

Opportunity Title: Autonomy prospects for commercial unmanned aerial systems

Opportunity Reference Code: IC-18-32

Organization Office of the Director of National Intelligence (ODNI)

Reference Code IC-18-32

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:

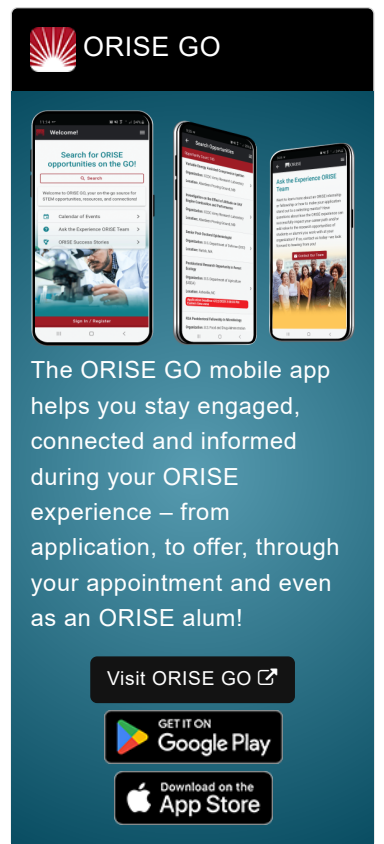
<https://orau.org/icpostdoc/>.

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:**


- Many futurists are forecasting that UAS swarms will pose a threat on the battlefield within 15 years given the convergence of innovations in robotics, sensor and data fusion, additive manufacturing, and software algorithms. Perhaps the biggest obstacle is software algorithms behind intelligent control systems (ICS) that allow a drone or group of drones to perceive its environment, learn, and adapt. The most likely source for major advances in autonomy algorithms will originate from artificial intelligence shops in commercial companies such as Amazon, Google, and Baidu. We need to understand what the near term signposts and indicators are (within 5-10 years) that we should track to more accurately forecast when fully autonomous commercial drones will become available to hostile non-state adversaries. What artificial intelligence (AI) techniques hold the most promise for mature autonomy algorithms?
- Although it is difficult to disentangle the many mutually reinforcing technologies that would enable UAS autonomous systems (e.g., power constraints, sensors, flight control technology), we would ask the researcher to try and focus on autonomy algorithms that support UAS deployment to destroy ground targets. If other key developments must occur in other technological areas, then note those milestones and make appropriate and transparent assumptions to support your analysis of algorithm development.




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Example Approaches:

Research could examine one or more of the following questions:

- How to determine when new commercial advances in swarm intelligence, inter-UAS communications, and human-to-system interaction will culminate in mature autonomy algorithms?
- How to determine which new deep learning techniques using neural networks might push flight control algorithms beyond a narrow AI approach to multitask learning, transfer learning, or even a more generalized AI flight control algorithm?
- How to determine if machine learning techniques, using only a small amount of training data or no data, can achieve high levels of algorithm performance for UAS applications? For example, in October 2017 Goggle's DeepMind shop announced a new AI program, Alpha Go Zero, that used self-learning without human interaction and no data to simply apply the rules of GO and play itself millions of times to defeat AlphaGo which recently defeated the best human player.
- Forecast likely future outcomes using a structured analytical technique like Alternative Futures Analysis. Identify the main technological drivers to track over time, combine them to create relevant and likely future scenarios, and identify the indicators or metrics associated with those drivers. What are the implications for each future scenario? Is it possible to assess or forecast a rough timeline for significant milestones towards mature autonomy algorithms that have military application? Will autonomy advances for commercial world applications (e.g., oil pipeline inspection, humanitarian disaster relief, wildfire detection, etc) only have limited benefit for military applications?

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](#)👁)

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- **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](#) )