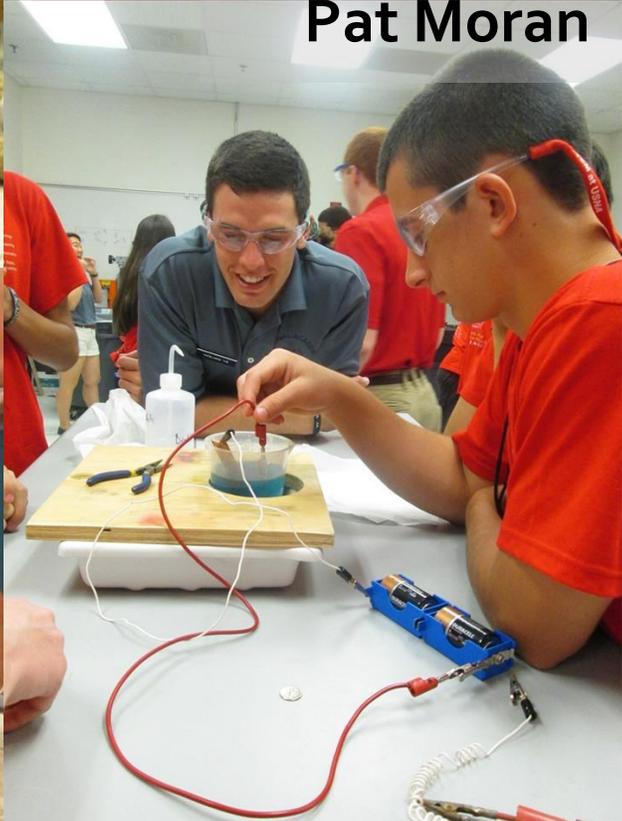
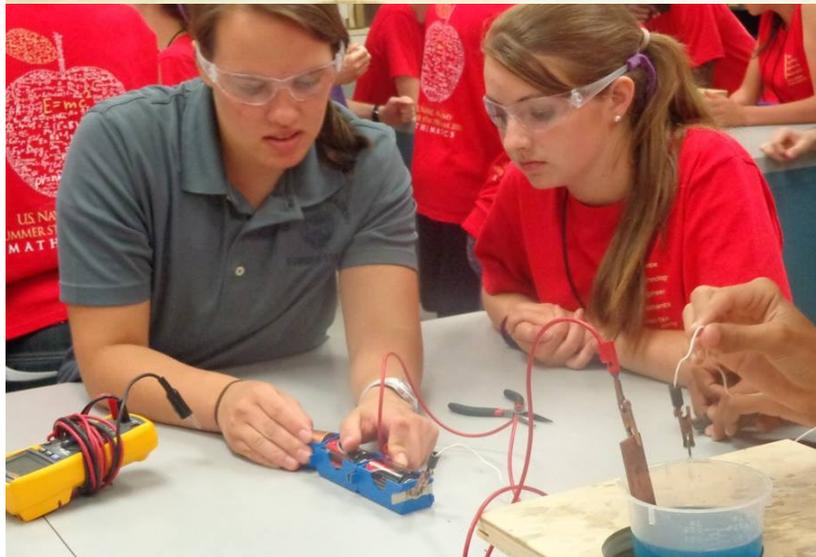


# Corrosion In ACTION



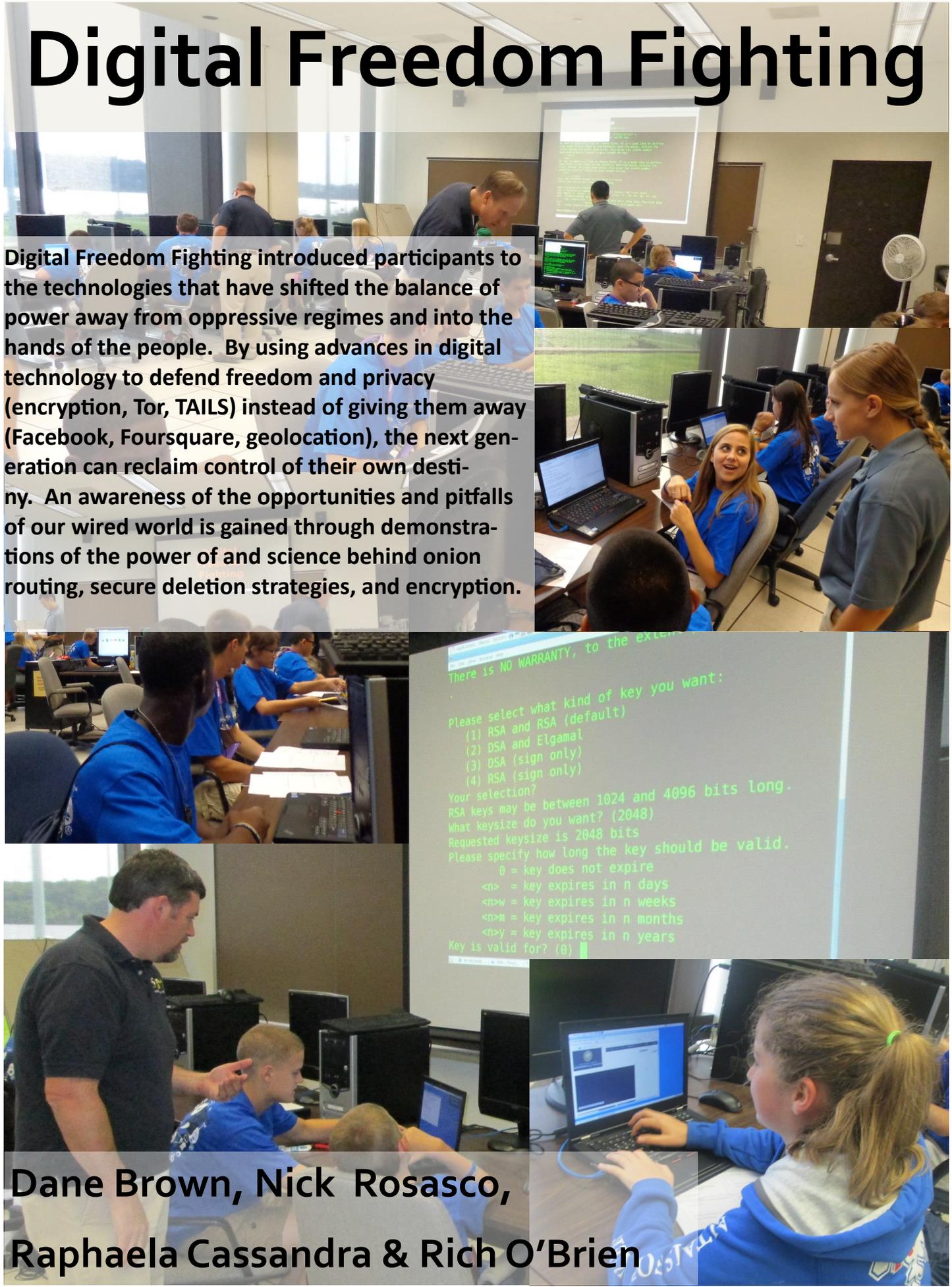
Corrosion occurs through electrochemical reactions. In this module students explored the topics of corrosion prevention and control as well as oxygen production on submarines, fuel cell operations, and electroplating. They were also provided the opportunity to perform their own electroplating.

**Beth Mutch &  
Pat Moran**



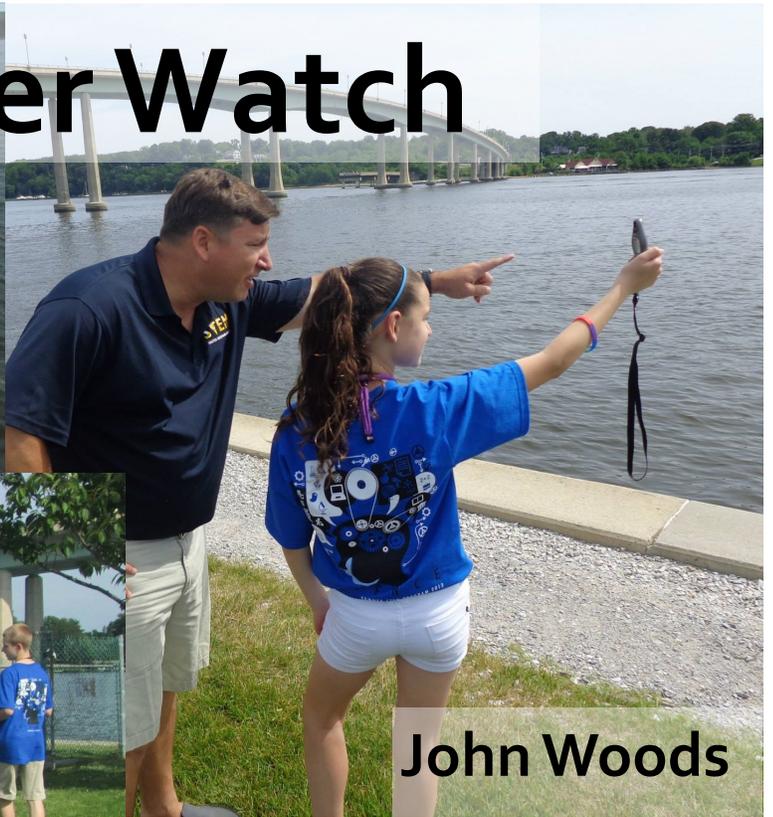
# Digital Freedom Fighting

Digital Freedom Fighting introduced participants to the technologies that have shifted the balance of power away from oppressive regimes and into the hands of the people. By using advances in digital technology to defend freedom and privacy (encryption, Tor, TAILS) instead of giving them away (Facebook, Foursquare, geolocation), the next generation can reclaim control of their own destiny. An awareness of the opportunities and pitfalls of our wired world is gained through demonstrations of the power of and science behind onion routing, secure deletion strategies, and encryption.



Dane Brown, Nick Rosasco,  
Raphaella Cassandra & Rich O'Brien

# Weather Watch



**John Woods**



Students observed the 7 Elements of Weather (humidity, temperature, rainfall, wind speed, cloud cover, air pressure, and wind direction) using various meteorological instruments. Their observations were then compared to the NOAA Automated Surface Observation System (ASOS) that is located at USNA. The activity was held outside in the elements, to give the students a better understand of the different factors that affect local weather.

