

Alex Baowend Soom M. A. Zongo

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RESEARCH INTERESTS

Multi-agent reinforcement learning and large language vision models for safety-critical autonomous systems, with applications to air traffic control and advanced air mobility. Current research focuses on robust aircraft conflict resolution under uncertainty, generative AI for safety critical control and aircraft separation assurance, eVTOL aircraft energy estimation and energy efficient tactical deconfliction.

EDUCATION

Ph.D. in Mechanical and Aerospace Engineering

George Washington University, School of Engineering and Applied Sciences

Advisor: Dr. Peng Wei — Research: *Multi-Agent Reinforcement Learning, Large Language Vision Models, Flight Control, Optimization*

August 2024 – Present

Washington, DC, USA

GPA: 3.91/4.0

M.S. in Control Sciences and Engineering

Tsinghua University, Department of Automation,

Advisor: Prof. Qing Li — Research: *Reinforcement Learning, and Flight Dynamics and Control*

September 2021 – May 2024

Beijing, China

GPA: 3.81/4.0

Machine Learning Summer School

University of Oxford

June 2022 – August 2022

Oxford, United Kingdom

B.S. in Aircraft Design and Engineering

Beijing University of Aeronautics and Astronautics, Department of Aeronautics,

Advisor: Dr. Jidong Wang — Research: *Aircraft Design, Flight Dynamics and Control, Aerodynamics*

September 2018 – June 2021

Beijing, China

GPA: 3.78/4.0

Freshman Year in Aeronautics and Astronautics

National Cheng Kung University

GPA: 4.05/4.3

September 2017 – June 2018

Tainan, Taiwan

PUBLICATIONS

Published

- Sharifi, I., **Zongo, A.**, Wei, P. Published, May 2026
Fine-Tuning Large Language Models for Cooperative Tactical Deconfliction of Small Unmanned Aerial Systems.
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops 2026. [\[DOI\]](#) [\[Preprint\]](#)
- **Zongo, A.**, Wei, P. Published, June 2026
eVTOL Aircraft Energy Consumption Estimation with Conflict Resolution in High-Density Airspaces.
2026 Integrated Communications, Navigation and Surveillance Conference (ICNS), Herndon, VA, USA. (Best in-session paper award) [\[DOI\]](#) [\[Preprint\]](#)
- **Zongo, A.B.**, Li, Q. (2025). Published, March 2025
Towards Intelligent Fault Tolerant Attitude Flight Control Of A Fixed-Wing Aircraft,
In: Yan, L., Duan, H., Deng, Y. (eds) *Advances in Guidance, Navigation and Control*. ICGNC 2024. Lecture Notes in Electrical Engineering, vol 1353. Springer, Singapore. [\[Preprint\]](#) [\[DOI\]](#) [\[Code\]](#)

Accepted

- **Zongo, A.**, Wei, P. Accepted, May 2026
Runtime Safety Filtering for Learned sUAS Separation Policies under GNSS Degradation.
Accepted to the Digital Avionics Systems conference (DASC) 2026. [\[Preprint\]](#)

- **Zongo, A.**, Fotiadis, F., Topcu, U., Wei, P. Accepted, July 2026
Robust MARL for Small UAS Separation Assurance under GPS Degradation and Spoofing.
Accepted to the Conference on Decision and Control (CDC) 2026; and was also presented at the American Control Conference (ACC). [Workshop] [Preprint]
- Pang, Y., Aziz, A., **Zongo, A.**, Wei, P., and Crandall, K. To be published, September 2026
Large Language Model Guided Reinforcement Learning for Maritime Ship Collision Avoidance.
Accepted to presentation at OCEANS 2026 IEEE.
- Ghazanfari, M., Casanova, M., Kam, J., **Zongo, A.**, Wei P., Darrell T., Bayen, A. Accepted, January 2027
Air Traffic Control Using Large Language Models: Prompt Engineering, Architecture, and Evaluation.
Accepted for presentation at SciTech 2027. [Preprint]
- **Zongo, A.**, Ochoa, S., Sun, L., Nguyen, A., Tran S., Wei, P. To be published, January 2027
Regional Air Mobility Operational Energy Assessment Using A Full-Envelope eVTOL Power Model.
Accepted for presentation at SciTech 2027.

TECHNICAL ESSAYS

Zongo, A. (2025). Published, December 2025
Aircraft Traffic Control: Managing Order in a Crowded Sky. Scholarly blog post, archived on [Zenodo](#), and accessible [Online](#).

RESEARCH EXPERIENCE

Visiting Researcher May 2026 – August 2026
CITRIS and the banatao Institute, UC Berkeley

- Support ongoing research on multi-modal aircraft trajectory prediction via ADS-B and ATC-voice communications.
- Advised by Professor [Alexandre Bayen](#) leading [CITRIS and the Banatao Institute]

Graduate Research Assistant September 2024 – Present
Intelligent Aerospace Systems Lab (IASL), George Washington University

- Developing eVTOL aircraft energy consumption prediction with conflict resolution maneuvers for high-density airspaces. Integrated eVTOL aircraft models and energy consumption models into the BlueSky simulator. Designed and customized both learning-based and rule-based conflict resolution algorithms. (NASA University Leadership Initiatives)
- Designing robust multi-agent reinforcement learning framework for aircraft separation assurance under GNSS spoofing and degradation. Introduced an analytical closed-form first order solution using multi-agent value-gradient and dynamic programming to optimally synthesize the control policy under worst-case erroneous/spoofed state observations at each step.
- Developing a simulation-to-language data generation pipeline using BlueSky ATM simulator for fine-tuning Large Language Models on autonomous tactical deconfliction of small UAS, achieving improved decision accuracy and reduced near mid-air collisions through parameter-efficient fine-tuning (LoRA, GRPO).
- Organized the Safe and Responsible AI Workshop (September 2024) with participants from FAA, DOT Highly Automated Systems Safety Center of Excellence (HASS COE), Johns Hopkins APL, MIT Lincoln Labs, TRAILS, NIST AI, and RAIUK.

Research Assistant September 2021 – May 2024
Navigation and Control Lab, Tsinghua University

- Developed intelligent fault-tolerant attitude flight control for fixed-wing aircraft using reinforcement learning, resulting in ICGNC 2024 publication.

Robotics Software Engineer Intern June 2022 – November 2022
Popular Robotics, Beijing, China

- Developed biped robot simulation in Gazebo using ROS/ROS2.
- Designed a curriculum module on gait motion fundamentals, simulation, and control.

TEACHING AND MENTORING

Guest Lecturer

September 2026 – December 2026

George Washington University

- Course: Large Language and Vision Models (MAE 6291), Fall 2026
- Gave a lecture on Diffusion Models

Graduate Teaching Assistant

January 2025 – May 2025

George Washington University

- Course: Linear Systems Dynamics (MAE 3134), Spring 2025
- Conducted recitations, held office hours, graded assignments and examinations

Student Mentoring

Summer 2025 – Present

Intelligent Aerospace Systems Lab, George Washington University

- Mentored an undergraduate student on introductory air traffic management simulations and research using BlueSky simulator (Summer 2025)
- Mentoring a M.S. student research on maritime traffic simulation and multi-agent RL for separation assurance and tactical deconfliction (Fall 2025 – Present)

PROFESSIONAL SERVICE

Journal Reviews

- Journal of Aerospace Information Systems (JAIS)
- Journal of Guidance, Control, and Dynamics
- Journal of Engineering Applications of Artificial Intelligence (EAAI)
- Transportation Research Part C
- Transactions on Aerospace and Electronic Systems
- Transactions on Intelligent Transportation Systems

Conference Reviews

- International Conference on Guidance, Navigation, and Control (ICGNC)
- International Conference on Intelligent Transportation Systems (ITSC)
- Conference on Decision and Control (CDC)

TECHNICAL SKILLS

Programming	Python, Julia, MATLAB/Simulink, C/C++, ROS/ROS2, Ada
ML/AI Libraries	PyTorch, JAX, NumPy, Scikit-Learn, OpenCV
CAD/Simulation	BlueSky ATM, OpenVSP, SolidWorks, CATIA, ANSYS Fluent
Languages	French (native), English (C2), Chinese (B1)

AWARDS AND FELLOWSHIPS

Graduate Research Assistantship

2024 – Present

George Washington University, Fully funded Ph.D. program

Chinese Government Scholarship

2021 – 2024

Tsinghua University, Full funding for Master's program

Chinese Government Scholarship

2018 – 2021

Beijing University of Aeronautics and Astronautics

Outstanding Academic Achievement Award (2019, 2020)

Taiwan Ministry of Foreign Affairs Scholarship

2016 – 2018

National Cheng Kung University & Fu Jen Catholic University

OTHER SELECTED PROJECTS

George Washington University

September 2024 – May 2025

- Visual odometry algorithm implementation on self-recorded datasets
- System identification and nonlinear control for SpaceX Grasshopper dynamics
- Graph algorithm analysis: Jack Edmonds' blossom algorithm implementation

Beijing University of Aeronautics and Astronautics

September 2020 – May 2021

- Flight simulator modeling with MATLAB/Simulink using RCAM model [\[Code\]](#)
- Conceptual design of lightweight sport aircraft and preliminary helicopter design

LEADERSHIP AND SERVICE

Secretary General

May 2022 – May 2024

Tsinghua University African Student Association (THUASA)

- Led cultural activities planning and community engagement initiatives
- Coordinated leadership development programs for international students

R&D Engineer

September 2022 – May 2023

Tsinghua AI International Student Association (TAISA)

- Developed AI solutions for societal challenges as part of graduate-level club

SELECTED COURSEWORK

Machine Learning (A)	Deep Reinforcement Learning (A)	Computational Optimization (A)
Aerodynamics (A)	Electro-Mechanical Control Systems (A)	Advanced Engineering Mathematics (A)
Aircraft Design (A)	Robotics and Computer Vision (A)	Flight Dynamics, Simulation and Control (A)
Algorithm Design (A)	Automatic Control (A)	Large Language Vision Models (A)

EXTRA-CURRICULAR

- Church Musician at *North Cathedral of Beijing* September 2023 – July 2024
- Campus Service Volunteer at *Tsinghua University* September 2021 – May 2024
- Piano player and performer at the *Global Village* and *Starry Night* events at Tsinghua University, Beijing, China May 2023

REFERENCES

Dr. Peng Wei

Professor, Department of Mechanical and Aerospace Engineering

The George Washington University, Washington, DC, USA

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Dr. Alexandre Bayen

Professor, Department of Electrical Engineering and Computer Science

University of California, Berkeley, California, USA

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Dr. Qing Li

Professor, Department of Automation

Tsinghua University, Beijing, China

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Dr. Ying Zhao

Associate Professor, Department of Computer Science and Technology

Tsinghua University, Beijing, China

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