

Opportunity Title: Data Fusion and Deep Learning to Detect, Track, and Identify Global Maritime Traffic
Opportunity Reference Code: IC-18-31

Organization Office of the Director of National Intelligence (ODNI)

Reference Code IC-18-31

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.


Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: <https://orau.org/icpostdoc/>.

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

Application Deadline 3/12/2018 11:59:00 PM Eastern Time Zone

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

- With the advent of swarms of small commercial satellites (e.g., www.planet.com and www.urthecast.com) comes the possibility of much greater persistence over the open ocean. Making sense of this wealth of new data will require insight into the best approaches to process the data as well as methods to put it together to form a high confidence view of maritime activity. This effort will require the combination of disparate sources of information. More importantly, given the near-term goal of daily global coverage by constellations of commercial satellites, advanced data science methods can be called upon to build a succinct and nearly complete picture of vessel traffic.
- The fundamental problem is the making sense and analysis of sometimes contradicting information fused from different sources. This will likely rely on building and maintaining quality assessments of the disparate sources of information and using them to work towards a higher confidence conclusion regarding the operational picture of the maritime environment. Expediency is an important issue of this problem. It is one thing to understand seasonal patterns of where fishing activity takes place, it is quite another to be able to relay in near-real time the current maritime traffic

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situation to a US Navy/Coast Guard aircraft or vessel which needs to decide how to proceed in order to be most effective. Rapidly making sense of all available information to produce and disseminate a high-confidence representation of vessel identification, position, and tracking attributes will greatly assist in the day-to-day the operations of the US Navy.

Example Approaches:

- Apply image processing techniques to remotely sensed open ocean imagery (e.g., Panchromatic, Multi-spectral, Synthetic Aperture Radar) to detect and classify ships (i.e., position, size, heading, color).
- Cull position and heading information from the vessel's Automatic Identification System (AIS) transponder. This data is available from many web-based services (e.g. www.marinetraffic.com). Many of the new commercial small satellites will include an AIS antenna and it is expected that this new capability will greatly increase the completeness of global maritime awareness.
- Intelligent fusion of these data sources might include the extrapolation forward in time from the AIS information to the vessel's expected position in overhead imagery collection.
- Likewise, the detection of a vessel in an overhead image could be correlated to past knowledge of vessels in the vicinity that were transponding their position, speed, and heading information.
- Physical characteristics of vessels (i.e., size and color) could be used as additional features to assist in building confidence in the correlation between data sources.

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

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- 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 )