

CCAT-DPSI

Summary Review

May 2014

Domestic Preparedness Support Initiative

Since 2008, the Office of the Assistant Secretary of Defense for Homeland Defense and Americas' Security Affairs (OASD(HD&ASA)) has partnered with the Center for Commercialization of Advanced Technology (CCAT) in support of that portion of the Domestic Preparedness Support Initiative (DPSI) mission dealing with the transfer of dual-use Department of Defense (DoD) technology to the 1st Responder community. The primary goal of the program is to leverage the DoD investment in new technology development and extend the benefit to the civilian population in support of disaster preparedness and response, as well as enhancing emergency medical capabilities and law enforcement operations.

During the 6 years of the CCAT-DPSI partnership, CCAT conducted five national solicitations seeking technologies in priority focus areas to meet 1st responder requirements such as:

- 1st Responder Training and Simulation Tools
- Personal Protective Clothing and Equipment
- Resource/Asset Management, Allocation and Tracking
- Portable Facial Recognition Technologies
- Automated Situational Awareness and Personnel Location
- Personal Toxic Chemical Detector and Biometric Health Monitors
- Emergency Medical Services for Mass Casualties

The CCAT-DPSI team worked together to evaluate the applications using independent subject matter experts from industry, academia, government, investment firms, and the 1st responder community as evaluators and panelists. Nineteen (19) technologies, mostly from small business concerns were selected to receive commercialization support including product development awards and business development services. Of these, twelve (12) technologies have achieved one or more of the success metrics: product sales, 3rd party funding, licenses, and partnerships within 18 months of the completion of CCAT project funding and services.



Innovation For A Safer Nation

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DPSI: Transitioning DoD-sponsored Technologies to 1st Responder Community

CCAT continues to support DPSI in transferring DoD-developed technologies to the 1st Responder community. In its 6 years of operations with DPSI, CCAT has facilitated the successful transition of several DoD-funded technologies to the 1st Responder and other markets. The following are a brief synopsis of some of the more recent successes:

NoFoam Systems – La Jolla, CA: Fire Vehicle NFPA Standard Compliance

NoFoam Systems is a "green technology" company providing proprietary equipment and technical information for regulatory compliance testing of fire-fighting foam systems, which eliminates fire foam pollution and associated cleanup costs. A trailer-mounted water supply and metering electronics combined with a modification to the fire vehicle's foam supply system allows the trailer to connect to the fire vehicle and measure the foam concentrate flow rates without expending actual foam concentrate during the test. A solar panel operates the electronics and recharges a small battery.



The U.S. Navy developed, validated, and implemented this proprietary testing technology for the past decade during mandatory testing of ARFF (Airport Rescue and Fire Fighting) trucks with on-board foam systems and fixed foam systems installed in airport hangers. The NoFoam technology was used primarily in DoD airports, because the NoFoam technology was not designed to test the water pump flow rate, which is a required component of civilian airport NFPA testing standard for fire vehicles annual testing.

Funding from DPSI via CCAT assisted the transition of this technology to the civilian first responder community. NoFoam Systems received assistance with documenting a reliable, precise and affordable method for testing water pump flow rate in a step by step manual and creating a technical drawing of a specialty meter setup used to

accomplish the test. These documents allow local fire vehicle maintenance staff to correctly perform the required water pump flow rate test without additional instructions or training required. Through the CCAT-funded project, the entire NoFoam System technology has become market ready and by implementation of modifications which enhance conformance to the revised NFPA 412 standard, the technology can now be utilized in any civil airport fire stations, all of which follow the NFPA 412.

Within five months following completion of CCAT project support in October 2013, NoFoam has successfully delivered trailers and modification kits to NAS New Orleans (1 trailer and 3 vehicle modifications) and to USAFE Mildenhall in the UK (1 trailer and 5 modification kits), as well as installed its first fixed pipe system at a helicopter maintenance hangar in Fort Lewis, Seattle, WA. These orders represent a value of over \$200K. Also, the company currently is working on doing demo's for the top 30 US civil airports, and since January this year has already sent out proposals to civil airports for over \$400k.

Luna Innovations Incorporated - Blacksburg, VA: Advanced 1st Responder Uniform Field Demonstration

Chemical protective clothing and equipment shields individuals from the chemical, physical, and biological hazards that may be encountered during hazardous materials operations. For 1st Responders involved in chemical operations, exposure is not always apparent since many chemicals pose invisible hazards and offer no warning properties. For any given situation, equipment and clothing should be selected that provide an adequate level of protection.

For this purpose Luna Innovations has developed a novel multifunctional textile that can protect from toxic chemicals, blood, and other biological agents and is an inherently flame resistant fabric.

These enhanced protective properties were combined in a lightweight garment with low thermal stress that is to be worn as a regular duty uniform on a daily basis. The main focus of this project was to produce a new EMS garment that will be both comfortable to wear and protect against numerous hazards.

With DPSI funding and CCAT marketing support, Luna's technology and formulation produced and tested a garment that provides chemical and biological protection due to its omniphobic (fluid resistant)/antimicrobial surfaces, as well as flame protection. The project produced invaluable technical data and end user feedback to further direct the technology development toward successful transition of Luna's technology to DHS and other agencies. Luna's fluid resistant treatment

has been exclusively licensed by UltraTech for production and commercialization into military, 1st Responder, and industrial markets. In a recent press release Mark Shaw, UltraTech's co-President stated, "We're pleased to partner with Luna, a leader in technology development, to advance their patent-pending textile treatment that we expect will have many commercial and military applications." The product will be promoted under the trade name Ultra-EverShield®. UltraTech will utilize the data obtained on this program to aid in marketing to the 1st Responder community.



Omniphobic
Self-cleaning oil and water fluid resistance and chem / bio agent defense



H₂O



Chemical agent simulant



H₂O



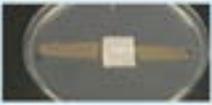
Oil



Flame Retardant
Excellent char formation and self-extinguishing properties



Antimicrobial
Proven biocidal treatments and reduced odor/stains caused by microbial growth



Luna's Multifunctional Textiles for Advanced First Responder Uniforms

Li Creative Technologies, Inc. - Florham Park, NJ: MaskPhone - Clear Voice Communication for Firefighters with Facemasks

Effective communication among 1st Responders is vital for completing tasks and for personal safety. However, because 1st Responders often work in high-noise environments, communication clarity is severely degraded, especially when they are wearing a protective gear such as a self-contained breathing apparatus (SCBA) facemask. Li Creative Technologies (LcT) has developed a novel device called the MaskPhone™ which provides a clear communication solution for firefighters, 1st Responders, and others who work in extremely noisy and hazardous environments and must communicate while wearing an SCBA mask.

In order to make the product ready for manufacturing and deployment, LcT was funded to modify the existing version of MaskPhone™ based on the suggestions which the company received from field testing. The program plan included firmware and hardware development, industrial re-design, firefighter evaluation, and NFPA certification.



Through product customization and modification in collaboration with CCAT, LcT improved the MaskPhone™ hardware component, specifically increasing audio performance on the mask unit by further reducing unnecessary noise. Continual progress was also made on the firmware and enclosure including implementing the structure design. LcT is actively looking for customers for the new technology and contacting SCBA manufacturers Scott, Avon, MSA, Draeger, and Honeywell to form collaborative partnerships.

ANP Technologies, Inc. - Newark, DE: Development of Universal Biological Training Antigens and Handheld Assays for Aerosol, Powder, Liquid and Surface Sample Testing

The NIDS Universal Training Assay (UTA), and Antigen (UTAg), recently developed by ANP Technologies, is a tool that allows military and civilian 1st Responders to be trained under real-life scenarios without exposing equipment, personnel, or facilities to live biological agents or deadly pathogens.



ANP received a CCAT award in June 2013 for development of the UTA and UTAg for use by military and civilian 1st Responders. The NIDS UTA kit allows user training under real-world situations without the use of live antigens (e.g., BG, MS2, and EH) or other expensive simulants. Subsequently the project expanded the scope of application to modify the antigen to be dispersed in an aerosol format which can be collected with air sampling devices, further expanding the type and number of training scenarios applicable to the system.

ANP optimized and finalized the assay and progressed to a final hard prototype formulation which was used to produce the assays for final quality control (QC) testing against a standard testing protocol. Manufacturing of final assays was completed and manufacturing technical documents

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were finalized following ANP's internal Quality System procedures. ANP Techs successfully completed the development and commercialization of a UTA which mimics the use and results of the NIDS Multiplexed Biothreat assays and has taken a modified antigen format to an advanced production-ready prototype phase. This product is now offered for sale by both ANP Technologies and their biological warfare (BW) product distributor, Smiths Detection.

ArchieMD, Inc. – Boca Raton, FL: MEDRILLS: Medical Training Apps

Despite serious constraints on participants' time and money, Emergency Medical Services (EMS) workers nationwide are under pressure to complete time-consuming refresher and continuing education courses. In particular, delivering certification and continuing education training to Emergency Medical Technicians (EMT) in rural areas remains a significant problem due to cost and geographical barriers. To address this need and with DSPI product development funding and business development services provided by CCAT, ArchieMD has successfully transitioned military lifesaving medical skill training apps, funded by DARPA and developed by ArchieMD for military combat medics, to civilian 1st Responder community use.



MEDRILLS apps offer lifesaving medical procedural skills training to civilian Emergency Medical Technicians (EMT's) and Paramedics on Android and iOS smartphone and tablet mobile devices. Apps provide a unique delivery means for EMT's and Paramedics to review important medical procedural skills by taking advantage of small windows of opportunity during an intermittently demanding daily work schedule. Utilizing 3D computer graphics and gaming technology, the twenty-five plus MEDRILL apps currently available offer inquiry based immersive environment training, follow N-REMT guidelines, and can earn EMT/Paramedic CECBEMS certified Continuing Education hours. The apps can be downloaded individually or accessed via web-based individual or group subscription.



MEDRILLS app content for Emergency Medical Technicians and Paramedics includes: Cardiac Emergencies, Diabetic Emergencies and Altered Mental Status; Respiratory Emergencies, Respiration and Artificial Ventilation, Scene Size-Up, Primary Assessment, Secondary Assessment Trauma, Secondary Assessment Medical, Reassessment and Decision Making, Poisoning and Overdose Emergencies, Allergic Reactions, Obtaining IV Access, Cricothyroidotomy, Medication Port, Medication Administration, NCD for Pneumothorax, AED, Hemorrhage Control, Airway Management, Airway Suctioning, Performing CPR, Triage, Oxygen Administration, Hypovolemic Shock, Fracture, and Spinal Cord Injury.

Over 8,000 Medrills Apps have been purchased by several thousand users in all 50 states and 61 countries worldwide. ArchieMD is currently finalizing distribution agreements with three separate major companies in the EMS education market that will further expand the distribution into EMS/Fire departments and EMS schools. The U.S. Army Medical Department Center & School has licensed content from the MEDRILLS apps for use in training new Combat Medics.

Hydronalix – Green Valley, AZ: Man-portable USV for 1st Responders EMergency Integrated Life-saving LanYard - E.M.I.L.Y.

1st Responders are often the first to encounter hazardous situations and, as such, are frequently requested to support local Sheriff's departments, Fisheries, NOAA, and other government offices investigating potentially dangerous situations. In particular, dangerous water conditions are a constant concern for 1st Responders working in coastal areas. To assist emergency response personnel, including life guards, E.M.I.L.Y., a remotely controlled unmanned surface vessel (USV), was developed by Hydronalix to perform effectively and reliably in challenging salt and fresh water environments. E.M.I.L.Y. has been tested and operationally deployed in large surf, swift water, rip currents, and white water coastal water conditions to improve situational awareness, complete search and rescue operations, and fulfill other 1st Responder missions.



This autonomous surface vessel was initially developed for military and scientific customers through collaborative efforts with NOAA, the U.S. Navy, and U.S. West Coast fire departments. DPSI funding via CCAT enabled Hydronalix to build 8 USVs, distribute them for testing by various emergency response organizations throughout the U.S. to promote testing of the vessel in typical working conditions with 1st Responders, and to refine the E.M.I.L.Y. platform based on 1st Responder feedback. Shortly after deployment, the vessel was used to rescue a father and son from drowning.



In addition to exploiting the E.M.I.L.Y. platform as flotation and rescue assistance for conscience swimmers in distress, 1st Responders recommended refining the E.M.I.L.Y. platform to allow installation of a variety of sensor options. High resolution imagery capable of monitoring distressed swimmer activity above and below water level is an example of a sensor which supports 1st Responder search and rescue as well as other 1st Responder investigative activities.

Since completion of the CCAT project, Hydronalix has experienced annual sales of about \$1.3 million and a 3-year growth rate of 20%. In addition, the company has produced its first long duration prototype EMILY with computer control and EO/IR camera which they

provided to the Los Angeles Fire Department with \$600K pending for more R&D. Hydronalix established programs with NOAA, RA133R-11-CN-0188 E.M.I.L.Y. Unmanned Surface Vehicle (USV) for Oceanic and Atmospheric Research (\$300,000) to deliver multiple platforms for tracking and monitoring hurricanes, and with NAVFAC, N61331-09-D-0021-DO0006, Autonomous Ordnance Mapping Demonstration (\$175,000) for autonomous surveying of coastal regions, mapping, and location of ordnance. A Navy Phase II SBIR N102-182: Maritime Critical Infrastructure Protection and Security Unmanned Surface Vessel. Also, the company has successfully introduced its product on the international market with sales in France, Brazil, and Indonesia.



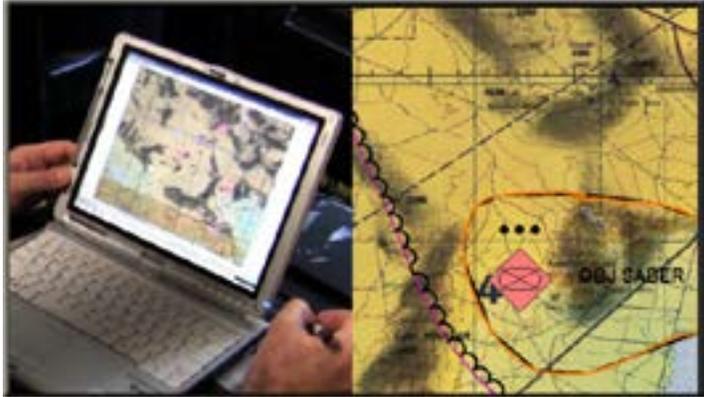
Pixon Imaging LLC – San Diego, CA: Portable Smoke-Piercing Video Processor for Firefighters and 1st Responders

Following completion of the DPSI sponsored CCAT subaward in 2009, Pixon Imaging participated in a US Army Phase II SBIR in development of a Deblurring Anisoplanaticism Corrector (DAC), which removes image warp ("heat waves") encountered when looking through turbulent atmosphere. Pixon Imaging currently develops and manufactures advanced image-processing systems. These image processors and proprietary algorithms provide image enhancement in a variety of military, homeland security, surveillance, and scientific applications. Video enhancement using a real time "dehazing" algorithm allows Pixon Imaging PX40/50 technology users to see up to 3 times further in haze, mist, fog, smoke, rain, snow, low light, thermal/IR, heat haze shimmer and murky water. The algorithms incorporated in the PX50 work on aerosol scattering, removing scattered light from the sun and other sources and restoring the colors and intensities of the targets of interest. Real time dehazing, deblurring, motion adaptive denoising and contrast enhancement achieved by Pixon Imaging algorithms dramatically improve image understanding allowing rapid decision making by 1st responder and other users.

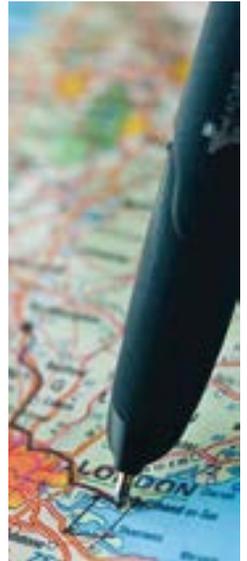


ADAPX – Seattle, WA: Capturx for First Responders

Beginning as a natural user interface technology developed for DoD, Capturx products now streamline handwriting, natural speech, and sketches into actionable structured data in a variety of formats including Microsoft Office, SharePoint, CRM, ERP, GIS, C2, C4ISR systems, etc. which support collaboration by 1st responders, military, government and industry users.



Capturx Digital Pens solutions for field data collection scan and integrate handwritten data on paper forms, maps and designs into software applications, eliminating the cost and delays of transcription without requiring expensive equipment, IT involvement, training, or changes to existing standard operating procedures. Capturex Speech & Sketch for command and control enables users to quickly capture field data and share courses of action by speaking naturally and sketching plans on wall displays, touchscreens, and handheld electronic devices.



Stereovision Imaging, Inc.: 3DMobileID™ Face Recognition Binocular System

In conjunction with San Diego State University’s Center for Commercialization of Advanced Technology, SVI demonstrated, for the first time, its wireless mobile face recognition binoculars to federal, state and local law enforcement in the San Diego area including University Police. Individuals were enrolled in the system and identified out on the field through the hand held surveillance and real time identification device. The 3D video clip captured through the device connected wirelessly to a standalone laptop running SVI’s proprietary 3D and 2D imaging algorithms and displaying positive identification results against a 2D facial database within seconds. All test runs were 100% successful at ranges up to 65 meters, outdoors under challenging uncontrolled environmental conditions.



Domestic Preparedness Support Initiative *(continued from page 1)*

The CCAT program with its proven technology commercialization processes and resources has assisted the OASD(HD&ASA) and DPSI in meeting their objectives. Overall, a total of \$1.84 million of DPSI funding resulted in \$6.3 million in product sales, \$4.5 million in 3rd party funding, and 3 partnership/license agreements. Additional sales and partnerships are pending for several of the recently completed companies (see other articles). Overall, the program has a success rate of 63.1% and achieved a return on investment of at least 6.0 to 1.0.

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