Opportunity Title: Predicting the Unpredictable: Can you Predict Drone Intent?
Opportunity Reference Code: ICPD-2021-54

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.

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

Description

Research Topic Description, including Problem Statement:

This research will increase the understanding of predictive drone behaviors.

The unmanned aircraft (colloquially "drone") industry is rapidly developing and has the potential to dramatically impact the United States in a positive way. Drones are being used to deliver medical supplies to remote islands during Covid-19, support emergency services, and for leisure activity.

As drone systems become larger and more capable, their potential broadens too. Drones will be critical to shaping the future of urban mobility, revolutionizing commercial operations and how we perceive and utilize airspace. Drones have already proven to be incredibly versatile additions to commercial enterprises. According to a Price Waterhouse Coopers forecast, the drone industry will contribute an extra $56.7 billion to the British economy by 2030, making up 1.9 percent of British GDP and supporting more than 600,000 jobs in the drones economy.

Artificial Intelligence (AI) probably will be used in the management of a future Unmanned Traffic Management (UTM) system, and in the identification of malicious or illegal drones. The largest advantage AI provides drones will be AI's ability to make decisions to achieve autonomous flight. The next generation of drones will be able to complete many complex functions that now require a pilot and crew. AI will allow for multiple drones to cooperate and coordinate in a swarm as a single, semiautonomous system. Many applications could benefit from the use of swarms. For example, a search-and-rescue swarm might permit more efficient searching in a complex environment, not only by covering a larger area quicker, but by combining sensor data. However, with autonomous drones comes greater challenge and the need for more advanced counter-drone technologies to detect, track, identify, and disrupt drones.

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This research topic addresses the challenge of using data sets to distinguish between ‘normal’ and ‘anomalous’ drone behavior; drones working in silo or as part of an autonomous swarm; and drones being controlled by a real person or by AI. As our skies become busier and drone use increases, it is critical that we learn to distinguish between normal, negligent, and malicious drone use to safeguard the widespread benefits drones can bring and to effectively mitigate the threat.

This research topic explores the concept of predicting drone intent by analyzing data sets and previous drone behavior. Can we identify and create a signature library of predictive behaviors to accurately predict future drone behavior and hostile intent? This understanding and predictive ability would inform effective operational response and threat prioritization.

Example Approaches:

Part of this research topic will require a data science understanding of drone patterns of life; a possible approach may include:

- Collation and analysis of existing research and known drone data sets, including alignment with international partners.
- Distinguishing between what is normal drone behavior and what is an anomaly.
- Distinguishing between normal, negligent, and malicious drone behaviors.
- Distinguishing how or who is controlling a drone:
    - Is it a real person?
    - Is it autonomous?
        - There will be various levels to explore in this part, including a set of waypoints up to full AI.
        - Exploration of whether the drone is interacting with other drones in a type of swarm (these will vary in complexity).
- Explore whether there are signs a drone is working in a swarm flying or working in silo.
- Explore how to track drone swarm behavior and then identify predictive behaviors.
- Explore smart swarms and their predictive behavior.
- Develop a tool to identify drone patterns and use AI to predict, inform, and assess future drone behavior intent.
- Explore the possibility of feeding this predictive data into a counter-drone Detect, Track, Identify (DTI) capability to cue a further counter-drone response.

Relevance to the Intelligence Community:

This research topic has significant national security implications and benefits and relevance to the Intelligence Community.

Key Words: Autonomy, Drone, Counter-Drone, Artificial Intelligence, AI, Predictive Behaviors, Patterns, Drone Swarms, Future Aviation, Unmanned Traffic Management

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

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- 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 👁)