

# Spring 2012 USNA STEM Newsletter

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USNA STEM has a QR Code!!  
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# STEM

## At the United States Naval Academy

*Science \* Technology \* Engineering \* Mathematics*

*The USNA STEM Office is focused on addressing an urgent national priority—persuading more young people to pursue careers in science, technology, engineering, and mathematics while engaging our own midshipmen in quality STEM programs and outreach to the community.*

*The Odgers Professorship was established in 2010 by a private testamentary gift to the US Naval Academy Foundation from the Carol and Ralph E. Odgers Family Trust.*

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[www.usna.edu/STEM](http://www.usna.edu/STEM)  
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## STEM Family Day 2012

On May 12, 2012 the STEM Office held a Family Day, to introduce members of USNA and their families to some of the varied activities that the STEM Office promotes. Children of all ages were invited and participated in hands on activities including building

straw rockets, modeling houses in storms, programming robots, maneuvering underwater robots, a full presentation on the ‘magic’ of fluids, and hovercraft rides. It was a fun filled day for all!



## Navy-Army Bridge Design Contest Results

The US Naval Academy and the US Military Academy (West Point) held the 1<sup>st</sup> ever NAVY-ARMY Engineering design event for 6<sup>th</sup> and 7<sup>th</sup> Grade competitors in 2012. The collaboration came about through the Navy and Army STEM outreach offices as a special edition to the Annual West Point Bridge Design Program Competition for high school competitors. The middle school competition teams were sponsored by a teacher in their respective towns and designated their affiliation with the Army or Navy when registering. Over 200 competitor teams from around the nation competed for the final round.



*Pictures from top down:*  
Team Navy Bridge receiving trophy  
Team Navy Bridge with his sponsor teacher (Tom Shrilla, Woodward Park Middle School) and mother  
Team Navy Bridge intensely designing during competition

The final two middle school teams travelled to West Point to compete alongside, but separately, from the high school team on two bridge design challenges. **Team Navy Bridge** from Columbus OH was the victor in this year's inaugural debut of the competition, actually rising as high as 2<sup>nd</sup> ranked in the high school scores at one point during the competition. USNA Prof Joel Schubbe represented the STEM Office and presented the winners with USNA STEM kits, a Dell Laptop computer and crystal trophy for their superior performance.

## SeaPerch Regionals 2012

On April 14, 2012, seventy teams from the Maryland and Virginia area came to USNA to participate in the 2<sup>nd</sup> Annual SeaPerch Regional Competition. Each team had between two to four students who had been working together for several months to build and design their own SeaPerch, which they tested in various timed trials in the Hydro-Tank in Rickover.

Like last year's competition the students were initially evaluated during timed trials which tested both speed and maneuverability. The speed challenge tested how quickly the SeaPerch could travel across the width of the tow tank and return, while the maneuverability challenge had the students travel a slalom course through hoops at the bottom of the tank and then return. Upon successful completion of these first two basic challenges, teams were asked to modify their SeaPerch and locate and retrieve objects in the tow tank in an effort to simulate a salvage operation.

Apart from the timed trials, SeaPerch teams were also judged separately on creativity, engineering, design and teamwork. Students were able to score some extra points by participating in a new activity, Math Counts, as part of a program aimed at stimulating youth interest in mathematics in innovative and engaging ways. For more information on Math Counts please visit the website:

[www.MathCounts.org](http://www.MathCounts.org).

The final competition this year focused on the use of lift bags. A lift bag is used in diving to lift heavy objects underwater by means of the bag's buoyancy. To reproduce this for the competition the teams were required to float 5-gallon weighted buckets to the surface and move them to the side of the pool. The students had prior-knowledge of this challenge, and independently designed and engineered additions and modifications to their SeaPerch. The total cost of the modification was required to be less than \$20. Students came up with various creative and innovative solutions to the problem, including one team which inflated a balloon and another which utilized a detachable weight system.

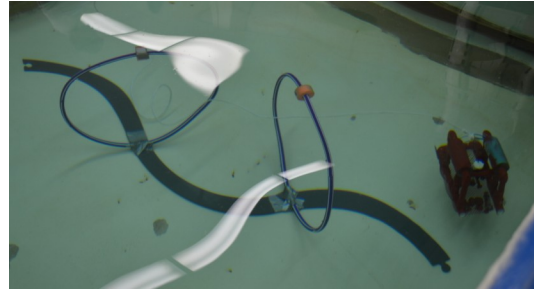
Overall the day was a complete success, with students learning many of the aspects of engineering, including last minute modifications and creative problem solving.



## SeaPerch Showcase 2012

This year, once again, the STEM Office hosted the Annual SeaPerch Showcase for Middle School Students. Around 350 students and 150 adults from all over the Anne Arundel County School System attended the event.

The students were challenged in timed trials of speed and maneuverability, where they tested their SeaPerch (some for the first time) in the Hydro Lab tow tank in the basement of Rickover. After a successful launch students were invited to participate in several other activities, including a math challenge,



a straw-rocket launch, and the “finker” challenge. A flinker is an object that is neutrally buoyant, and gets its name because it neither sinks nor floats.

Prior to the event students were exposed to the more long-term planning and design aspects of engineering, as well as the mechanical skills necessary to build a functional SeaPerch. Many important STEM lessons were learned the day of the Showcase as well. Some students had to triage their SeaPerch, attempting to make alterations quickly and correctly. Other students had to alter their original ballasting estimations, because it was the first time they had tested their SeaPerch in water. Aside from creative immediate problem solving addressed during the timed trials, the additional stations allowed students to explore other aspects of STEM education, and realize the far reaching applications of STEM in various careers.

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## Judging at the 2012 International Science and Engineering Fair

Two Midshipman and six faculty members from USNA participated as judges at the 2012 International Science and Engineering Fair (ISEF) held in Pittsburgh May 14-18. They were part of a 45 member ONR sponsored Navy judging team which awarded over \$150,000 in scholarship money to twenty two well deserving high school students. ISEF is the pinnacle of the high school science fair structure, where participants from all over the world compete for scholarship money from a variety of corporations, societies, and government agencies. Each student has already placed highly in one or more local or regional fairs.



USNA Judges at 2011 ISEF. Left to right: MIDN Michael McPherson, MIDN Katherine Ashton, CAPT Jack Nicholson, Assoc Prof Mark Murray, LT Greg Bodemer, Asst Prof Chris Morgan, LT Katherine Dozier, CDR John Schedel

## Midshipmen Choose STEM: *Spring Break 2012*

Two groups of Midshipmen elected to spend their Spring Break this year both focusing on their communities and STEM Outreach.



One group went to Joplin, Missouri, where they interacted with 40 students in the 3<sup>rd</sup> and 4<sup>th</sup> grades. The midshipmen did several hands on science and engineering focused activities, and effectively demonstrated that STEM Fields are both fun and challenging.

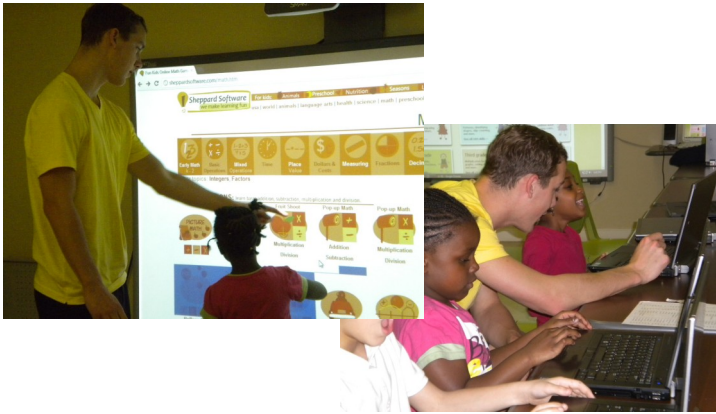


Another group travelled to South Dakota to the Pine Ridge Indian Reservation. These midshipmen interacted with 500 students, ranging from elementary to high school focusing on hands-on science activities.

MIDN 2/C Longhery said, “It’s not really tedious make-your-brain-hurt kind of work. It’s a fun hands-on activity to get the kids interested in science.” Midshipmen also impressed the importance of education when speaking to the older middle school and high school students.



## Midshipmen In The Community



Many midshipmen chose to be a STEM Presence in the local Annapolis community this spring. One group, featured here, spent many hours at a local kids' club. MIDN Alec Merling, Charlie Talisse, and Aaron Arellano volunteered at Bywater, Admiral Oaks, and Bates Boys and Girls Clubs. They were participating in a pilot Math Enrichment Program using SmartBoards.

## USA Science and Engineering Festival



Once again STEM at USNA had a strong presence at the annual USASEF. The second-annual USA Science & Engineering Festival was held in Washington D.C. on April 28th and 29th. Two hundred thousand people came to participate in demonstrations, educational activities and conferences. The USNA Booth provided about a dozen of our most popular and portable activities including mini-SeaPerch, fluids, flinkers, boats, gears, bell jars, and fun with liquid nitrogen!



*From a letter to the Superintendent*  
Sir,

I wanted to congratulate the USNA. I took my family (wife and 5 kids ages 11, 9, 8, 6 & 6 months) to the STEM Forum at the Washington Convention Center.

After three hours of herding kids through 20-30 exhibits we packed it up and headed home. I asked my wife (3 engineering degrees and formerly a nuclear plant designer for ABB) which booth she liked the best. She reflected for a moment and said the USNA booth.

Her rationale was that there were three types of STEM exhibits: entertainment, crafts, and science/engineering. Your exhibit teaches science & engineering. Our children learned at your exhibit and could explain what they had seen and learned: Part of this is because of the design of the exhibit, part of this is the quality of the science experiments and part of this is the quality of the Midshipmen (who were truly extraordinary).

Thank you for giving my kids a great experience and please pass to the Midshipmen our familial Bravo Zulu.

Best  
Lawrence C. Schuette, Ph.D.  
Director of Innovation, ONR

# Anne Arundel County Public Schools

The learning studios are forums for selected middle school teacher groups in the Anne Arundel County Public School system to develop project based learning in their classrooms. Three schools were selected last year and are signed on for a three year effort. The USNA is their technical partner and advisor.



Lindale Middle School started looking at air quality and their local environment (they are next to the BWI airport). This past year, they concentrated on types of air and noise pollution and created a data recorder from scratch with the aide of Joe Bradshaw in the Weapons and Systems Engineering Department. This recorder and sensor will be installed on the middle school grounds and will provide constant air quality monitoring. The other project they instituted was posting air quality flags on their school flagpole alerting students and local citizens to the current air quality condition. As a culmination of this project, they toured the USNA Central Heating Plant courtesy of the USNA Environmental Engineering Department and participated in STEM air quality and storm weather modules. They ended their day with rides in the USNA alternative fuel vehicle go-carts.



Central Middle School and Old Mill South Middle School are both working on water quality projects. Central's 7th graders are doing projects on rain barrels and OMSMS students are working on water filters. Both schools spent a day at USNA. The USNA environmental engineering department gave tours of the water plant and waste water plant and the bioretention facilities. Professor Cecily Steppe taught the students "What's in the water," by taking samples of the Severn river and looking at them under the microscopes. OMSMS also had a chance to

learn about a midshipmen general engineering water filtration project headed by CDR Schedel.



We will continue working with these groups and more next year in an effort to get project based learning in the normal regular school curriculum.

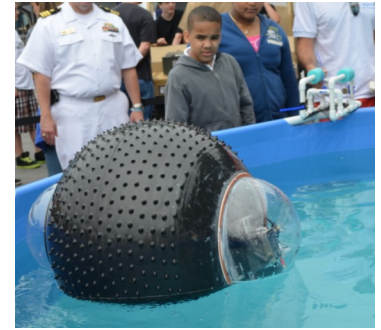




## SeaPerch at Fleet Week in NYC



Over Memorial Day weekend, STEM faculty members Gwen Gray, Richard O'Brian and Beth Mutch went to Fleet Week in NYC to help with the ONR exhibits and to showcase SeaPerch. Their pool was on the pier of the USS Intrepid. Thousands of children, educators, and parents had the opportunity to operate a SeaPerch, and learn about the SeaPerch program.



### *Coming Soon:*

Look for our special STEM Summer Newsletter, which will feature all three weeks of this year's Summer STEM, GET-IT and SET Sail Camps.

The theme for Summer STEM 2012 is Extreme Technology.

The 2012 theme for Girls Experiencing Technology through Innovative Topics is Destination: Design - Engineering Your Future.

S(TEM) E(ducator) T(raining) Sail Annapolis will launch again in July.



Mitch, the STEM Office mascot, receives superhero status at ISEF 2012.