



ALERT

AWARENESS AND LOCALIZATION OF EXPLOSIVES-RELATED THREATS

Northeastern University

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Research Areas

- Characterization and Elimination of Illicit Explosives
- Trace and Vapor Sensors
- Bulk Sensors and Sensor Systems
- Video Analytics and Signature Analysis

"ALERT has given us another tool to help mitigate potential threats to the nation's aviation transportation system."

- Donald Kemer

Transportation Security Manager
Cleveland Hopkins Intl. Airport, Ohio

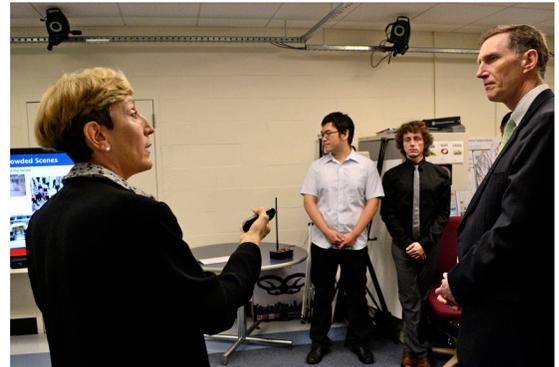
Mission: To conduct transformational research, develop technology, and provide educational development to improve effective characterization, detection, mitigation, and response to explosives-related threats facing the country and the world.

Quick Facts

- Led by Northeastern University (NEU) and includes three key academic strategic partners: Boston University, Purdue University, and University of Rhode Island (URI).
- Engages a consortium of 13 academic institutions, seven national labs and over 30 industrial organizations.
- Received more than \$9 million in funding for homeland security related explosives research from sources outside of the DHS Office of University Programs.
- Conducts sensitive or protected research through NEU's Kostas Institute for Homeland Security and URI's Performance Testing Facility, Center for Chemical and Forensic Sciences.

Key Accomplishments

- Approximately 20 professional development classes are offered each year to more than 400 working professionals and first responders.
- URI Ph.D. student Jon Canino received the \$10,000 First Prize at the 2014 Annual National Security Innovation Competition for his entry "Safe Training Aids for Bomb Sniffing Dogs." His entry was chosen out of over 100 submissions.
- ALERT created a centralized, online library of analytical data for explosive and energetic compounds ([ALERT website](#)) that is used by police, prosecutors and scientists. The library currently has 450 registered users from the United States and 25 other countries.
- ALERT and Los Alamos National Laboratory have received an additional \$240,000 award from the Defense Advanced Research Projects Agency (DARPA) for their continuing partnership in Nuclear Magnetic Quadrupole Resonance research. This brings the total amount of the DARPA award to over \$700,000.
- Video analysis tools to detect suspicious behavior for enhanced security.
- Counter-explosives technologies developed, including:
 - Canine training aids for detection of peroxide explosives in use at numerous canine units throughout the United States.
 - Radar systems that can identify potential suicide bombers at greatly increased standoff distances.



Professor Octavia Camps demonstrates VAST software to former TSA Administrator John S. Pistole during a June 2013 visit to ALERT.

Research Partners

Northeastern University, MA (lead)
Argonne National Laboratory, IL
Ben-Gurion University of Negev
Boston University, MA
The Hebrew University of Jerusalem, Israel
Lawrence Livermore
National Laboratory, CA
Los Alamos National Laboratory, NM
Massachusetts General Hospital, MA
Naval Research Laboratory, DC
New Mexico State University, NM
Pacific Northwest
National Laboratory, WA
Purdue University, IN
Rensselaer Polytechnic Institute, NY
Sandia National Laboratories, NM
Texas Tech University, TX
Transportation Security Laboratory, NJ
Tufts University, MA
University of Notre Dame, IN
University of Puerto Rico
at Mayaguez, PR
University of Rhode Island, RI
Washington State University, WA

Industrial Advisory Board Members

Analogic Corporation
American Science & Engineering
Eos Photonics
Kiernan Group Holdings, Inc
Lockheed Martin
Morpho Detection, Inc.
Passport Systems, Inc.
Rapiscan Systems
Raytheon
Renaissance/HXI
Siemens Corporate Research

Over 30 Other Industrial Collaborators Include:

Astrophysics, Inc.
L-3 Communications
Morpho Detection, Inc.
Physical Sciences, Inc.
Square One
TeleSecurity Sciences
Textron Systems
United Technologies
Research Corporation

ALERT Highlights



Real-time application of the VAST “in-the-exit” Software currently deployed and used by TSA at CLE.

Finding Solutions for the Transportation Security Administration (TSA)

ALERT’s Video Analytics for Surveillance and Tracking Project is developing advanced methods at Cleveland Hopkins International Airport (CLE) to address existing airport security concerns, including “in-the-exit” security breaches (when a person tries to enter a secure terminal area through the exit lane); and “tag-and-track” capabilities (monitoring the path of a suspicious person

in real time). Conducted in partnership with Siemens Corporate Research, TSA and CLE, the project has already demonstrated success in solving the “in-the-exit” problem.

Trace Screening and Technology Workshops

ALERT’s Advanced Development for Security Applications (ADSA) Workshop series fosters dialogue on advanced algorithm development among traditional vendors of security systems, academic researchers, the national laboratories, DHS, and security companies. As a result, more than 15 research groups across the United States have engaged in algorithm development for implementation in computed tomography (CT) luggage screening systems, making several sets of validation data available to the ADSA research community.

ALERT’s Trace Explosives Sampling for Security Applications (TESSA) workshop series, similar in style to ADSA, works to determine the baseline for measuring quantitative sampling efficiency. This will enable the development of a protocol against which competing contact sampling approaches can be compared and measured, to help identify appropriate aspects of trace detection where greatest impact can be realized.

Preparing First Responders

ALERT provides hands-on explosives training/workshops for professionals who come into contact with explosives. ALERT offers intensive 2-3 day explosives courses for first responders, week-long training for TSA explosive specialists and a yearly Range Day for bomb squads. One TSA specialist noted: “I learned more during your class than I did in my entire 20-year military career.”

Establishing a Facility for Next Generation Technology Development

With equipment from American Science & Engineering, HXI, Neurologica, and SAIC, ALERT established a laboratory capable of testing the next generation of Advanced Imaging Technologies (AIT) for passenger screening. Current AIT systems do not leverage multi-modal fusion technologies, which are key to advancing AIT. Some of the modalities to be tested include millimeter-wave, X-ray backscatter, infrared thermography and nuclear quadrupole resonance.

Creating Student Pathways to Homeland Security Careers

ALERT’s unique educational programs develop future homeland security researchers and professionals. Minority Serving Institutions and Community Colleges actively engage through research programs and hands-on education which foster DHS career opportunities. ALERT’s DHS Homeland Security-STEM Career Development Program awards graduate fellowships to full-time engineering students. Participants take courses, engage in career development activities, and conduct research in DHS-related topics at a national lab or industrial venue. In the Gordon Engineering Leadership Program, students participate in an intensive graduate program designed to build a future corps of engineering leadership professionals trained in DHS technologies.