Overview:

**eCYBERMISSION** is a U.S. Army sponsored web-based, science, technology, engineering and mathematics (STEM) competition for students in grades six through nine. Teams identify a problem in their community, and use the scientific method/inquiry or the engineering design process to propose, and implement, if feasible, a solution to that problem. Teams composed of three to four students and one adult Team Advisor compete against thousands of their peers to be named as a Regional First-Place Winning Team and compete at the national level for a chance to win up to $8,000 in U.S. Series EE Savings Bonds (matured value).

The National Judging and Educational Event (NJ&EE) is the culminating experience for the eCYBERMISSION competition. NJ&EE is a weeklong event where 20 regional winning teams compete for the national title and an additional $5,000 in U.S. EE Savings Bonds per student (matured value).

Throughout the week, students are exposed to various STEM-rich activities coupled with several educational enrichments such as visits to the National Mall museums, interactions with guest speakers, team building activities, and STEM Challenge Workshops to engage in immersive, hands-on activities with Army scientists and engineers.

Army personnel are present throughout the week’s events, demonstrating the Army’s commitment to the advancement of STEM education.

On Judging Day, the teams present their projects to a panel of National Judges, who are distinguished STEM professionals from Army organizations and academia. Judges listen to student presentations; engage with students in question and answer sessions; and work together to select the national winning teams from each grade. On this day, teams also present their projects to their peers, the public (live in person and via webcast), and educational audiences at the National Showcase.

At the conclusion of NJ&EE, each of the 20 finalist teams are recognized during the eCYBERMISSION National Awards Ceremony & Luncheon in front of their families, peers, and Army leadership.

The U.S. Army Research, Development and Engineering Command (RDECOM) at Aberdeen Proving Ground, Md. provides program management for eCYBERMISSION, which is part of the Army Educational Outreach Program (AEOP) at the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (OASA(ALT)).

The National Science Teachers Association (NSTA) is a member of the Youth Science Cooperative Outreach Agreement (YSCOA) cooperative formed by the U.S. Army Educational Outreach Program. NSTA administers the eCYBERMISSION program in support of AEOP and the U.S. Army.
Program Updates and Changes

New Regions for eCYBERMISSION!
In 2014, eCYBERMISSION’s regions were re-drawn and expanded from four to five to provide more opportunity for students to be recognized for their innovative projects. Additionally, teams of students participating from Department of Defense Education Activity (DoDEA) schools, to include DoDEA Pacific and Europe, as well as students from U.S. Territories such as Puerto Rico, American Samoa, Guam, and Virgin Islands are considered their own state and are part of the South East Region.

Army Scientists and Engineers team up with NCOs as Mentors
Since its inception, AEOP has always called upon Army Non-Commissioned Officers to mentor and guide eCYBERMISSION students during the enrichment activities scheduled throughout the week. In 2014, junior Army scientists and engineers were added to the roster of mentors for NJ&EE. This addition was made to provide STEM-focused young professionals from whom the eCYBERMISSION cohort might gain further inspiration for the wide variety of STEM career paths available across the Department of Defense (DoD).

Volunteer Outreach Incentive
The increase in eCYBERMISSION participation has more than doubled over the past four years to an impressive 29,593 students in the 2013–2014 program year. To match pace with an ever-growing number of mission folders submitted for judging, AEOP kicked off the “Volunteer Outreach Incentive”. With this new incentive, the Army Laboratory or S&T Organization with the most active eCYBERMISSION volunteers receives up to $20K for use in promotion of AEOP or in support of AEOP priorities locally, including awareness of DoD STEM and career opportunities.
Program Updates and Changes (Cont.)

STEM-in-Action Grant

The 2013–2014 competition marks the first program year for the new AEOP STEM-in-Action grant. After a competitive analysis conducted at the close of the 2012–2013 program year, the new grant was created as a method to push project innovation beyond the final judging at NJ&EE. The STEM-in-Action grant provides up to $5,000 of AEOP seed funding for each of the five national finalists whose projects and implementation plans are deemed most likely to affect positive change in their community.

The STEM-in-Action grant recipients may use the awarded funds to pursue patents and implement their projects under the mentorship of U.S. Army scientists and engineers. The grant is awarded based on scores provided by the eCYBERMISSION national judging panel.

STEM Challenge Workshops

As part of the 2014 NJ&EE, students had the opportunity to explore the world of Army Science and Technology by participating in various hands-on STEM workshops led by scientists and engineers from various Army research and development laboratories. During the workshops, students designed a Naval Sonobouy; developed an 'out-of-this-world' packaging solution with nanocomposites; conducted CSI sample analysis; dove into 3-D printing; engaged in virtual robot reconnaissance; built a signaling device only visible with night vision goggles; and learned about composite testing, environmental engineering and managing the nation's power infrastructure. Furthermore, Army subject matter experts provided students and teachers a taste of the science and engineering behind the Meal Ready to Eat (MRE) packs that keep soldiers well-nourished in theater. At the conclusion of the workshops, eCYBERMISSION students presented their workshop topics and experiences to their peers.
Program Updates and Changes [Cont.]

AEOP Alumni Panel

NJ&EE has included student presenters in previous years, with preference to those who have recently engaged in the Junior Science and Humanities Symposium (JSHS) or other AEOP programs at or above the eCYBERMISSION level. The 2014 NJ&EE changed this session from a single presenter to an AEOP Alumni panel of three to four students each having participated in or are currently engaged in AEOP programs. The panel members each present their AEOP and STEM experiences and at the conclusion of the panel presentations eCYBERMISSION students have an opportunity to pose questions to specific members or the panel at large.

2014 eCYBERMISSION NJ&EE Awards Banquet

The 2014 NJ&EE awards banquet was hosted by Ms. Suzanne Milchling, Director of Program Integration, RDECOM, Edgewood Chemical Biological Center, on behalf of U.S. Army RDECOM, and the keynote address was given by Lieutenant General Thomas Bostick, Commanding General of the U.S. Army Corps of Engineers and Chief Engineer.

The 2014 national awards were presented by Ms. Nancy Harned, Executive Director for Strategic Planning & Program Planning at OASA(ALT), who was assisted on stage by Lieutenant General Thomas Bostick, Ms. Suzanne Milchling, and RDECOM Command Sergeant Major Lebert Beharie.

Volunteer of the year and STEM-in-Action Grant awards were presented by Jeffrey Singleton, Director for Basic Research, OASA(ALT).

The Army Values Award was presented by Command Sergeant Major Lebert Beharie.
The winning teams of the 2014 competition have already garnered media attention both locally and nationally, with many teams granting in-person and phone interviews to news affiliates even prior to the announcement of national winners.

6th Grade: Quake Safe
School: Gahanna Middle School East, Gahanna, OH
Team Members: Aston Cofer, Julia Bray, Luke Clay
Team Advisor: Haruna Cofer

Team Quake Safe studied the tragedies of the recent earthquake in Haiti to focus their research in developing a housing solution that could both withstand the physical demand of an earthquake but could also meet the economic requirements of any country that may be limited by resources. Their design relies on a hyperboloid shaped structure made of quick growing bamboo. Their prototype was able to withstand all of the tests they were able to put it through while remaining sound and functional as a home.

7th Grade: Ants Go Marchin’ 2 by 2
School: Science Rocks U, Whiteface, TX
Team Members: Davis J. Smith, George F. Wiebe, Hudson S. Sanders, Christina R. Crawford
Team Advisor: Laura Wilbanks (Melanie Gruhlkey)

Team Ants Go Marchin’ 2 by 2 investigated soil. The health and condition of soil is a major issue in the state of Texas and across the Midwest. The overuse of chemicals means that the living soil may be in serious decline. Many farming practices have been counterproductive by taking living soil and turning it into nothing more than dead dirt. This team’s goal was to improve the soil’s health.

8th Grade: Bro x 4
School: Wheatland Middle School, Wheatland, WY
Team Members: Haiden Moody, Joey Madson, Jacob Stafford, Christian Moody
Team Advisor: Miken Harnish

Team Bro x 4 developed a prototype frame that is placed on the backs of school lockers. When deployed, this frame is pushed away from the wall and the lockers, and would then rest at a 45 degree angle, creating a safe, shielded space for students to use as cover in the event of a tornado or other natural disaster.

9th Grade: Crabyotics
School: Taos Middle High School, Taos, NM
Team Members: Anthony J. Archuleta, James M. Valerio, Andrea G. Chin-Lopez, Julia A. Robinson
Team Advisor: Laura Tenorio

Team Crabyotics was looking to remove the abundance of antibiotics that gets passed into our drinking water and food through our sewer and water processes by filtering. They tested Chitosan, crab shells, a filter, and cotton. Chitosan removed 40% of the antibiotics from the water.
Beyond eCYBERMISSION/STEM in Action Award Winners

The criteria for eCYBERMISSION challenges students to address problems within their own communities. Many teams quickly discover the passion to continue their efforts beyond the eCYBERMISSION program and continue to mature their proposals, prototypes and research. Many of this year’s competing teams are either currently working through or taking steps toward the patent process with hopes of bringing their solutions to the communities that need them. The following teams are winners of the 2014 STEM-in-Action Grant and recipients of up to $5,000 toward turning their project into a real solution for their communities.

Ravenclaws
School: Metea Valley High School, Aurora, IL
Team Members: Kalpa Anjur, Kavya Anjur, Lori Kipp
Team Advisor: Jonathan Ogrodnik

Team Ravenclaws researched the variables that determine the size of a tornado. These variables can be analyzed to help better predict the size and strength of tornados in the future. The team hopes their research will allow people to better prepare for natural disasters like tornados.

Knightettes of the Twisters
School: Jenks Middle School, Jenks, OK
Team Members: Rebecca Mackey, Riya Kaul, Hayden C. Hilst
Team Advisor: Jenks Manju Kaul

Team Knightettes of the Twisters identified a list of building materials that could be used to create a natural disaster resistant type home. They tested the identified materials, and found that the materials could be used to build a natural disaster resistant home by individuals that could not afford a FEMA certified shelter.

CyberRams
School: Rocky Run Middle School, Chantilly, VA
Team Members: Diego Gutierrez, Rishabh Krishnan, Ravi Duhagha, Adityasal Koneru
Team Advisor: Felipe Gutierrez

Team CyberRams tried to prevent hearing loss among children and teens. They developed an application that measures the amount of excessive noise, in decibels, a person receives over the course of a day and then shows the user what damage they may be experiencing to their hearing.

Crabyotics
School: Taos Middle High School, Taos, NM
Team Members: Anthony J. Archuleta, James M. Valerio, Andrea G. Chin-Lopez, Julia A. Robinson
Team Advisor: Laura Tenorio

Team Crabyotics was also recognized for first place in 9th grade eCYBERMISSION competition. Please see their project description on page 5.
The AEOP Alumni Panel

In addition to continuing the work on their eCYBERMISSION initiatives, students are encouraged to continue their education in STEM by participating in AEOP programs throughout their student-careers. During the week of NJ&EE, the students had the opportunity to listen to a panel of AEOP Alumni each with different pathways and perspectives in STEM. At the conclusion of the panel presentations, the Alumni Panel took many questions from the audience about their experiences in AEOP, their preparation for college, and their research.

Betlihem Ayalew has participated in the Gains in the Education of Mathematics and Science (GEMS) Program as a student and as a Near-Peer Mentor (NPM). While born in Addis Ababa, Ethiopia, she grew up in Washington, D.C. and attended Benjamin Banneker Academic High School. Her GEMS summer experience at Walter Reed Army Institute of Research (WRAIR) in 2010 fostered Betlihem’s interest in biological sciences and biomedical research. Her main areas of interest include physiology, molecular and cellular biology, and cancer research. From the summer of 2010 to the fall of 2011, Betlihem conducted laboratory research on the mechanisms of chemoresistance in cervical cancer in WRAIR’s Department of Molecular Pathology. She currently serves as a NPM in the GEMS program as a way of giving back to local high school students. This is Betlihem’s third year studying biology at Wake Forest University with an anticipated concentration in cellular biology as a pre-medical and public health student. Following her undergraduate years, she plans to enter a MD-PhD dual degree training in Public Health and Medicine.

Morganne Kelliebrew has participated in the GEMS Program as a student and NPM at WRAIR. Morganne attended Bladensburg High School in Bladensburg, Md. During her high school summers, she was very involved in STEM programs, such as the GEMS summer program of 2010 and 2011. She is currently a junior at Cornell University studying Animal Science and serves as an undergraduate researcher in a laboratory under the Microbiology and Immunology Department at the Cornell Center of Veterinary Medicine. Morganne also interned in the Science and Engineering Apprentice Program and the College Qualified Leaders Program. Her experiences within the AEOP not only helped her during her introductory science courses, but furthermore helped her advancement as an undergraduate researcher. GEMS provided her with knowledge that she continues to apply at Cornell University and gave her a solid science foundation for her career pathway as a veterinarian.
The AEOP Alumni Panel (Cont.)

**Tarun Kamath** participated in eCYBERMISSION in middle school and the 2014 National JSHS. He is about to graduate from Thomas Jefferson High School for Science and Technology in Alexandria. Tarun’s interest in STEM, in particular in Biology, started in elementary and middle school when he started engaging in various science competitions. He became involved in JSHS after hearing about the competition from his biology teacher at school. During JSHS, he worked on an epidemiology study that focused on ciprofloxacin-resistant Pseudomonas aeruginosa in the community and hospital acquired settings. In addition, JSHS offered him exposure to peers, who conducted fascinating research in diverse STEM fields and introduced him to eminent scientists and their research. In the future, Tarun hopes to advance his epidemiology research to explore the fundamental cause of spreading diseases and emerging threats, such as HIV.

**Samuel Rohrer** participated in eCYBERMISSION in middle school and received third-place awards in the Engineering category of the 2014 National JSHS. He grew up in Vienna, Virginia and is about to graduate from Thomas Jefferson High School for Science and Technology in Alexandria. Samuel was accepted to study Aerospace and Electrical Engineering at the University of Michigan next year, which is partially funded through his JSHS winnings. He’s been involved in STEM activities, such as Robotics and the Aerospace Club, since elementary school. During his sophomore year of high school, he took a class in electronics and became very interested in the field, which led to two summer internships at the NASA Goddard Space Flight Center. Samuel then began working on his JSHS research where he developed a new method for creating a true audio image for a tablet device using digital signal processing and beamforming.