SORMA West 2016

Report of Contributions

Contribution ID: **0** Type: **not specified**

1A-1: Welcome and Opening Remarks

Monday, 23 May 2016 08:45 (30 minutes)

Welcome to SORMA West 2016
Focus on National & Homeland Security
Clark Kerr Campus at University of California at Berkeley
Social Events
Invited Speakers

Presenter: Dr VALENTINE, John (LBNL)

Session Classification: Session 1A: Opening Plenary I

Contribution ID: **1** Type: **not specified**

1A-2: Glenn F. Knoll Memorial Lecture: Radiation Measurements - Concepts and Misconceptions

Monday, 23 May 2016 09:15 (45 minutes)

The salient characteristic of radiation measurements is the discrete nature of the measured substance. The radiation manifests itself as energetic quanta that are emitted and interact with the radiation detectors randomly in time. In addition, the radiation measurement signals are always subject to statistical fluctuations due to the nature of the radiation-matter interactions and the detector signal generation.

Various concepts address the challenges presented by the amplitude and the temporal randomness associated with the radiation measurements. These concepts are often associated with other science and engineering fields such as electronics, physics, chemistry, mechanical engineering and others. The measurement concepts in general are dynamic - new ones are often created, old ones are forgotten, some are improved and some are resurrected. With these dynamics come misconceptions - some less profound, some with a more lasting and perhaps noticeable impact.

In this presentation we are analyzing few of these concept-misconception relationships. They can be very simple - for example, the concept of counting rates, random in nature, and the misconception of using the deterministic frequency measurement unit Hz. The more complex concept-misconception controversy is associated with the concept of analytical spectroscopy performance and the misconception that it can be maintained at any counting rate using adaptive pulse processing. Other concept-misconception topics are also presented in view of a generalized model of radiation measurement systems.

Presenter: JORDANOV, Valentin T. (labZY, Santa Fe, NM, USA)

Session Classification: Session 1A: Opening Plenary I

Contribution ID: **2** Type: **not specified**

1B-1, Radiation Detection Development and Procurement Opportunities at DOD

Monday, 23 May 2016 10:30 (20 minutes)

A short overview of the Joint Product Manager for Radiological and Nuclear Defense (JPM-RND) will precede a summary of the current and future radiation detection development and procurement programs at JPM-RND. Current and future programs for JPM-RND include RADIAC survey equipment, dosimetry, and detectors focused on special nuclear material (SNM) search. Additionally, opportunities for proposal submission for the various programs to include the upcoming Joint Enterprise Research, Development, Acquisition and Production/Procurement (JE-RDAP) will be summarized. Finally, the linkages between technology developers such as DTRA and other Government agencies such as DNDO and DOE will be described as well as examples of procurement coordination between various relevant governmental entities.

Presenter: NOVIKOV, Valentin (JPEO-CBD)

Session Classification: Opening Plenary II

Contribution ID: **3** Type: **not specified**

1B-2, DNDO ATDs - Past, Present, and Future

Monday, 23 May 2016 10:50 (30 minutes)

Presenter: RYNES, Joel (Domestic Nuclear Detection Office)

Session Classification: Opening Plenary II

Contribution ID: **4** Type: **not specified**

1B-3, Technology Development and the Need for Realistic Testing under Realistic Conditions

Monday, 23 May 2016 11:20 (20 minutes)

In support of, and through funding from, DNDO, we have developed a capability to simulate the key operational environment for the detection of nuclear material under a wide variety of simulated real world conditions. Additionally, the ability to collect data from prototype systems and to analyze the data collected in such a way that performance information can be fed back to the vendors has proven critical in the advancement of these technologies.

The rigor applied to testing at DNDO includes the ability to explore real and simulated threat objects, operational conditions such as conveyances and contents (e.g., cargo) of conveyances, more controlled test condition such as ANSI standard benchmarks, and a Data Collection, and Analysis and Management (DCAMS) software system that insures documentation, quality control and quick turn-around of results. The DCAMS has been used in a variety of ways from very formal double blind testing to informal investigations of many settings and system thresholds during the later stages of system development.

DNDO has created methods of reusing data collected to stimulate algorithm improvements by sequestering portions of the data and releasing to the developer other portions of the data for improving results. This replay of the data has been shown to be effective in improving system capability.

In this presentation, we will describe the complexity and robustness of the TAR Technology Demonstration and Characterization campaigns as well as present the opportunities for simulating operational environments.

This work has been supported by the US Department of Homeland Security, Domestic Nuclear Detection Office, under competitively awarded contract/IAA HSHQDC-16-D-00003. This support does not constitute an express or implied endorsement on the part of the Government.

Presenter: CASSIDY, Tom (Sensor Concepts & Applications, Inc.)

Session Classification: Opening Plenary II

Contribution ID: **5** Type: **not specified**

1C-1, Towards Implementation of Large Scale Context-Sensitive Mobile Standoff Radiation Detection Systems

Monday, 23 May 2016 13:30 (30 minutes)

Over the past decade, the Domestic Nuclear Detection Office (DNDO) has sponsored technology development within the grand challenge topic area of Wide Area Monitoring and Search (WAMS). These research & development activities are intended to fill technological gaps within the operational mission space to confidently clear an area or venue of, or actively search for, the presence of radiological and nuclear threats. Standoff radiation detection, in this context, is the ability of a system to detect, identify, and locate a source of radiation at a distance consistent with a given set of concepts of operation.

As opposed to portal-based systems that remain static with tight controls of the placement and dwell time of the inspection item, mobile standoff systems are assumed to operate in highly variable conditions encountered within urban landscapes with little or no previous knowledge of the environment. With the additional requirement of providing both identification and localization at ranges up to 100 meters, scientists and engineers within the national laboratories and industry began a number of R&D efforts to propel the technology forward.

The trajectory of development since the attacks of 9/11 through today trace the early extensions of portal technologies to mobile platforms, to the development of advanced gamma-ray imaging based systems, and finally to the integration of multi-sensor, contextually aware systems. At all phases of this development, funding, and characterization efforts under DNDO Advanced Technological Demonstration programs have provided the required knowledge in performance trades that have propelled the technology towards implementation.

The Mobile Urban Radiation Search (MURS) ATD project, currently being developed and tested with end-users, is the culmination of these characterization efforts and integrates successful concepts to provide design specifications for a commercial product. This talk will review these efforts to develop advanced mobile detection systems starting from the early incarnations of mobile spectroscopic systems to today's networked and contextually aware systems.

This work has been supported by the US Department of Homeland Security, Domestic Nuclear Detection Office, under contract HSHQDC-14-X-00197. This support does not constitute an express or implied endorsement on the part of the Government.

Presenter: CHIVERS, Dan (Berkeley Applied Analytics LLC, Berkeley, CA, USA, and LBNL)

Session Classification: Session 1C: Passive Detection in Wide-Area Search and Cluttered Environments Plenary

Contribution ID: **6** Type: **not specified**

1C-2, Development and Characterization of the Airborne Radiological Enhanced-sensor System

Monday, 23 May 2016 14:00 (30 minutes)

The Airborne Radiological Enhanced-sensor System (ARES) Advanced Technology Demonstration (ATD) strives to improve capabilities to detect, localize, track, and identify illicit radiological and/or nuclear material in airborne search scenarios. The Transformational and Applied Research (TAR) Directorate in the Domestic Nuclear Detection Office (DNDO) contracted Lawrence Berkeley National Laboratory (LBNL) to perform a study to identify potential technologies that could be transformational when applied to gamma-ray detection from an aerial platform. Based mostly on benchmarked modeling, this study quantified the adverse impacts that real complexities such as changing topography and varying helicopter orientation have on the detection and localization performance of existing airborne detection systems, helping to inform the scope of the ATD program. The study identified improved energy resolution and imaging capabilities - particularly in the dimension perpendicular to the path of the platform - as desirable detector system improvements. This study also suggested that focus on contextual data such as the digitized topography and the material composition of the geographic and man-made features encountered during measurements; better knowledge of the position and orientation of the detector system; and the ability to track targets could be potentially impactful. To fully realize the performance gains that could be achieved from fusing data, more advanced algorithms are required. Under the ATD, performers were contracted to conduct research and development under two separate areas, referred to as Topics 1 and 2. Topic 1 involved the production of an advanced prototype detector system based on the implementation of mature technologies that would be fielded on the Bell 412 helicopter platform and would generate both the radiation and the contextual data. The Topic 2 teams were responsible for developing advanced algorithms to better utilize the information within the data streams generated by Topic 1. To date, approximately 100 hours of flight data have been collected over a variety of topologies. The final ~60 flight hours featured the fully operational ARES sensor package. A portion of the collected data was provided to the Topic 2 teams to facilitate algorithm development, while the remainder is being used to test and quantify system performance. Due to the practical limitations preventing placing radiological sources in the public, the majority of the characterization relies upon experimentally-validated source injection performed offline using a data replay tool. This offline approach results in the creation of an extensive data set that could provide additional value in the future, and enables a more systematic approach to characterization. Through this ATD, TAR will gain a comprehensive understanding of the state and potential of available aerial radiation detection technologies as well as the impact that the various contextual data streams have on detection and localization of radiological threats.

Presenter: QUITER, Brian (LBNL)

Session Classification: Session 1C: Passive Detection in Wide-Area Search and Cluttered Environments Plenary

Contribution ID: **7** Type: **not specified**

1C-3, Radiation Awareness and Interdiction Network (RAIN) Advanced Technology Demonstration

Monday, 23 May 2016 14:30 (30 minutes)

RAIN is a U.S. Department of Homeland Security (DHS) Domestic Nuclear Detection Office (DNDO) Advanced Technology Demonstration (ATD) to detect vehicle or cargo borne radiological or nuclear threats when traveling up to highway speeds. The approaches feature integration of radiation detectors, image capture systems, automated analysis, and communications intended to provide a highly sensitive and cost-effective capability. Specifically the ATD seeks to demonstrate the ability to:

• Detect radioactive sources in vehicles or conveyances moving at highway speeds as they approach or depart a region;

• Discriminate between benign sources of radiation, such as medical patients and naturally occurring radioactive materials, and potential threat sources which could be used in a radiological dispersal or nuclear device;

• Identify the vehicle or a small set of suspect vehicles carrying the radioactive material or device; and

• Transmit timely and actionable information, such as vehicle license plate data and radiation sensor alarms, to a law enforcement operations center to support threat interdiction.

Presenter: WROBEL, Mark (Domestic Nuclear Detection Office)

Session Classification: Session 1C: Passive Detection in Wide-Area Search and Cluttered Environments Plenary

Contribution ID: **8** Type: **not specified**

1C-4, Passive Detection in Wide-Area Search and Cluttered Environments Path Forward

Monday, 23 May 2016 15:00 (20 minutes)

For the past 10 years the U.S. Department of Homeland Security (DHS) Domestic Nuclear Detection Office's (DNDO) Transformational and Applied Research (TAR) Directorate has been developing and testing technologies to improve the technical ability to detect, identify, and localize illicit radiological and nuclear materials from transformational stand-off distances. Looking to the future, DNDO TAR is increasingly engaging with the end-user community to marry past transformational developments, with operational objectives and constraints. DNDO TAR is also working with innovators outside of the radiation detection community to leverage developments in environmental sensing and automation in order to enhance detection capability and operational utility. The path forward at DNDO TAR will focus on enhanced detection through operational environment characterization and associated noise compensation, with an iterative development approach that incorporates real-world technical development and user requirements.

Presenter: CRONK, Kevin (Domestic Nuclear Detection Office)

Session Classification: Session 1C: Passive Detection in Wide-Area Search and Cluttered Environments Plenary