Opportunity Title: Developing Pattern-of-Life Analysis & Predicting Future Locations Using Open-Source Locational Data
Opportunity Reference Code: ICPD-2021-24

Organization	Office of the Director of National Intelligence (ODNI)	

OAK RIDGE INSTITUTE
FOR SCIENCE AND EDUCATION

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Application Deadline 2/26/2021 6:00:00 PM Eastern Time Zone

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

Automatic Identification Systems (AIS) provide near-real-time geolocation of maritime vessels in shipping lanes and can be viewed from across the globe through the use of applications on a phone or an internet browser. Automatic Dependent Surveillance—Broadcast (ADS-B) provides a similar level of data for aircraft—including altitude, speed, and heading—all available in open source reporting. The aim of this project is to determine how this information could be used to accurately track and predict transportation activity in real time or near real time.
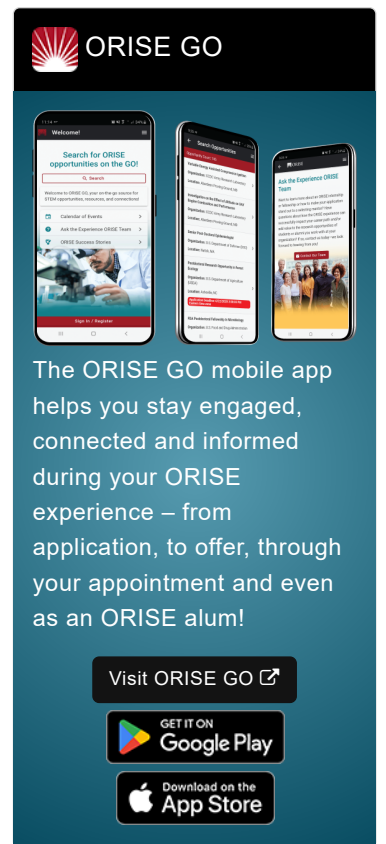
Key Questions

- How accurately does this data represent the true positioning of commercial vessels?
- What types of algorithms could be used to distinguish signals and track the movement of these vessels over time for pattern-of-life-analysis?
- What other signals might AIS/ADS-B be combined with to provide more accurate geolocational data?
- What other systems can be combined with AIS/ADS-B to identify or track transportation vehicles in real time (cameras with image recognition, infrared tracking, predicting movement based on weather)?

Example Approaches:

This project should leverage all available open-source data and other transmitted information sources, machine learning and "big data" techniques to analyze whether and how open-source information could be used to accurately depict patterns-of-life for commercial air and maritime transport and possibly predict where and when they are likely to show up again.

Relevance to the Intelligence Community:

A successful project will develop models for predicting commercial transportation movement as well as providing a foundational understanding of the capabilities of AIS/ADS-B transceivers and their use for a global audience, enabling a wide range of Intelligence Community activities, such as helping law enforcement track illicit market trading routes or identifying locations that are more

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susceptible to terrorist attacks.

Key Words: Transportation, Shipping, Maritime, Aviation, Signals, Machine Learning, Big Data
Analytics, Scraping, Geospatial Analysis, Pattern-of-life, Automatic Identification Systems, AIS,
Automatic Dependent Surveillance—Broadcast, ADS-B, Illicit Market, Trade Routes

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** (2 👁)
  - **Computer, Information, and Data Sciences** (17 👁)
  - **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** (2 👁)
  - **Physics** (16 👁)
  - **Science & Engineering-related** (1 👁)
  - **Social and Behavioral Sciences** (27 👁)