

Opportunity Title: Flapping Wing Micro Aerial Vehicles (MAVs) for Remote Sensing

Opportunity Reference Code: ICPD-2023-40

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.ora.gov/icpostdoc/index.html>.

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

Application Deadline 2/28/2023 6:00:00 PM Eastern Time Zone

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

Flapping wing Micro Aerial Vehicles (MAVs) – un-crewed aerial vehicles inspired by birds, bats or insects that use flapping propulsion – have not yet reached their potential as remote sensing platforms. They have potential to be as small as insects, enter confined or covered spaces, perch and loiter, display high maneuverability and stealth, achieve better energy efficiency, mimic insects with much greater fidelity, be carried by people or other aerial vehicles, safely fly overhead in public spaces, and provide sufficient payload capacity for multiple miniaturized sensors. This research topic aims to combine several basic research challenges to move towards production of insect-sized, flapping-wing MAVs capable of efficient, sustained, controlled and untethered flight outdoors. Challenges include:

- Designs inspired by insect dynamics and morphology
- Development of soft, flexible artificial muscles that are more responsive, compact and lightweight than traditional actuators
- Computational modelling of fluid-structure interaction and stimuli-responsive materials
- Test, validation and calibration of modelling using 3D-printed prototypes
- Integration of miniaturized batteries, electronics, control, communications and sensors

Example Approaches:



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Example approaches include those that seek to:

- Produce designs that draw on inspiration from the dynamics and morphology of insects using motion tracking environments and facilities for high-resolution imaging
- Develop controllable, soft actuators using material characterization and computational modelling expertise and facilities
- Test, validate and calibrate modelling using 3D printing facilities, prototyping and testing facilities
- Integrate state-of-the-art miniaturized components using electrical, mechanical and aerospace engineering expertise and facilities

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

Key Words: Soft Robotics, Aerospace Engineering, Flapping Wing Vehicles, Nano Uncrewed Aerial System, Micro Aerial Vehicle.

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** (17 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (48 )
 - **Mathematics and Statistics** (11 )
 - **Other Non-Science & Engineering** (2 )
 - **Physics** (16 )
 - **Science & Engineering-related** (1 )
 - **Social and Behavioral Sciences** (29 )