Opportunity Title: Application of sensing networks for situational awareness and early detection of threats
Opportunity Reference Code: ICPD-2019-22

Organization Office of the Director of National Intelligence (ODNI)

Reference Code ICPD-2019-22

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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.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: https://orise.orau.gov/icpostdoc/index.html.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 3/1/2019 6:00:00 PM Eastern Time Zone

Description **Research Topic Description, including Problem Statement:**

- Depending upon the situation or circumstances to be monitored, sensors will require to be deployed and remain in situ for periods of time, providing data to a central point. These sensors will enable decisions to be made that can mitigate threats. These sensing networks could be a simply as an intrusion detection system around a perimeter or inside a building, but these often require installation and routine maintenance. Furthermore, the location is often known well in advance and the logistics are carefully planned.
- There may be incidents where there could be threats to buildings or open spaces due to changing local dynamics. To effectively monitor the situation, it would be advantageous to deploy sensors to monitor the environment, such as Unmanned Aerial Vehicles (UAVs). However, UAVs have their challenges: size, payload, power, visibility. Therefore, what types of tools and techniques could we employ in the future that would enable us to: rapidly deploy sensors, that navigate to a location, remain in that location, source power in that location, transmit information to a control centre and remain discreet? The potential application and benefit for this is extensive: for example, monitoring construction sites overseas, monitor complex buildings, detect environmental conditions or detect the presence of CBRN (Chemical, Biological, Radiological and Nuclear) material or improve security in a wide range of scenarios such as following a major incident, without disrupting people going about their day to day business or creating more distress in circumstances where there has been a major incident.

Example Approaches:

- The use of unmanned aerial vehicle technology to enhance situational awareness is well known and widely employed in a range of scenarios and is merely a platform for other sensors to gather information. There is evidence of sensors placed *in situ* to monitor oil and gas pipelines over large distance to enable disruption of supply detection, sabotage or indicate a maintenance issue. These sensors can similarly self-repair as they operate in challenging

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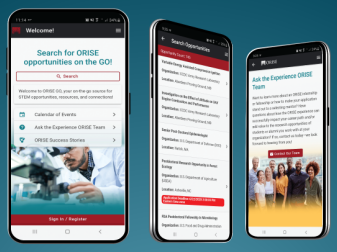
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environments in extreme temperatures. However, the challenge remains that these networks of sensors are often pre-planned installations. There is still a gap, to rapidly deploy small sensing networks which can monitor the environment, and then be removed without causing any disruption. This capability gap, could help many different sectors.

Key Words:

Autonomous platforms; power conservation; power sources; live data; intelligent sensors.

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program.

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
  - **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** (5 👁)
  - **Physics** (16 👁)
  - **Science & Engineering-related** (1 👁)
  - **Social and Behavioral Sciences** (28 👁)