Opportunity Title: Detection and Characterization of Tunnels and Underground Facilities
Opportunity Reference Code: IC-16-01

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 The goal of this research effort is to advance the state of the art in the detection and characterization of underground structures and volumes. It is well known that imagery and geospatial analysis can be used to detect and characterize these structures. Progress has been made at developing advanced geospatial algorithms to integrate multiple data sources to improve the likelihood of detection and the level of detail for characterization.

The principle aim of this research is to discover new data sources and methods to integrate with proven solutions to improve the detection and characterization of underground structures. Attention should be placed on exploring data processing algorithms, machine learning models, and data fusion methods for forecasting, discovery, characterization, and verification. Methods could include exploring suitability modeling, volumetric analysis, detection automation, innovative signatures, and gravity gradiometry.

Example Approaches

A successful proposal should address one or more of the following questions or goals:

- Suitability modeling to identify optimal site locations for underground structures using factors such as terrain characterization, lithology, geomorphology, land cover, and required infrastructure.
- Improve methods for tunnel and underground structure characterization by optimizing volumetric analysis based on displaced rock and sediment.
- Improve methods for structural characterization including likely depth, volume, orientation, and configuration using interpolation models that incorporate terrain, lithology, geomorphology, and hydrologic features.
- Automate construction detection to increase the likelihood of discovery during the construction phase when surface signatures are most

prevalent.

- Explore new signatures and signature detection methods for identifying materials and activities which are more likely associated with underground structures.
- Explore gravitational signatures to discern gravity field anomalies which could indicate potential spatial changes in the local distribution of mass due to voids or high density materials associated with tunnels and underground structures.
- Explore methods to create structural, electronic, or augmented terrain barriers that could provide early warning capabilities if breached by tunneling or underground structure construction activities.

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **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)