

Opportunity Title: Dynamic Simulation, Validation, and Aeromechanics Analysis of Novel UAS Concepts

Opportunity Reference Code: ARL-R-WMRD-300136-WS

Organization DEVCOM Army Research Laboratory

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Description About the Research

This project involves aeromechanics research and development in support of real-time dynamic modeling and simulation of small to mid-scale autonomous Unmanned Aerial Systems (UAS). The work typically involves implementation, validation, and application of first-principles methods for rotor mechanics to capture static and dynamic response, power requirements, handling qualities, and additional parameters of interest for novel UAS configurations. Focus areas will include steady level typical flight regimes in addition to less understood regimes including ground effect, aerodynamic interaction, aggressive maneuvering, and transitioning flight. Research goals could also incorporate machine learning or empirical corrections based on system identification and/or sub-system experimentation to improve simulation results, as well as making improvements to the code for computational efficiency gains.

ARL Advisor: Jean-Paul Reddinger

ARL Advisor Email: jean-paul.f.reddinger.civ@army.mil

About Army Research Directorate (ARD)

ARL's Army Research Directorate (ARD) focuses on exploiting concept development, discovery, technology development, and transition of the most promising disruptive science and technology to deliver to the Army fundamentally advantageous science-based capabilities through laboratory's 11 research competencies. This intramural research directorate also manages the laboratory's essential research programs, which are flagship research efforts focused on delivering defined outcomes.

About Weapon Sciences (WS)

Internal, transitional, and external ballistics; launch, flight, control, and navigation of guided weapons and aerial systems; development of novel weapon concepts.

About ARL-RAP

The [Army Research Laboratory Research Associateship Program](#) (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal



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processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
 - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
 - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
 - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research
- References of published efforts may be used to improve the proposal

A link to upload the proposal will be provided to the applicant once the advisor has made their selection.

Questions about this opportunity? Please email

ARLFellowship@ora.u.org.

Point of Contact [ARL-RAP](#)

- Eligibility Requirements**
- **Citizenship:** U.S. Citizen Only
 - **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree.
 - **Academic Level(s):** Any academic level.
 - **Discipline(s):**
 - **Computer, Information, and Data Sciences** ([17](#))
 - **Engineering** ([2](#))
 - **Age:** Must be 18 years of age