Opportunity Title: Unconventional distributed sensor optimization and integration for robust agile flight control
Opportunity Reference Code: IC-18-08

Organization	Office of the Director of National Intelligence (ODNI)
Reference Code	IC-18-08
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:** • Studies of insects, birds, and bats demonstrate their exceptionally robust flight agility and maneuverability, and suggest that this performance is based upon their use of numerous sensory modalities that we typically do not exploit in current engineered aerial vehicles. Recent advances in sensor and sensor processing technologies motivate consideration of the possibility of using unconventional sensor arrays for efficient robust agile flight control. However, an information and control theoretic framework does not exist for optimizing distributed multi-modal sensor configurations for generating robust, high performance controllers for the coupled high-order and rigid body dynamics of such sensor-rich, agile vehicle concepts. **Example Approaches:** • An approach could encompass clearly tying a vehicle mission and operational environment to an animal or insect of similar size that is reasonably present in the urban area. For instance, a large vehicle focused on efficiently operating with long loiter time in uncontested airspace above a metropolitan area might seek to leverage birds that fly with minimal energy expenditure. Conversely, a small recoverable vehicle for in-building mapping just ahead of an advancing team may be better approximated with an insect. • Outside building Intelligence, Surveillance, and Reconnaissance (ISR) mission considerations include investigating urban canyon approach, building inspection, hazard identification, and entry point assessment. Internal to buildings, the research could indicate lightweight sensor trade-offs for autonomous in-building ISR and mapping, without GPS, of unknown interiors of structures including low/no light conditions. • Developing cooperative communication packages linking a secure, distributed vehicle sensor network could be a novel approach. Overcoming temporary or permanent losses of vehicle sensor nodes could demonstrate the robustness of the vehicle network or swarm. An approach might be to prioritize internal vehicle energy distribution algorithms during lower power states to maximize sensor network effectiveness until platform replacement is possible.

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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 👁)