Detecting, Locating, and Discriminating Impulsive Airburst as HE/CB Event Using Unattended Acoustic Sensors

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Relevance to Homeland Security

- Providing a low cost solution for defense and enhanced situational awareness against Chem/Bio attacks via airburst disseminations.
- Protecting vital interest against aerosol attacks via airburst explosions.
- Utilizing acoustic sensors to cue more expensive sensing systems.

Key Objective of Technology

- Determining if an explosive event contains only High Explosive material or plausible Chemical/Biological agent on the battlefield.
- Providing emergency workers greater response time using a stand alone acoustic sensor.
- Giving greater situational awareness to first responders.

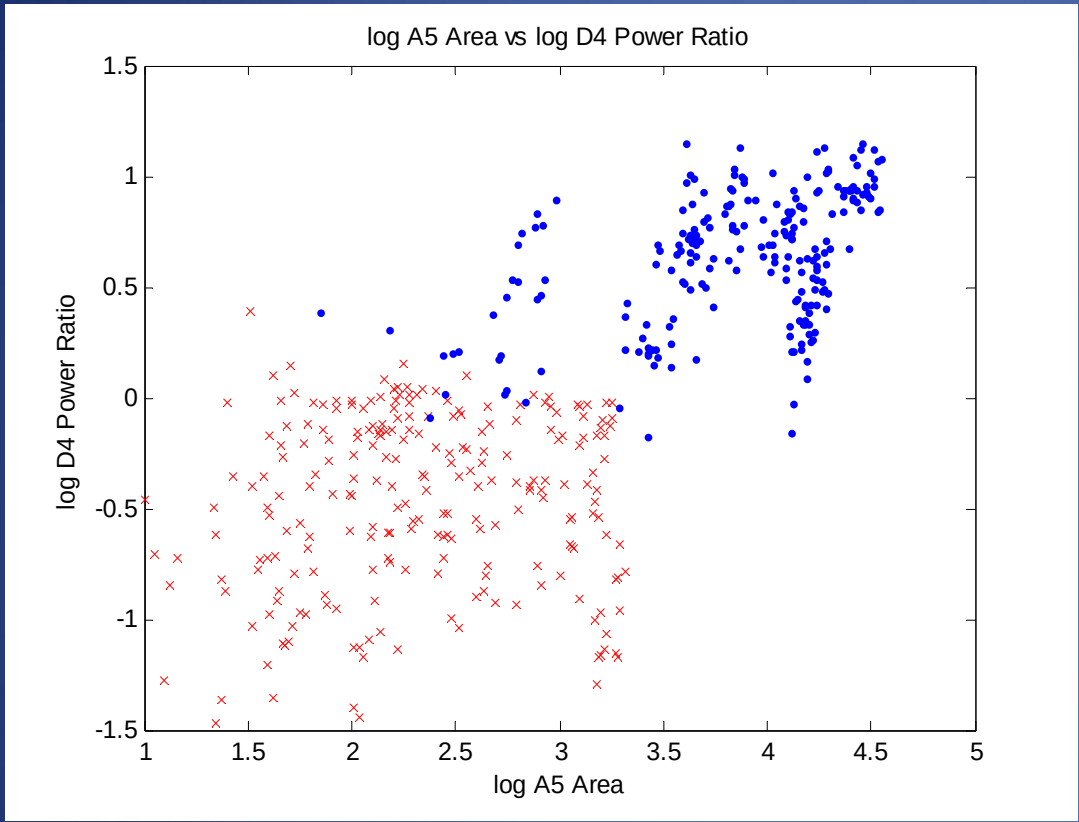
Topic Content

- Current Readiness
- Key Challenges to Implementation
- Benefits of the Technology
- Conclusion
- Future Work

Maturity and Readiness Level

- Portable Area Warning Surveillance System (PAWSS).
  - 1yr Limited Objective Experiment (LOE).
  - Focused on the utility of cascading detection methodologies.
- LOE Outcomes.
  - Demonstration of capabilities within simulated battlefield environments of layered wide area cascading detection.
- Cueing System.
  - Develop a cueing mechanism for expensive sensing technologies like JSLSCAD.

Barriers To Readiness



Picture from GDATP website

Merging the acoustic algorithms with more complex but distance/energy limited sensing technologies to provide notification and cueing.

Benefits to Homeland

Courtesy of www.iir.com

The utilization of acoustics for cueing and notifying more expensive sensing chem/bio sensing technologies will increase situational awareness for first responders reducing exposure and expedite rescues.

Courtesy of www.republicoft.com

Conclusions/Recommendations

- Features extracted facilitate robust classification.
  - Reliable discrimination of CB rounds, 98.3% or greater of single volley events.
- The features this algorithm is based on utilize only acoustic properties.
  - Degradation due to signal attenuation and distortion is nullified and exceeds 3km in range propagation.
- The acoustic signature propagated from the event provide approximate location to the event and if event was CB dissemination event.
  - Isolating the details of higher oscillatory components.
- Real time verification at PAWSS LOE of CBRN Discrimination Program Implemented in C++.
  - Airburst discrimination in real time for all variants was 100%.
- Implementing the algorithms with an array provide added situational awareness for first responders in advent of potential CB attacks.
  - Utilizing TDOA algorithms and acoustic propagation properties to provide cueing capabilities to more expensive limited sensing technologies.
- Future Considerations.
  - C4 initiated releases and providing cueing information to a JSLSCAD in September 2007.