

Opportunity Title: A new approach to measuring moving vehicles carrying radioactive materials

Opportunity Reference Code: IC-16-02

Organization Office of the Director of National Intelligence (ODNI)

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How to Apply **Create and release your Profile on Zintellect** – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Application Deadline 4/15/2016 6:00:00 PM Eastern Time Zone

Description Measuring nuclear material such as medical waste, or spent fuel rods as they are being transported in vehicles is an extremely difficult challenge. The materials of most interest are often in configurations that do not produce a lot of emissions. The vehicles can range from small passenger cars to very large trucks, and they can be moving at considerable distances from the sensors (potentially more than 50 m away). The challenge is not just to detect the nuclear material, but to measure the characteristics of the material including its chemical and isotopic composition, surrounding shielding materials, size and mass; while also measuring the speed, direction, and other characterizations of the vehicle itself. As with virtually anything, Size Weight and Power (SWaP) are always a consideration.

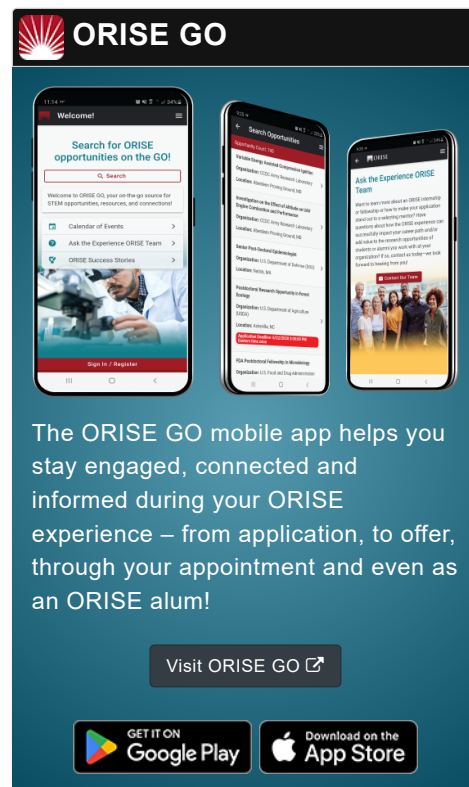
Example Approaches

There are different ways that this research can be approached. One option could be:

- Address the different modalities used, and how the information will be used collectively to address the problem. A breadboard system could be constructed and a measurement campaign conducted under a range of different conditions. Sensor fusion, data fusion, and other analysis algorithms could be developed into software that can be applied to the measurements, as well as extensions of the measurements obtained by injecting signatures of interest into the measured samples.

Whatever your approach, proposals should also consider one or more of the following questions:

- A medical waste or active radioactive isotope has not arrived at its destination. Is there a system that could be



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emplaced along major transportation routes that could aid law enforcement in finding the material?

- Distributed arrays of sensor systems may be able to increase the total system sensitivity while keeping the size and weight of each component reasonable. A methodology must be included to fuse the data to provide a real boost in sensitivity without increasing the false alarm rate.
- Many sensors can detect the presence of a vehicle nearby. What sensor, or combination of sensors can also determine the range, speed, and bearing of the vehicle at all times?
- Are there methods to configure the complex analysis algorithms into software that can run with much less computational power?

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Academic Level(s):** Postdoctoral.
- **Discipline(s):**
 - **Business** (11 )
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (6 )
 - **Computer, Information, and Data Sciences** (16 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (45 )
 - **Mathematics and Statistics** (10 )
 - **Other Non-Science & Engineering** (13 )
 - **Physics** (16 )
 - **Science & Engineering-related** (1 )
 - **Social and Behavioral Sciences** (28 )