OCT 2014
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U14-394

US ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT & ENGINEERING CENTER

Science, Technology, Engineering and Math (STEM) Outreach

FY14 PROGRAM REPORT

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.


ROEBUCK
U.S.ARMY

OVERVIEW:

The mission of the Natick Soldier Research, Development and Engineering Center (NSRDEC) Science, Technology, Engineering and Math (STEM) outreach is to share our technical story of the science behind the Soldier with the students and educators of today in order to inspire leaders and problem solvers of tomorrow. STEM outreach is supported by the Executive Office of the President of the United States through the Office of Science and Technology Policy (OSTP), the Commonwealth of Massachusetts through the Governors STEM advisory council board, chaired by Congressman Joseph P. Kennedy, and heavily imbedded in the cultural fabric of the NSRDEC.

Our current outreach focuses on five main areas:

1. Tours and interactive demonstrations across the installation.
2. Development and implementation of real-world problem statements for our academic community partner schools
3. Scientist and engineers supporting science/career fairs across New England as mentors and science fair judges.
4. Offering annual teacher trainings to the teachers and educators across the Commonwealth,
5. Actively sharing and connecting with academic and industrial partners through social media platforms such as LinkedIn, Facebook and Twitter.

These five focus areas are only made possible because of the continuous support from the scientists and engineers across the NSRDEC and our collaborative partnership with US Army Research Institute of Environmental Medicine (USARIEM). The scientists and engineers across the installation actively support STEM activities through hosting visitors within their labs, conducting interactive STEM demonstrations, and volunteering their time and talents as mentors and science fair judges. USARIEM, with support from NSRDEC personnel, manages a successful Army sponsored summer program called the Gains in the Education of Math and Science (GEMS). The GEMS program alone hosts over 200 middle school students and 10 near peer mentors through July and August and allows students to conduct STEM related experiments and activities. The NSRDEC hosts over 1000 students annually on the installation and participates in monthly activities off post such as science fairs and offsite technical demonstrations.

The NSRDEC STEM outreach team established a STEM charter for FY14. This charter set annual team goals and objectives and communicates team mission within the organization and with external stakeholders. The report below will outline the FY14 goals and objectives, the accomplishments towards each objective, lessons learned from FY14 and publications generated over the fiscal year.

STEM OUTREACH CHARTER:

STEM Outreach Mission:

To share our technical story of the science behind the Soldier with the students and educators of today to inspire the great leaders and problem solvers of tomorrow.

Key Project Stakeholders:

NSRDEC, K-12 public/private/charter schools, Research Development and Engineering Command (RDECOM), USARIEM/GEMS, Massachusetts STEM Council, Massachusetts STEM Pipeline networks, National Defense Education Program (NDEP), Army Education Outreach Program (AEOP), eCybermission, Department of the Army, Department of Higher Education, and industrial partners

Team Structure:

STEM Project Lead: Strategic project lead; Oversight of project funding and internal and external interactions; NSRDEC representative on the Governors STEM Council with external Stakeholder. Primary decision maker for overall project direction and funding activities.

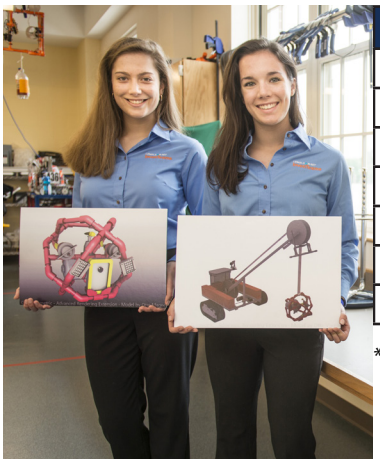
Project Coordinator: Manage and organize day-to-day STEM activities such as maintain STEM schedule, Primary POC on internal tours for schools and STEM Stakeholders; coordinate base-wide support for STEM activities; communicate all STEM requests through designated POCs within each technical commodity area; Maintain STEM Outreach Tracker for all STEM activities for reporting purposes; Communicate all STEM activities to Project Lead and STEM team at least on a monthly basis and as needed.

Strategic Outreach/Social Media Coordinator: Lead external communications through social media tools (Facebook, Twitter, LinkedIN, NSRDEC website); Alternate lead for internal and external STEM activities (school tours, STEM stakeholder tours, external committees) as needed.

Workforce/Employee Liaison: Support all external employment activities in support of STEM activities; Lead communication between the workforce and available hiring vehicles to attract new student interns/employees from STEM fields. Communicate external hiring activities to Project Coordinator as needed.

STEM Lab Coordinator: POC for STEM lab and activities; Responsible for communicating all lab activities to the Project Coordinator on a monthly basis to be added to the STEM monthly calendar. Also the primary POC for eCybermission.

Project Administer Assistant: Manage taskers and stakeholder activities from Project Lead and disseminate information to team as needed. Communicate all STEM related activities to the Project Coordinator as needed. Facilitates purchase requests for STEM team.



STEM INTERACTIONS AT A GLANCE	
# of Students interactions	3715*
# of teacher interactions	414
Total number of Teacher training modules	4
Average NSRDEC Facebook "views" annually	50,000
Average NSRDEC STEM Facebook "views" annually	10,000
Average NSRDEC/STEM LinkedIn "views" annually	300,000
# of NSRDEC Twitter followers	348

* *Student interactions based on STEM tracker. Some numbers were estimated based on size of venue (career fairs/science fairs) and most estimates were conservative. Numbers DO NOT include the number of students interacted with through two large RDECOM events (JSHS and Ecybermission).*

MASSACHUSETTS STEM PLAN 2.0 GOALS AND OBJECTIVES

Governors' STEM Council 5 Strategic Goals for 2016

1. Increase student interest in STEM areas.
2. Increase student achievement among all PreK-12 students in order to prepare graduates to be civically and college and/or career ready.
3. Increase the percentage of skilled educators who teach PreK-16 STEM.
4. Increase the percentage of students completing postsecondary degrees or certificates in STEM subjects.
5. STEM degrees and certificate attainment will be aligned with corresponding opportunity in STEM-related fields to match the state's workforce needs for a STEM talent pipeline.

NSRDEC Goals/Objectives:

Goal 1: Increase student interest in STEM activities (Gov STEM Council Goal #1).

Objectives:

1. Increase the number of school tours on post with a target of at least one new school per month until FY15.
2. Project coordinator to participate in each of the 7 districts STEM outreach committees with specific emphasis on the MetroWest committee.
3. Conduct a half day interactive tour (with SMEs across all directorates) with at least Wilson and Kennedy Middle School on an annual basis.
4. Utilize the STEM Lab at least 1 time per month specifically for STEM activities.
5. Conduct a "STEM Road show" at least 1/month to a new school in the MetroWest area gaining interest in touring the labs.

Goal 2: Increase the # and/or % of STEM classes led by effective educators (Gov STEM Council #5) through the onsite training efforts and the development and accessibility of educational modules/kits.

Objectives:

1. Develop 2 new educational module kits independently or collaboratively with industrial and/or educational partners.
2. Identify and acquire new funding source to increase the # of existing kits and/or develop new kits.
3. Execute at least 1 "train-the-trainer" module on post

Goal 3: Align STEM education programs with Workforce needs of key economic sectors (Gov STEM Council Goal #6) through collaborating and integrating student employees and interns

Objective:

1. Form 3 new corporate/educational collaborations by FY 15.
2. Acquire 3 new student interns by mid-year and 6 new interns by the end of FY15.
3. Increase the number of interns and employees through the available hiring mechanisms in STEM fields.

Methods of Internal Team Communication:

1. Monthly Team Meetings
2. STEM sub-committee meeting
3. External communication through social media

FY 14 Charter Accomplishments:

Goal 1: Increase student interest in STEM activities

- STEM hosted 10 schools/school programs for onsite tours/ demos of the installation during FY14 to include: Bellingham High School, Natick Wilson Middle School, Natick Kennedy Middle School, Framingham State University Nutrition program, University of Rhode Island Nutrition Program, Framingham State University Computer Science program, Dover/Sherborn Middle School, Assabet Valley Technical High School, WPI ROTC cadets, Northeastern Young Scholars Program (see Appendix A).
- The STEM "road show" participated in 10 offsite school career days/STEM demonstrations to include: Framingham State University Career showcase, Nashoba Valley Career Day (Bolton, MA), Millbury Middle/High School Science Day, Nipmuc High School Career Day (Mendon/Upton, MA), Natick High School Freshman class address, Worcester Middle School Innovation Day, Worcester Technical High School, Brandeis University Career day, Olin College of Engineering Career Expo and Bridgewater State College Resource Fair for the southeast STEM network.
- Participated in 3 of the 7 MA STEM Pipeline Network quarterly meetings. Participated in metrowest, central and southeastern Massachusetts networks.
- Conducted interactive demonstrations/tours for both Natick Middle schools 7th grade class. NSRDEC had historically only offered this tour to the Wilson Middle School. This was the first year we also added Kennedy Middle School to the annual tour schedule.
- STEM lab heavily utilized for the summer GEMS program in July and August and hosted the first GEMS teacher training in April.
- Participated in a number of science fairs across Massachusetts, to include Worcester Regional Science Fair, St. Bernadette Science Fair, Engineering Day in Ashland MA, and ScienceFest in Holliston MA.
- Participated in the annual online science competition, ecybermission, through online judging, regional judges, and supporting the annual final competition held in Washington, DC.

Goal 2: Increase the # and/or % of STEM classes led by effective educators (Gov STEM Council #3) through the onsite training efforts and the development and accessibility of educational modules/kits.

- Conducted the first Gains in the Education of Math and Science (GEMS) teacher training for teachers and educators. It was a 4 day course geared towards middle school teachers and was approved for graduate level credit through Framingham State University.
- Funded educational module kits for the Blue Heron/Hall at Patriots Place teacher training titled Engaging Youth through Engineering (EYE STEM training). The training was attended by 20 teachers and implemented 3 different training modules at the middle school level.
- Hosted an onsite professional development training for 20 middle school science teachers from Kennedy and Wilson Middle school.
- Supported request from RDECOM to produce all 8 interactive videos for the eCybermission online "team resource" files to be utilized by all eCybermission teams nationally. (http://www.ecybermission.com/TeamResources)
- Representatives from Combat Feeding Directorate conducted a plastics engineering seminar at UMASS Lowell.
- Initiated collaborative partnership with Millis Middle/High School physical education teacher to support the 2014-2015 physical activities program at the school. NSRDEC plans to support the program with an overview of nutrition and performance.

Goal 3: Align STEM education programs with Workforce needs of key economic sectors (Gov STEM Council Goal #5) through collaborating and integrating student employees and interns.

- For FY14, NSRDEC sponsored 34 pathways students and 17 student volunteers across all commodity areas.
- Supported the summer GEMS program that hosts over 200 middle school students and employs approximately 10 near peer mentors who are responsible for running the STEM related activities with the students. This program is the gold standard on STEM education programs since it engages middle school aged with interactive hands-on STEM activities across our technical commodity areas and allows high school students the opportunity to learn key leadership and organizational skills while teaching students basic science and engineering principles. (see Appendix B)
- Hosted the 8th Annual Student Intern poster session with 32 projects highlighted. (see Appendix C)
- Initiated educational training module development for a "fueling for fitness" lesson plan with Blue Heron and Millis Public Schools.

Special Events/Awards:

- Natick Soldier Systems Center (NSSC), NSRDEC and USARIEM collaboratively received the Natick Education Foundation Corporate Shining Light Award for our support of the Natick Public Schools.
- Active committee member on the Massachusetts STEM advisory Council, chaired by Congressman Joe Kennedy. This board oversees STEM activities across the Commonwealth.
- Natick High School's Inventeam was honored at the White House Science fair for the work conducted on developing an underwater search and rescue robot for first responders. NSRDEC supported the team through mentoring and key design review opportunities that not only offered real world technical guidance but shortened the design process by highlighting key issues with early stage prototypes. (see Appendix D)
- Attended annual STEM summit, hosted at Gillette Stadium, for academia, industry and government partners across Massachusetts to learn of the opportunities and STEM programs across the commonwealth. (see Appendix F)
- Two NSRDEC engineers mentored five students from the Mass Academy of Math and Science on their STEM projects related to helmet technology and backpack/load carrying systems.
- Combat Feeding Directorate supported the annual eCybermission NJ&EE conference in Washington DC with two hands-on STEM projects, a MRE food demonstration, and a junior scientist mentor for the week of activities.
- Supported Army Materiel Command (AMC) Girls in Engineering/ Science Day in Huntsville, Alabama through MRE product samples and literature on the science behind combat rations.
- Support for USFIRST robotics teams, specifically Natick High School, who sent 4 teams to this year's robotic competition. One of the teams went all the way to the eastern regional competition.
- Combat Feeding directorate supported the 52nd Annual National Science & Humanities Symposium (JSHS) hosted by RDECOM in Washington, DC. CFD hosted a STEM booth highlighting the science behind combat rations during the 4 day event.
- Supported Natick High School's first advanced robotics team with a real world problem statement for the class. NSRDEC representatives videotaped the problem statement to be viewed by the class and participated in mid-point and final design reviews.
- Participant in the STEM advisory council subcommittee "Defining STEM" which is tasked with defining STEM outreach for the state of Massachusetts.

PUBLIC RELATIONS/SOCIAL MEDIA ACTIVITY:

Through the use of key social media platforms (such as Facebook, Twitter, and Linkedin) the NSRDEC STEM team is capable of connecting our outreach activities with students nationwide and to connect with key stakeholders and collaborative partners. Below is an overview of the social media activity for FY14:

	# Followers	Average # posts/year	Average # views per post
NSRDEC Facebook	632	200	250
STEM Facebook	104	200	50
LinkedIn	5487	250	1700
Twitter	384	900	N/A

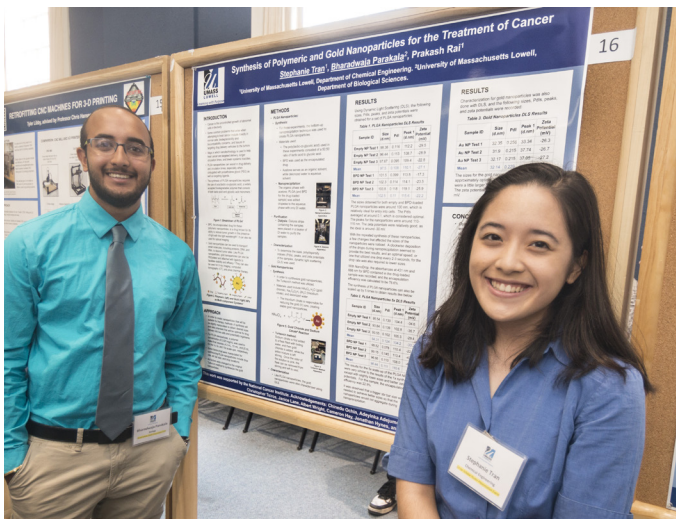
See Appendix F for highlights of noteworthy social media activity.

LESSONS LEARNED:

- Hosting no more than 2 onsite STEM visits/tours/ demonstrations proved optimal with regards to gaining support from the workforce.
- Flow of STEM activity directly correlated to requirements during the school year. There was heightened activity in the beginning of the school year (September-November) and then again heightened activity in the spring after standardized test (March/April).
- Conducting onsite school visits proved very beneficial and allowed for STEM outreach to occur on a larger scale than onsite visits.
- Funding uncertainties and late arrival of available funds strained STEM outreach's ability to consistently support organizations and community programs given the programs timeline and our ability to consistently support activities.
- GEMS teacher training was effective pilot program and gave insight into ways to improve in future years.
- After testing various communication tools to the workforce all STEM requests will be sent through specific directorate POCs to consistently request support.
- Strengths of the STEM outreach include: basic engagement and student interaction through tours and onsite visits, support for local robotics teams, funding specific teacher trainings across Massachusetts, and partnering with local schools and other industrial partners. These activities have strengthened NSRDEC's "voice" in the STEM outreach plan for Massachusetts.
- Areas of opportunity for STEM outreach include: tailoring more interactive demonstrations and academic lesson plans to tell "our technical story" through STEM vs. using preexisting lesson plans , improved tracking of all STEM related activities across the installation, and modification of the current "STEM road show" material to showcase the four technical commodity areas more thoroughly (aerial delivery, shelters, clothing/protective equipment, and combat feeding).

PLANS FOR FY15:

At the end of FY14, the STEM team will revise the team charter to reflect new goals and objectives for FY15, incorporating the lessons learned from this fiscal year, and use this charter as a guide and reference point on all STEM activities. The event tracker will be continued to capture all STEM related activities across the installation and highlight trends and areas for improvement on future outreach efforts.



APPENDIX A:
NORTHEASTERN YOUNG SCHOLAR ARTICLE,
www.army.mil/article/130783/

Natick Visit Inspires Future Scientists And Engineers

July 29, 2014

By Jane Benson, NSRDEC Public Affairs

NATICK, Mass. (July 29, 2014) -- High school students participating in Northeastern University's Young Scholars Program came to where science and engineering rule, the Natick Soldier Research, Development and Engineering Center, or NSRDEC, July 24, 2014.

"Hosting events such as the young scholars from Northeastern University is important because it not only opens our installation to future leaders and problem solvers, it creates important academic partnerships with the colleges and universities in our own backyard," said Joanna Graham, NSRDEC's Science, Technology, Engineering and Mathematics, or STEM, coordinator. "By opening our gates to students and educators, we get to share our technical story with current and future STEM professionals and continue to keep our pipeline full of the best and brightest scientists and engineers."

The highly selective Northeastern University Young Scholars Program provides high school students interested in STEM the opportunity to garner hands-on experiences. Field trips to corporate and government sites are one component of the program.

"We try to really expose the students to the range of ways they can utilize their STEM interests," said Claire Duggan, director for Programs and Operations, the Center for STEM Education at Northeastern University. "We want to show them that there are pathways in the public and private sector."

The visitors to NSRDEC — including about 30 high school juniors and seniors, three college mentors, and three educators — interacted with NSRDEC scientists and engineers and learned about the areas of biomechanics, aerial delivery, welding/fabrication, and combat feeding — to name a few. Students also toured the Doriot Climatic Chambers and the Ouellette Thermal Test Facility.

"It feels great to bring our work to the students' attention," said George Matook, an NSRDEC mechanical engineer. "I love seeing the faces of budding engineers light up when I show them what we do in aerial delivery S&T. We always need more engineers, and reaching out to the students before they make their educational and career choices is crucial."

Matook's overview of NSRDEC's work in aerial delivery especially inspired one young scholar.

"I think it is really cool we got to visit here to see different types of engineers in different fields," said Laura Jenny, who attends Leominster High School. "We got to see a video of an actual test they did on airdropping the supplies and shipments and how they develop the parachutes. I am really interested in that. Hopefully, someday I could go into engineering and maybe even work in a lab like this."

One student was particularly impressed with the Flameless Ration Heater, developed by NSRDEC's Combat Feeding Directorate, or CFD.

"The heater is amazing," said Ali Elgabri, who attends the Al-Noor Academy. "The heater is magic. You guys really feed your Soldiers, which is awesome."

"I am so happy to have been a part of the NU Young Scholars' tour," said P.J. Bitopoulos, an equipment specialist in NSRDEC's CFD. "It's wonderful to see the next generation of students coming through to learn about our R&D capabilities. I hope they'll continue on into scientific fields in their future."

Photo Credit: Chi Tse, Northeastern University

High school students participating in Northeastern University's Young Scholars Program visited the Natick Soldier Research, Development and Engineering Center, or NSRDEC, on July 24, 2014. The visit provided the students -- who are interested in science, technology, engineering and mathematics, or STEM -- the opportunity to garner hands-on experiences and learn about career possibilities.

APPENDIX B:
GAINS IN THE EDUCATION OF MATHEMATICS AND SCIENCE (GEMS),
www.army.mil/article/132661/Natick_labs_gives_kids_hands_on_experience_in_science_through_GEMS/

Natick labs gives kids hands on experience in science through GEMS

September 2, 2014
By Kelly Field, USARIEM

NATICK, Mass. (Sept. 2, 2014) -- Oil spills, crime scene investigations and DNA sampling. Usually, these words would send an organization into a tailspin, but this is just another day of summer camp for Massachusetts middle school students.

This summer the U.S. Army Research Institute of Environmental Medicine once again sponsored the Gains in the Education of Mathematics and Science, or GEMS, program at Natick Soldier Systems Center here. The GEMS program is an extracurricular summer science education program that enables middle-school-aged students to experience science in a real laboratory setting.

GEMS has a multidisciplinary educational agenda, and students take part in grade-appropriate, hands-on activities relating to science, engineering, mathematics, computational sciences, computational biology, biomedical sciences, chemistry and biology.

Capt. Carrie Quinn, the GEMS lab champion for USARIEM, said her main goal for GEMS is to get students enthusiastic about science and math while fostering a sense of community.

"Our main objective was to take science and math out of the classroom and put it in a real-world setting," said Quinn, who is also a research physiologist for USARIEM. "The kids got to see things here that they wouldn't be able to experience anywhere else. They get to truly see how science and math are everywhere -- even in the Army."

Now in its fourth year, the program has grown from four sessions with 100 children to six programs, GEMS I, II and III, with nearly 200 students in attendance. Each GEMS session allows students to return the following summer, slowly building on the lessons learned the summer before and encouraging future scientific leaders.

Advanced high school- and college-aged students called "Near-Peer Mentors" lead the GEMS programs, and serve as role models for the students. Near-Peer Mentors completed extensive training at a science boot camp prior to the student interns' arrival. The mentors learned how to conduct and teach the GEMS experiments.

"The Near-Peer Mentors are in charge of the curriculum and instruction for the summer GEMS program; they are the driving force behind this program," Quinn said.

While exploring the GEMS program this year, the students investigated problem-solving, estimation, water properties, physics/forces of motion, forensics, and even got to see a helicopter land.

Collin Newman, a middle school student, participated in the GEMS program. He said his favorite parts of GEMS were the hands-on experiments he doesn't normally get to do in the classroom.

"You get a big experience in science," Newman said. "Plus, it is really fun. I like the hands-on experiments it takes to do GEMS."

The Army has a long history of recognizing that a scientifically and technologically literate citizenry is this country's best hope for a secure, rewarding and successful future.

"We created the GEMS program as part of this realization that science and mathematics (are) important to instill in the younger generations for future prosperity," Quinn said.

GEMS began as a single program at then-Walter Reed Army Medical Center, in 2005, and has expanded to 12 programs across the major Army research installations, including the one at USARIEM, which runs annually in July and August.

Photo Credit: U.S. Army photo

This summer the U.S. Army Research Institute of Environmental Medicine once again sponsored the Gains in the Education of Mathematics and Science program at Natick Soldier Systems Center, Massachusetts. The GEMS program is an extracurricular summer science education program that enables middle-school-aged students to experience science in a real laboratory setting.

APPENDIX C:
8TH ANNUAL STUDENT INTERN POSTER SESSION, www.army.mil/article/131597/Natick_hosts_Future_Workforce_Poster_Pres

Natick hosts Future Workforce Poster Presentation

August 12, 2014
By Jane Benson, NSRDEC Public Affairs

NATICK, Mass. (Aug. 12, 2014) -- The 8th Annual Future Workforce Poster Presentation, hosted by the Natick Soldier Research, Development and Engineering Center, or NSRDEC, proved that every poster definitely tells a story. All 32 displays told a story of college students and their NSRDEC mentors using science, technology, engineering and mathematics, or STEM, to improve life for the nation's warfighters.

"The Future Workforce Poster Presentation event brought together students hired through the Pathways program, Oak Ridge Institute for Science Education program fellows, and student volunteers through UMass Lowell's Harnessing Emerging Research Opportunities to Empower Soldiers program," said Kelly Mitchell, a lead staffing analyst, Workforce Development, NSRDEC. "All three of these programs are vehicles for students to contribute to our mission of support to the Soldier."

The posters were manned by student presenters, an opportunity that helped them further hone their professional speaking skills.

"The annual poster day is an important event at NSRDEC," said Sharon Menard, NSRDEC Workforce Development manager. "It promotes collaboration, and it gives them the chance to network and make a lot of connections. The event also gives the students the chance to present in a safe and supportive environment. It preps them to present in their field further down the road."

Two University of Massachusetts Lowell students, both studying plastics engineering, worked together on a really "cool" NSRDEC project. David Van Schalkwijk, who is in Pathways Program, and Stephen Burbine, who is in the HEROES program, were involved in testing of the Multi-Temperature Refrigerated Container System. The two students also created drawings of subcomponents. Both feel the experience greatly enhanced their skills using a computer-aided design software program called SolidWorks. There was also the added benefit of helping the Soldier.

"I've worked in private industry in a co-op (job) before this," Van Schalkwijk said. "The part I like about here is that I feel like my work has a little bit more meaning by working in public service."

Another participant in the event, Shalli Sherman, graduated from Northeastern University in December and was a co-op student last year. She has returned to NSRDEC as an ORISE contractor and is working on multifunctional textiles. She is working with coatings on fabrics, including focusing on antimicrobial coatings for textiles.

Sherman said she enjoys working at NSRDEC because of the collaborations with academia and because NSRDEC works continuously to improve life for the Soldier.

"That's my favorite part about working here," Sherman said.

The event itself was coordinated by a student working at NSRDEC, Melissa Tobin. Tobin, a business major at Stonehill College, has worked on NSRDEC's Workforce Development Team for the past three summers and during winter break. Mitchell is her mentor.

"It is so great to see how enthusiastic our students are about their research and how they are truly dedicated to the mission of supporting the Soldier," said Tobin. "The poster presentation not only allows the students to show off their hard work, it is also a great way for them to network with the workforce, which creates great opportunities for the students as well as NSRDEC as a whole. We always get a lot of positive feedback from the rest of the workforce about this event, as it leaves the impression that the future of the installation is in good hands."

Thomas DiPasquale, who is in the UMASS Lowell HEROES program, feels what he experienced at

NSRDEC will help him in his field.

"I did a lot of chemistry," DiPasquale said. "I learned a lot about fiber extrusion. I learned all types of procedures. I feel really fortunate."

Jason Soares, a research chemical engineer at NSRDEC, is one of DiPasquale's mentors.

"Thomas worked on the incorporation of metallic nanoparticles into polymeric fibers," said Soares. "The metallic nanoparticle fibers will be made into a knitted or nonwoven material that will be the basis of a chemical sensor being co-developed with UMASS Lowell through a HEROES collaboration. It is always a pleasure to mentor future scientists and engineers and provide a peek into a real research lab setting . . . We can make the connection of research to real-world applications and products to show students how science can impact our Soldiers."

Quoc Truong, a physical scientist at NSRDEC, is committed to mentoring young people. Last year, he mentored two UMASS Lowell students. This year, he is working with three UMass Lowell students and a postdoc student developing advanced chem-bio protective materials.

"I feel so blessed with having a job at Natick for the past 30 years, working among extremely bright, gifted colleagues," Truong said. "As I become older, I think it's extremely important for me to pay back for the blessings I've received, through passing on the knowledge that I have gained in working here to younger, talented and energetic colleagues and friends. I sincerely hope that they will do the same when they become older."

Dr. Laurel Allender, NSRDEC acting director, summed up the spirit of the day.

"So, we have called this the "Future Workforce Poster Presentation," but what I am seeing is that these people aren't waiting for the future -- it is happening now," Allender said. "They are doing that work now, and it is just very exciting. I have definitely learned a thing or two."

Photo Credit: David Kamm

Dr. Laurel Allender (l), NSRDEC acting director, recognizes the work of Shalli Sherman (r), a recent Northeastern University graduate, with a certificate of participation and appreciation at the Natick Soldier Research, Development and Engineering Center's Eighth Annual Future Workforce Poster Presentation.

APPENDIX D:
INVENTEAM VISIT TO THE WHITE HOUSE,
www.army.mil/article/127749/Natick_researchers_mentor_high_school_robotics_team/

Natick researchers mentor high school robotics team

June 11, 2014

By Jeffrey Sisto, NSRDEC Public Affairs

NATICK, Mass. (June 11, 2014) -- When the Natick High School robotics team was approached by the town's fire department in March 2012 to develop a remotely operated vehicle, or ROV, that could assist in search and rescue dives, they first turned to the Natick Soldier Research, Development and Engineering Center for technical expertise and guidance on their project.

Two years later, Natick InvenTeam leaders Katelyn Sweeney, 17, and Olivia Van Amsterdam, 16, found themselves presenting their team's work to President Obama at the fourth annual White House Science Fair.

InvenTeams are comprised of high school students, teachers and mentors that seek to invent technological solutions to real-world problems in their communities.

"In our meetings with firefighters, we kept hearing about how dangerous ice-diving was," said Sweeney, a senior who will attend MIT this fall. "So we decided we wanted to try to tackle that."

Armed with a $10,000 grant from the Lemelson-MIT Program, to which they were selected as one of 16 teams nationwide, students set to work on an underwater vehicle that can assist firefighters searching for people or objects trapped under the ice.

With an initial scale model made from Legos, the team continued to refine their prototype with technical guidance from NSRDEC scientists and engineers.

"They made that small prototype turn into a reality," said Van Amsterdam of the NSRDEC mentors. "They asked a lot of questions and if we didn't have their input during the brainstorming phase, we would've gone through prototype after prototype after prototype."

"It was actually excellent that we failed so many times," said Van Amsterdam, a junior, who also serves as the technical lead for the team. "Fail early and fail often is what (Natick High School robotics teacher) Mr. (Douglas) Scott always says, and that was an important part of the process."

"With a team, it is easy to get either completely polarized or stuck on a single idea," said Sweeney. "Everybody had a different perspective on how to make the machine work, so we had to learn how to combine them to make something that was better than any singular idea."

In addition to providing technical assessments during the mentoring sessions, NSRDEC researchers also emphasized the need for students to work collaboratively.

"It is important to respect each other's thoughts and ideas," said Gary Proulx, an engineer with NSRDEC's Prototype Shop who was one of the mentors. "Often the end result is a hybrid of different ideas."

The end result is a two-part design that uses a tread-wheeled ROV to traverse the ice to the point-of-entry hole, where an embedded crane then lowers a smaller, amphibious ROV equipped with an underwater camera system into the water. The submersible vehicle then searches beneath the water for the victim, ideally locating and latching on to its target for the rescue diver to retrieve.

The ROV, currently under patent review with the U.S. Patent and Trademark Office, weighs approximately 109 pounds — significantly lighter than a firefighter who would have to cross the ice to the point-of-entry hole.

"First and foremost, this is a device that is intended to scan an environment before a human has to go into it," said Sweeney. "So it could potentially be used in any application where that is necessary."

The goal is to not only assist firefighters in their search efforts, but to keep them as safe as possible while doing it — a familiar end state for NSRDEC scientists and engineers who work daily to ensure the protection and survivability of Soldiers in harm's way.

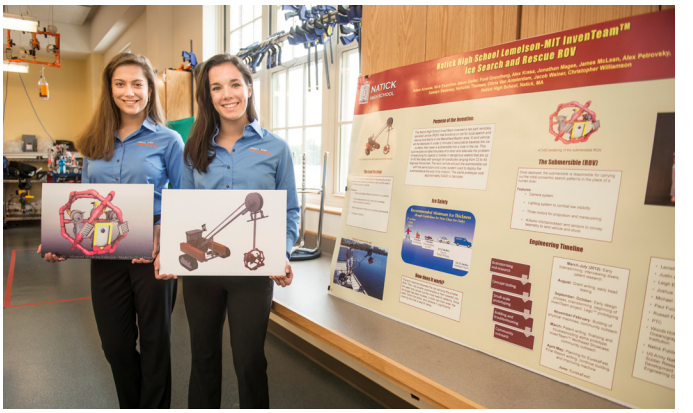


Photo Credit: Mr. David Kamm (RDECOM)

Olivia Van Amsterdam, 16, and Katelyn Sweeney, 17, from the Natick High School InvenTeam, display poster boards of the remotely operated vehicle they developed to assist local firefighters in search and rescue ice dives at their school's robotics lab. Van Amsterdam and Sweeney represented their InvenTeam at the fourth annual White House Science Fair where they presented their invention to President Obama. The Natick InvenTeam was mentored by scientists and engineers from NSRDEC.

APPENDIX E:
ANNUAL STEM SUMMIT,
www.army.mil/article/115827/NSRDEC_participates_in_Massachusetts_STEM_summit/

NSRDEC participates in Massachusetts STEM summit

November 25, 2013
By Jeff Sisto, NSRDEC

NATICK, Mass. (Nov. 26, 2013) -- Members of the U.S. Army Natick Soldier Research Development and Engineering Center attended the 2013 Massachusetts Science, Technology, Engineering and Math Summit, recently held at Gillette Stadium, in Foxboro, Mass.

It was the state's 10th annual STEM summit meeting, and the second year in a row that school administrators, educators, industry, business, academia and state representatives gathered at the home of the New England Patriots to celebrate and strengthen the state's STEM education pipeline. Nearly 1,300 people attended the event.

Since 2009, under the leadership of Gov. Deval Patrick, the state of Massachusetts has sought to bolster the education of students in STEM fields through the implementation of STEM Plan 1.0 and the Governor's STEM Advisory Council.

The Governor's STEM council is made up of academic, business, and government leaders, and serves as a vehicle for STEM advocates from both public and private sectors, charged with enhancing the state's STEM education programs and increasing student interest in STEM.

Patrick reinforced the overarching goals of the council when he spoke at the summit.

"Sustaining and widening Massachusetts' leadership in STEM is in not only our collective economic self-interest, but it is our generational responsibility to provide the best possible opportunities to stimulate the minds and broaden the potential of our children and grandchildren," Patrick said.

Joining the summit by video feed from Washington D.C., Rep. Joseph Kennedy, honorary chair of the Governor's STEM Advisory Council, unveiled the Massachusetts' STEM Plan 2.0, known as "Expanding the Pipeline for All: Massachusetts' Plan for Excellence in STEM Education."

"STEM lies at the intersection of education, economics, and social justice." Kennedy said. "It is a vehicle not just for growth and innovation but for access and opportunity. Massachusetts has led the way in setting a national STEM agenda. STEM Plan 2.0 builds on that success and works to expand our efforts even farther, so that zip code, skin color, and gender can no longer be used as indicators of a person's interest or achievement in STEM."

The new plan applies improved data metrics and sets the direction for the years ahead with concrete strategies to catalyze action around the goals of the plan.

The NSRDEC has been in lock-step with the state to realize these goals, and is playing an expanding role in increasing student interest in STEM subjects while aligning work force needs and opportunity with STEM talent pipelines.

Donna Bulger, the NSRDEC's Associate Director for Operations and Outreach, sits on the Governor's STEM Advisory Council providing an essential link between the state's STEM community and the Army.

"NSRDEC has a vested interest in promoting STEM education and fostering STEM partnerships," Bulger said. "There is a wealth of science and technology in our Soldier mission area that can be easily translated into STEM lesson plans. We take every opportunity we can to work across the communities in Massachusetts to share our efforts with teachers and students to inspire the next generation of great problem solvers."

The Army has long recognized that a scientifically and technologically literate population is a critical underpinning for ensuring the security and success of the nation.

Through the Army Educational Outreach Program, NSRDEC often hosts STEM- related school visits to its facilities and laboratories, while many of its scientists and engineers serve as mentors to STEM students from local elementary through secondary schools.

Through the Department of the Army's eCYBERMISSION Program, the NSRDEC scientists and engineers also act as judges for local and national web-based competitions that encourage students to address real problems in their communities through STEM-based solutions.

eCYBERMISSION is a free, web-based science, math and technology competition for students in grades six through nine targets diverse participants of all proficiency levels, interests and backgrounds.

NSRDEC representatives participated in the summit by providing a display demonstrating recent innovations in Army science and technology. Representatives also attended breakout sessions that included presentations and discussions focused on how to best expand the interest and opportunity for growth in STEM fields.

It was also an opportunity for NSRDEC STEM representatives to strengthen existing relationships and create new ones within the growing STEM community, paving the way for more local school visits and the potential for cultivating future STEM interest.

Photo Credit: Chris Bell, UMass Donahue Institute

A graphic of the 2013 Massachusetts STEM Summit is displayed at Gillette Stadium in Foxborough, MA.

APPENDIX F:
NOTEWORTHY SOCIAL MEDIAL INTERACTIONS

- As part of the NDRDEC's STEM Outreach Program, students at Millbury Jr/Sr High School got a chance to taste food and try on personal protective equipment in order to learn about the science behind the soldier. **– 112 views**
- It was great to talk to the entire freshman class at Natick High School about the science behind the soldier today. The minute we asked for volunteers to wear body armor we were swamped with kids. It was surprising to see how many girls wanted to try on body armor and talk about the way it's designed. **– 336 views**
- What happens when you give uniforms an oleophobic coating? They repel any fluid! **– 432 views**
- Hey 6th-8th Middle School teachers, are you interested in participating in STEM related, hands on experiments here at our facilities that you can take back to the classroom? Check out the attached flyer and sign up! **– 614 views**
- So great to see our STEM outreach team of Joanna and Dutch out at schools and explaining the science behind the Soldier, to what we hope, is the next generation of scientists. A big thanks goes out to the Worcester University Park Campus School for having us! **– 332 views**
- It was great to host 20 science teachers from Wilson and Kennedy middle schools here in the Natick. They got the chance to see the <https://www.facebook.com/hashtag/ sciencebehi ndthesoldier?source=feed_text&story_id=732995790053929> science behind the soldier as it applies to climatic testing, shelters and we even brainstormed about how to apply some of our work in the classroom. Go science! **- 213 views**
- Thank you Facebook folks for continuing to check out our links and posts AND following us. Help us reach a milestone! Tell your students, family, friends and most importantly fellow teachers about us and help us get to just 100 likes (and even more hopefully)! We'd also love to hear your feedback on stories, imagery or content you'd like to see on our page. **– 114 views**
- Are you a high school student looking for a STEM focused scholarship? Are you a high school science teacher that wants to get your students recognized for their STEM prowess? Then check out the Junior Science and Humanities Symposia Program. Click the link below! – **156 views**
- What an awesome video/commercial about learning robotics from Natick High School (our local community school). We're so pleased to be a part of their program! Kudos on the quality production of video too. **– 268 views**
- Students from Natick High School (our community school) brief NSRDEC representatives: Col. Slade - Military Deputy Commander and Ms. Joanna Sharp - STEM outreach coordinator. on the progress of their robotics project. **– 143 views**
- Hey 6th-8th Middle School teachers, are you interested in participating in STEM related, hands on experiments here at our facilities that you can take back to the classroom?! **– 97 views**
- We are so proud of Natick High School's (our community school) robotics team. Way to go guys! **– 328 views**
- Congratulations to Framingham High School on their recent rating by US News & World Report! A school that shines in spite of the hurdles it must overcome. **– 142 views**
- Only by partnering with local state and federal government and academia can we advance STEM and build the next great generation of advances and engineers. **– 283 views**
- A new thing we're gonna try out on our STEM page is "Fun Experiment Friday". We want to showcase easy, safe, inexpensive science projects to allow people a better understanding of science. Here's a way to explain non-Newtonian liquids to budding scientists young or old. **– 133 views**
- Looking for STEM related activities for your budding scientists and engineers to do over summer break? Head to over to WPI June 14th to see a whole new world of science through hands-on technology and exhibits. **– 271 views**
- US News article that suggests that the middle school years might be the best time to get students hooked on STEM. So, to the middle school educators that follow our page, What do you think? **– 192 views**
- Congratulations to all the finalists in the 2014 Massachusetts STEM Teacher of the Year competition...especially Mr. Doug Scott of Natick High School (our community school). Good luck! **– 828 views**
- 16 May: Post - Welcome to another "Fun Experiment Friday" where we showcase easy, safe, inexpensive science projects to allow people a better understanding of science. We know that everyday foods contain or are fortified with vitamins and minerals but can we SEE them…why yes we can! **– 111 view**s
- We were so blown away by the great thank you letter from Dover-Sherborn Middle School Veterans Citizen Action Group – quote: "We never realized how much goes on behind the scenes, and the different aspects of the labs really fascinated us…" **– 97 views**
- Showing that computer programming isn't just for men, the International Women's Hackathon looks to get more women coding. **– 321 views**
- We couldn't be more proud of Natick High School's Katelyn and Olivia who had the President stop by to see their robot today at the White House Science fair! It has been truly rewarding to work with Mr. Doug Scott and his students at Natick High on their projects through the years and we're delighted they get to showcase their work at the White House. Way to go! **– 414 views**
- President Obama speaks to America's up-and-coming scientists at the White House Science Fair today...but he singled out Natick High School's Katelyn and Olivia for not only their robotics project but also that they're working to get more girls interested in STEM. **– 296 views**
- In order to make STEM appealing to all ages, it requires some novel approaches. A student from MIT combined her love of dance and math to generate math problems…and solutions. It's so successful that it's slated to expand into some New York public schools next year. **– 142 views**
- We recently hosted a number of energetic, bright young kids from Kennedy Middle School here in Natick to see the science behind the soldier. How bright you ask? Well they knew what an anemometer is…do you? **– 119 views**
- Are you looking for something your budding scientist or engineer can do this summer? Want to get your child or student interested in science and technology…orROBOTS? Well, we're pleased to announce that Natick High School (our community school), in partnership with the NSRDEC, is hosting two sessions of a "Land and Sea Robotics Camp" for grades 5-8. **– 124 views**
- EVERY child should be encouraged to enter the STEM field if they're interested…no matter the gender. **– 160 views**
- A recent Brookings Institute study showed that "a high school grad with a STEM background is in higher demand than a college grad without such skills". **– 181 views**

U.S. Army Natick Soldier
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THE SCIENCE BEHIND THE WARRIOR: ***YESTERDAY, TODAY AND TOMORROW.***