



ALERT

AWARENESS AND LOCALIZATION OF EXPLOSIVES-RELATED THREATS

Northeastern University

302 Stearns Center
360 Huntington Ave
Boston, MA 02115

Phone: (617) 373-4673

Fax: (617) 373-8627

alert-info@coe.neu.edu

www.neu.edu/alert

Research Areas

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

"The workshop is great; it is an ideal networking environment with some good presentations thrown in. The environment is low key and relaxed and really fosters interaction. I describe the meeting as a mini-GRC (Gordon Research Conference) and recommend it to all my colleagues."

– ADSA11 Industry Participant

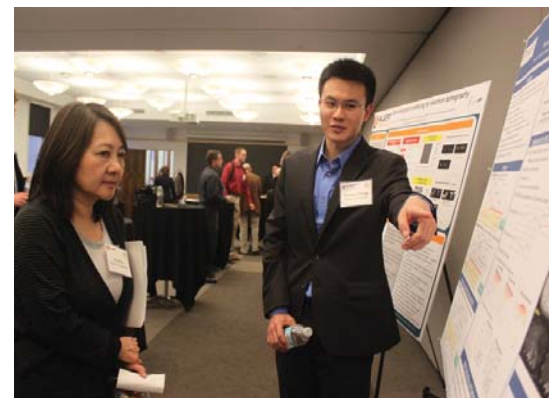
Mission: To conduct transformational research, develop technology, and provide educational development to improve effective characterization, detection, mitigation, and response to explosives-related threats facing the country and the world.

Quick Facts

- ALERT is led by Northeastern University and includes three key academic strategic partners: Boston University, Purdue University, and University of Rhode Island.
- Engages a consortium of 13 academic institutions, 4 national labs and over 30 other collaborating organizations.
- Recipient of more than \$10 million in funding for homeland security related explosives research from sources outside of the DHS Office of University Programs.
- Able to conduct secure research through the support of Northeastern'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 350 working professionals and first responders.
- In 2015, ALERT students Anthony Bisulco, Darby Hoss, and Amanda Figueroa-Navedo won the Judges Award at the URI "Internet of Things Hackathon". The team developed a prototype of a product that could locate biological weapon radiation sources in real time based on measurements from remote, wearable sensors.
- ALERT created a centralized, online library of analytical data for explosive and energetic compounds (website: <http://expdb.chm.uri.edu>) that is used by police, prosecutors and scientists. The library currently has 924 registered users from the United States and 49 other countries.
- Since 2015, ALERT researchers have been awarded two DHS task orders, totaling \$2.4 million in additional funding. The first task order focuses on Contact Sampling Methodology and Efficiency, while the other explores work in Advanced Automatic Target Recognition. These task orders are in addition to three others awarded since 2010.
- ALERT has developed counter-explosives technologies that include: radar systems that can identify potential suicide bombers at greatly increased standoff distances; video analytics tools to detect suspicious behavior for enhanced security; and canine training aids in use at numerous bomb detection units throughout the US.



Ruoqiao Zhang, an ALERT PhD student from Purdue University, explains his iterative reconstruction research to Rapiscan rep Jing Shea at the April 2015 Annual Student Pipeline Industry Roundtable Event (ASPIRE).

Research Partners

- Northeastern University, MA (lead)
- Ben-Gurion University of Negev
- Boston University, MA
- The Hebrew University of Jerusalem, Israel
- New Mexico State University, NM
- Purdue University, IN
- Rensselaer Polytechnic Institute, NY
- Texas Tech University, TX
- Tufts University, MA
- University of Notre Dame, IN
- University of Puerto Rico at Mayagüez, PR
- University of Rhode Island, RI
- Washington State University, WA

Industrial Members

- American Science & Engineering
- Analog Devices, Inc.
- Kiernan Group Holdings, Inc.
- Morpho Detection, LLC.
- Passport Systems, Inc.
- Pendar Technologies
- Rapiscan Systems
- Raytheon Company
- Renaissance/HXI

Government Collaborators

- Canada Border Security Agency
- Defence Science and Technology Lab, UK
- Defense Threat Reduction Agency
- John Adams Innovation Institute
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- Naval Undersea Warfare Center
- National Institute of Standards & Technology
- Night Vision & Electronic Sensors Directorate
- Office of Naval Research
- Pacific Northwest National Laboratory
- Port Authority of Savannah, GA
- Prime Minister's Office, Israel
- Transportation Security Laboratory

Other Industrial Collaborators including:

- Astrophysics, Inc.
- Bruker Detection
- DetectaChem, LLC.
- FLIR-Nomadics
- L-3 Communications
- Siemens
- Signature Sciences, LLC.
- Smiths Detection
- Stratovan Corporation
- TeleSecurity Sciences, Inc.
- Texwipe
- Thermo-Fisher Scientific, Inc.

ALERT Highlights



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

Finding Solutions for the Transportation Security Administration (TSA)

ALERT's Video Analytics for Surveillance and Tracking Team develops advanced detection methods which have been used by 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.

Advancing New Screening & Trace Sampling Technology Development

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 CT (computed tomography) 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 in 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, and Analog Devices/Hittite, ALERT established a laboratory capable of testing the next generation of Advanced Imaging Technologies (AIT) for passenger screening. Using the millimeter-wave radar scanning modality, the AIT lab is developing ways of improving resolution to the point that human examiners are unnecessary, eliminating artifacts which produce false alarms and pat-downs, and reducing hardware costs.

Creating Student Pathways to Homeland Security Careers

ALERT's unique educational programs develop future homeland security researchers and professionals. Minority Serving Institutions are actively engaged through research programs and hands-on education that fosters DHS career opportunities. ALERT's Science and Engineering Workforce Development Program awards graduate and undergraduate 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.