

# Peng Wei

Associate Professor

Department of Mechanical and Aerospace Engineering  
Department of Electrical and Computer Engineering (by courtesy)  
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## EDUCATION

**Purdue University**, West Lafayette, Indiana  
Ph.D. in Aerospace Engineering, May 2013  
Dissertation title: *Maximizing algebraic connectivity in air transportation networks*

**Stony Brook University**, Stony Brook, New York  
M.S. in Electrical and Computer Engineering, August 2009

**Tsinghua University**, Beijing, China  
B.S. in Information Science and Control Theory, July 2007

## HONORS

Panelist, 74th Annual Meeting of the SBPC (Sociedade Brasileira para o Progresso da Ciencia)	2022
Keynote Speaker, 3rd International Symposium on Air Traffic Management for Civil Aviation	2022
Keynote Speaker, 2nd International Symposium on Air Traffic Management for Civil Aviation	2020
Honoree, Stony Brook University 40 Under Forty	2019
Keynote Speaker, SITRAER XVIII - Brazil Air Transportation Symposium	2019

## AWARDS

GW SEAS Outstanding Early Career Researcher Award	2022
NSF CAREER Award	2021
GW-SEAS Engineers' Council Professor of the Year Award	2021
Best Paper Award, IEEE/CSAA Guidance, Navigation and Control Conference (GNCC)	2018
Best Paper Award, International Conference for Research in Air Transportation (ICRAT)	2018
Black and Veatch Faculty Fellow at Iowa State University College of Engineering	2017
Purdue College of Engineering Outstanding Graduate Student Research Award	2013

## RESEARCH INTERESTS

By contributing to the intersection of control, optimization, machine learning, and artificial intelligence, I develop autonomy and decision support tools for aeronautics, aviation and aerial robotics. My current focus is on safety, efficiency, and scalability of decision making systems in complex, uncertain and dynamic environments. Recent applications include: Air Traffic Control/Management (ATC/M), Airline Operations, UAS Traffic Management (UTM), eVTOL Urban Air Mobility (UAM) and Autonomous Drone Racing (ADR).

## ACADEMIC EXPERIENCE

**Associate Professor**, Department of Mechanical and Aerospace Engineering, George Washington University Sept. 2022 - Onward

**Assistant Professor**, Department of Mechanical and Aerospace Engineering, George Washington University Jan. 2020 - Aug. 2022

**Assistant Professor**, Department of Aerospace Engineering, Iowa State University Jan. 2015 - Dec. 2019

**Research Assistant**, School of Aeronautics and Astronautics, Purdue University Jan. 2010 - May 2013

## MAJOR PROJECTS

**Principal Investigator**, *Safe and Scalable Learning-based Control for Autonomous Air Mobility* Sept. 2021 - Onward  
*Budget to date: ~\$500K.*

The objectives of this **NSF CAREER** project are to: (1) design scalable multi-agent aircraft autonomy to support flight separation assurance and conflict resolution, (2) provide online and offline safety enhancements to the aircraft autonomy and prepare for certification, and (3) design a collaborative airspace management under uncertainties framework to achieve flexible and efficient coordination between flight operators and the airspace service provider.

**Principal Investigator**, *In-Time Learning-Based Safety Management for Scalable AAM Operations* Mar. 2021 - Onward  
*Budget to date: ~\$2.5M.*

In this **NASA** project our research team will design, develop and demonstrate an in-time learning-based aviation safety management system (ILASMS) for scalable heterogeneous advanced air mobility (AAM) operations. Working with NASA, we will address three types of hazards: (1) adverse weather such as winds, (2) eVTOL vehicle and component level faults/degradation, and (3) AAM corridor/track incursion by non-cooperative aircraft.

**Principal Investigator**, *Intelligent Low-Altitude Air Traffic Management System* Aug. 2017 - Onward  
*Budget to date: ~\$1M.*

The objective of this **NSF** project is to develop a system prototype to support the increasing autonomy in low-altitude airspace among other manned/unmanned air traffic. This project explores novel strategies of coordinating and managing the air traffic to ensure low-altitude airspace safety and efficiency in near future.

**Principal Investigator**, *Safe Autonomous Urban Air Mobility* June 2017 - May 2018  
*Budget to date: ~\$133K.*

In order to enable on demand air transportation in an urban setting, we have been working with **Airbus** teams on new concept of operations, modeling and simulation, and algorithm design and analysis to provide safe, efficient, sustainable and intelligent solutions for urban air operations..

**Principal Investigator**, *Aviation Weather Impact on Flight Operations* Nov. 2015 - Oct. 2017  
*Budget to date: ~ \$65K.*

We have been working with **Collins Aerospace** Advanced Technology Center to study the flight en route time variation under different convective weather events. Machine learning algorithms are being developed and analyzed by mining the large-scale nationwide flight data sets (AOTP) and meteorology data sets (ASOS, HRRR, NEXRAD). The resulted predictive model is expected to provide estimation for aircraft en route time before departure given weather forecast, which is critical for decision makings in both airline operations and air traffic management.

**Principal Investigator**, *Passenger Direct Share Forecast* May 2017 - Oct. 2018  
*Budget to date: ~ \$30K.*

The objective of this **FAA** project is to build machine learning based predictive models to forecast the direct passenger ratios for all the origin-destination airport pairs in the United States. The result is a macro-level indicator of passenger's trip itinerary preference. More importantly, the newly developed model is expected to replace the current FAA forecasting model.

## INDUSTRY EXPERIENCE

**Operations Research Analyst**, Operations Research Division, American Airlines June 2013 - Dec. 2014

**Research Intern**, Aviation Systems Division, NASA Ames Research Center May 2012 - Aug. 2012

**Research Intern**, Air Traffic Management Division, Intelligent Automation Inc. May 2011 - Aug. 2011

## TEACHING EXPERIENCE

**MAE 6291 (GW)** Fall 2021-2022  
Machine Learning and Control

<b>MAE 3134 (GW)</b> Linear System Dynamics	Spring 2021-2022
<b>MAE 6246 (GW)</b> Electromechanical Control Systems (Linear Systems Theory)	Fall 2020
<b>APSC 6212 (GW)</b> Analytical Methods in Engineering II (Linear Algebra)	Spring 2020
<b>AERE 504 (ISU)</b> Reinforcement Learning and Autonomy	Fall 2017-2019
<b>AERE 574 (ISU)</b> Optimal Control	Spring 2019
<b>AERE 563 (ISU)</b> Introduction to Multidisciplinary Design Optimization (MDO)	Spring 2015-2016
<b>AERE 461 (ISU)</b> Modern Design Methodology with Aerospace Applications (Aircraft Design I)	Fall 2015-2016, 2018
<b>AERE 462 (ISU)</b> Design of Aerospace Systems (Aircraft Design II)	Spring 2017, 2019
<b>AERE 362 (ISU)</b> Aerospace Systems Integration	Spring 2018

## PAST RESEARCH SUPERVISION

### Past Ph.D. students

Josh Bertram, Electrical and Computer Engineering, ISU (co-advise with Prof. Joseph Zambreno) Ph.D. dissertation title: <i>Applying FastMDP to Complex Aerospace-related Problems</i>	2022
Marc Brittain, Aerospace Engineering, ISU (co-advise with Prof. Leifur Leifsson) Ph.D. dissertation title: <i>Learning-based Decision Making for Safe and Scalable Autonomous Separation Assurance</i>	2021
Hao Sun, Mechanical and Aerospace Engineering, GW (co-advise with Prof. James Lee) Ph.D. dissertation title: <i>Modeling and Simulation of Tumor Growth by Finite Element and Machine Learning Methods</i>	2021
Syed Shihab, Aerospace Engineering, ISU (co-advise with Prof. Christina Bloebaum) Ph.D. dissertation title: <i>DeepARM: An Airline Revenue Management System for Dynamic Pricing and Seat Inventory Control using Deep Reinforcement Learning</i>	2020
Xuxi Yang, Aerospace Engineering, ISU Ph.D. dissertation title: <i>Learning-based Perception and Control with Adaptive Stress Testing for Safe Autonomous Air Mobility</i>	2020
Xufang Zheng, Aerospace Engineering, ISU Ph.D. dissertation title: <i>Air Transportation Direct Share Analysis and Forecasting</i>	2019
Guodong Zhu, Aerospace Engineering, ISU Ph.D. dissertation title: <i>Decision Making under Uncertainties for Air Traffic Flow Management</i>	2019
Priyank Pradeep, Aerospace Engineering, ISU Ph.D. dissertation title: <i>Arrival Management for eVTOL Aircraft in On-Demand Urban Air Mobility</i>	2019

### Past M.S. students

Josh Bertram, Electrical and Computer Engineering, ISU M.S. thesis title: A new solution for Markov Decision Processes and its aerospace applications	2020
Mohammad Anwar Manjanoor, Electrical and Computer Engineering, ISU M.S. project title: <i>Autonomous Drone Racing Platform</i>	2019
Daniel Zhou, Aerospace Engineering, ISU M.S. thesis title: <i>Airline Fleet Planning and Utilization Hours Comparison Studies</i>	2019
Imke Kleinbekman, Aerospace Engineering, visiting from TU Delft (co-advise with Prof. Mihaela Mitici) M.S. thesis title: <i>eVTOL Arrival Sequencing and Scheduling for On-Demand Urban Air Mobility</i>	2019

**CURRENT RESEARCH SUPERVISION**

Pouria Razzaghi, postdoc researcher (GW MAE)  
 Wei Guo, Ph.D. candidate (GW CS, co-advise with Prof. Robert Pless)  
 Abenezer Taye, Ph.D. candidate (GW MAE)  
 Shulu Chen, Ph.D. candidate (GW ECE, co-advise with Prof. Tian Lan)  
 Ellis Thompson, Ph.D. student (GW CS)  
 Binshuai (Derek) Wang, Ph.D. student (GW CS)  
 Amin Tabrizian, Ph.D. student (GW MAE)  
 Yifei Zhou, Ph.D. student (GW CS)  
 Chelsea (Yue) Li, M.S. student (GW Data Science)  
 Zhenhao Zhao, M.S. student (GW CS)  
 Yaofu Zhou, M.A. student (GW Elliott School, co-advise with Prof. Henry R. Hertzfeld)

**ACADEMIC SERVICE****Service to the GW Campus**

Faculty Senate Standing Committee on Research	2020 - Onward
Faculty Senate Standing Committee on Athletics and Recreation	2020 - Onward

**Service to GW School of Engineering and Applied Science**

Faculty Advisor for GW AIAA DBF Team	2020 - Onward
Faculty Advisor for GW AIAA Student Branch	2021 - Onward
Faculty Search Committee for ECE Department on Artificial Intelligence Hardware	2022 - 2023
Faculty Search Committee for CS Department on Artificial Intelligence, Machine Learning and Security	2021 - 2022
Faculty Search Committee for EMSE Department on Human-Autonomy Teaming	2021 - 2022
Faculty Search Committee for ECE Department on Digital Hardware Systems and Autonomy	2019 - 2020

**Service to GW Mechanical and Aerospace Engineering Department**

Undergraduate Curriculum Committee Member	2021 - Onward
Faculty Search Committee for Robotics and Autonomy	2019 - 2020

**Service to ISU College of Engineering**

Faculty Advisor for Iowa State AIAA DBF Team	2016 - 2019
Faculty Advisor for Iowa State Drone Racing Club	2017 - 2019
Faculty Advisor for AirOne Club	2018
Faculty Advisor for CyNest Club	2015 - 2017
Faculty Advisor for ISUAV Club	2015 - 2016

**Service to ISU Aerospace Engineering Department**

Founding Instructor for ISU Boeing AerosPACE program	2018-2019
Department Chair Search Committee	2018
Faculty Search Committee for Dynamics and Control	2017-2018
Faculty Search Committee for Intelligent Systems	2015-2016
Curriculum Committee	2017 - 2019
Academic Standards Committee	2015 - 2019
Faculty Advisor for ISU Airbus Fly Your Ideas	2017
Faculty Advisor for ISU Airbus Innovation Showdown	2016

**PROFESSIONAL AFFILIATIONS**

American Institute of Aeronautics and Astronautics (AIAA), Senior Member  
 Institute of Electrical and Electronic Engineers (IEEE), Senior Member  
 Institute for Operations Research and the Management Sciences (INFORMS), Member  
 Airline Group of the International Federation of Operational Research Societies (AGIFORS), Member

## PROFESSIONAL SERVICE

### Advisory Board/Group

<i>Member, Advisory Board for A<sup>3</sup> by Airbus</i>	2017 - 2019
<i>Member, Working Group for NASA UAS Traffic Management (UTM)</i>	2016 - 2018
<i>Member, Advisory Group for NASA Prognostics As A Service (PaaS)</i>	2018

### Technical and Program Committees

<i>Chair, AIAA Air Transportation Systems Technical Committee</i>	2022 - present
<i>Vice Chair, AIAA Air Transportation Systems Technical Committee</i>	2019 - 2022
<i>Member, AIAA Air Transportation Systems Technical Committee</i>	2016 - 2019
<i>Member, TRB Standing Committee on Airfield and Airspace Capacity and Delay - AV060</i>	2016 - 2019, 2022 - present

### Panels

*Panelist, "UAS Traffic Management", AIAA Aviation, Demand for Unmanned Symposium, Washington D.C., June, 2016*

### Conference Organizer

<i>Program Co-Chair</i> "Air Traffic Operations, Management, and Systems" <i>AIAA Aviation 2022, Chicago, IL</i>	2021 - 2022
<i>Program Co-Chair</i> "Air Traffic Operations, Management, and Systems" <i>AIAA Aviation 2021, Virtual Conference</i>	2020 - 2021
<i>Program Co-Chair</i> "Air Traffic Operations, Management, and Systems" <i>AIAA Aviation 2020, Reno, NV</i>	2019 - 2020
<i>Program Co-Chair</i> "Air Traffic Operations, Management, and Systems" <i>AIAA Aviation 2019, Dallas, TX</i>	2018 - 2019

### Conference Session Organizer

<i>Session Chair</i> "Surveillance" <i>Digital Avionics Systems Conference, Portsmouth, VA</i>	Sept. 2022
<i>Session Chair</i> "AI Safety and Security for Transportation Systems" <i>INFORMS Conference on Security, Arlington, VA</i>	Aug. 2022
<i>Session Chair</i> "Urban Air Mobility" <i>INFORMS Annual Meeting, Phoenix, AZ</i>	Nov. 2018
<i>Session Chair</i> "UAS in the NAS" <i>AIAA Aviation, Atlanta, GA</i>	June 2018
<i>Session Chair</i> "ATM/ATC/NEXTGEN" <i>AIAA Aviation, Atlanta, GA</i>	June 2018
<i>Committee Chair</i> "INFORMS Aviation Applications Section (AAS) Best Student Presentation Competition" <i>INFORMS Annual Meeting, Houston, TX</i>	Oct. 2017
<i>Session Chair</i> "UAS Traffic Management"	June 2017

AIAA Aviation, Denver, CO

*Session Chair*

“UAS Traffic Management and Low-altitude Airspace Operations”

*INFORMS Annual Meeting*, Nashville, TN

Nov. 2016

*Session Chair*

“Air Traffic Management and Airline Operations”

*INFORMS Annual Meeting*, Nashville, TN

Nov. 2016

*Session Chair*

“Air Traffic Management and Airline Operations”

*INFORMS Annual Meeting*, Philadelphia, PA

Nov. 2015

*Session Chair*

“Aerospace IV”

*IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL

Dec. 2011

*Session Chair*

“Transportation Science and Logistics”

*INFORMS Annual Meeting*, Charlotte, NC

Nov. 2011

## Reviewer Activities

- *Editorial board*
  - Associate Editor for AIAA Journal of Aerospace Information Systems 2018-Onward
  
- *Book reviewer*
  - AIAA, “Aircraft Design: A Conceptual Approach, Sixth Edition” 2018
  - Elsevier, “Air Transport and Tourism” 2016
  
- *Journal referee*
  - Artificial Intelligence Review 2020-2021
  - Aerospace Science and Technology 2020-2021
  - AIAA Journal of Aerospace Information Systems 2017-2021
  - AIAA Journal of Air Transportation 2017-2021
  - AIAA Journal on Guidance, Control and Dynamics 2010-2012, 2016-2021
  - IEEE Transactions on Aerospace and Electronic Systems 2019
  - IEEE Transactions on Intelligent Transportation Systems 2010, 2014-2021
  - Transportation Research Part B 2011-2019
  - Transportation Research Part C 2015-2021
  - Journal of Aerospace Engineering Part G 2018
  - Journal of Air Transport Management 2020-2021
  - Journal of Optimization Theory and Applications 2017
  
- *Conference referee*
  - ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2020-2021
  - AIAA Aviation 2015-2021
  - AIAA Conference on Guidance, Control and Dynamics 2011-2013
  - SESAR Innovation Days 2017-2020
  - American Control Conference (ACC) 2011-2013, 2019-2020
  - IEEE Conference on Decision and Control (CDC) 2010-2014, 2020
  - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2020
  - IEEE International Conference on Intelligent Transportation Systems 2018-2020
  - Transportation Research Board (TRB) Annual Meeting 2016-2019
  
- *Other*
  - INFORMS Aviation Applications Section (AAS) Best Paper Award 2020
  - INFORMS Aviation Applications Section (AAS) Best Ph.D. Dissertation Award 2017, 2021
  
- *Thesis committee member (outside of my own graduate students)*
  - Iowa State University, over 60 PhD and MS students 2015 - 2019

## PUBLICATIONS

### Journal Publications

Published, in press, accepted

1. J. Hu, X. Yang, W. Wang, **P. Wei**, L. Ying and Y. Liu, "Obstacle Avoidance for UAS in Continuous Action Space Using Deep Reinforcement Learning", accepted by IEEE Access, Aug. 2022
2. P. Wu, X. Yang, **P. Wei** and J. Chen, "Safety Assured Online Guidance with Airborne Separation for Urban Air Mobility Operations in Uncertain Environments", accepted by IEEE Transactions on Intelligent Transportation Systems, March 2022
3. M. Brittain and **P. Wei**, "Scalable Autonomous Separation Assurance with Heterogeneous Multi-Agent Reinforcement Learning", IEEE Transactions on Automation Science and Engineering, Feb. 2022.
4. J. Bertram, **P. Wei**, and J. Zambreno, "A Fast Markov Decision Process based Algorithm for Collision Avoidance in Urban Air Mobility", *IEEE Transactions on Intelligent Transportation Systems*, Jan. 2022.
5. M. Brittain, X. Yang, and **P. Wei**, "A Deep Multi-Agent Reinforcement Learning Approach to Autonomous Separation Assurance", *AIAA Journal of Aerospace Information Systems*, Aug. 2021.
6. S. A. M. Shihab and **P. Wei**, "A Deep Reinforcement Learning Approach to Seat Inventory Control for Airline Revenue Management", *Journal of Revenue and Pricing Management*, Mar. 2021.
7. X. Yang and **P. Wei**, "Autonomous Free Flight Operations in Urban Air Mobility with Computational Guidance and Collision Avoidance", *IEEE Transactions on Intelligent Transportation Systems*, Jan., 2021.
8. X. Zheng and **P. Wei**, "Air Transportation Direct Share Time Series Forecasting: A Hybrid Model", *AIAA Journal of Aerospace Information Systems*, vol. 17, no. 12, Dec. 2020.
9. X. Yang and **P. Wei**, "Scalable Multi-Agent Computational Guidance with Separation Assurance for Autonomous Urban Air Mobility Operations", *AIAA Journal of Guidance, Control, and Dynamics*, vol. 43, no. 8, Aug. 2020.
10. P. Pradeep and **P. Wei**, "Heuristic Approach for Arrival Management of eVTOLs in On-Demand Urban Air Mobility", *AIAA Journal of Aerospace Information Systems*, accepted, 2020.
11. X. Zheng, C. Liu, and **P. Wei**, "Air Transportation Direct Share Analysis and Forecast", *Journal of Advanced Transportation*, Article ID 8924095, 2020.
12. I.C. Kleinbekman, M. Mitici, and **P. Wei**, "A Rolling-horizon eVTOL Arrival Scheduling for On-demand Urban Air Mobility", *AIAA Journal of Aerospace Information Systems*, vol. 17, no. 3, March 2020.
13. P. Pradeep and **P. Wei**, "Energy Efficient Arrival with RTA Constraint for Multirotor eVTOL in Urban Air Mobility", *AIAA Journal of Aerospace Information Systems*, vol. 16, no. 7, July 2019.
14. C. Yang, J. Mao, X. Qian, and **P. Wei**, "Designing Robust Air Transportation Network via Minimizing Total Effective Resistance", *IEEE Transactions on Intelligent Transportation Systems*, vol. 20, no. 6, pp. 2353-2366, Oct. 2018.
15. C. Yang, J. Mao, and **P. Wei**, "Air Traffic Network Optimization via Laplacian Energy Maximization", *Aerospace Science and Technology*, vol.49, pp.26-33, 2016.
16. L. Du, S. Peeta, **P. Wei**, and D. Sun, "A Quantitative and Systematic Methodology to Investigate Energy Consumption Issues in Multimodal Intercity Transportation Systems", *International Journal of Transportation Science and Technology*, vol.4, no.3, pp.229-256, December 2015.
17. **P. Wei**, G. Spiers, and D. Sun, "Algebraic Connectivity Maximization for Air Transportation Networks", *IEEE Transactions on Intelligent Transportation Systems*, vol.15, no.2, pp.685-698, Apr. 2014.
18. **P. Wei**, L. Chen, and D. Sun, "Algebraic Connectivity Maximization of an Air Transportation Network: The Flight Routes' Addition/Deletion Problem", *Transportation Research Part E*, vol.61, pp.13-27, Jan. 2014.
19. H. Nagarajan, **P. Wei**, S. Rathinam and D. Sun, "Heuristics for Synthesizing Robust Networks with a Diameter Constraint", *Mathematical Problems in Engineering*, Volume 2014, Article ID 326963, 11 pages, 2014.
20. **P. Wei**, T. Kim, S. Han, S. Landry, D. Sun, and D. DeLaurentis, "Optimal Metroplex Routing Paradigm and its Performance Analysis", *AIAA Journal of Guidance, Control, and Dynamics*, vol.36, no.4, pp.1221-1225, 2013.



21. **P. Wei**, Y. Cao, and D. Sun, “Total Unimodularity and Decomposition Method for Large-Scale Air Traffic Cell Transmission Model”, *Transportation Research Part B*, vol.53, pp.1-16, July 2013.
22. S. Chu, **P. Wei**, X. Zhong, X. Wang and Y. Zhou, “Deployment of a Connected Reinforced Backbone Network with a Limited Number of Backbone Nodes”, *IEEE Transactions on Mobile Computing*, vol.12, issue 6, pp.1188-1200, 2012.

## Conference Publications

Published, in press, accepted

1. S. Chen, **P. Wei**, A. D. Evans and M. E. Nova, “Estimating Airspace Resource Capacity for Advanced Air Mobility Operations”, accepted by AIAA Aviation, Chicago, IL, June 2022.
2. A. G. Taye, J. R. Bertram, C. Fan and **P. Wei**, “Reachability based Online Safety Verification for High-Density Urban Air Mobility Trajectory Planning”, accepted by AIAA Aviation, Chicago, IL, June 2022.
3. A. Baheri, H. Ren, B. Johnson, P. Razzaghi and **P. Wei**, “A Verification Framework for Certifying Learning-Based Safety-Critical Aviation Systems” accepted by AIAA Aviation, Chicago, IL, June 2022.
4. E. L. Thompson, A. G. Taye, W. Guo, **P. Wei**, M. Quinones-Grueiro, I. Ahmed, G. Biswas, J. Quattrociochi, S. Carr, U. Topcu, J. Jones and M. Brittain, “A Survey of eVTOL Aircraft and AAM Operation Hazards”, accepted by AIAA Aviation, Chicago, IL, June 2022.
5. W. Guo, M. Brittain, and **P. Wei**, “Safety Enhancement for Deep Reinforcement Learning in Autonomous Separation Assurance”, IEEE International Conference on Intelligent Transportation Systems (ITSC), Indianapolis, IN, Sept. 2021.
6. M. Brittain, J. Nagawkar, **P. Wei** and L. Leifsson, “Multifidelity Aerodynamic Flow Field Prediction Using Conditional Adversarial Networks”, AIAA Aviation, Virtual Conference, Aug. 2021.
7. J. Bertram and **P. Wei**, “An Efficient Algorithm for Multiple-Pursuer-Multiple-Evader Pursuit/Evasion Game”, AIAA SciTech, Virtual Conference, Jan. 2021.
8. J. Bertram, J. Zambreno and **P. Wei**, “Scalable FastMDP for Pre-departure Airspace Reservation and Strategic Deconflict”, AIAA SciTech, Virtual Conference, Jan. 2021.
9. M. Brittain and **P. Wei**, “One to Any: Distributed Conflict Resolution with Deep Multi-Agent Reinforcement Learning and Long Short-Term Memory”, AIAA SciTech, Virtual Conference, Jan. 2021.
10. Z. Wang, **P. Wei** and L. Sun, “Optimal Cruise, Descent, and Landing of eVTOL Vehicles for Urban Air Mobility using Convex Optimization”, AIAA SciTech, Virtual Conference, Jan. 2021.
11. X. Yang, M. Murphy, M. Brittain, and **P. Wei**, “Computer Vision for Small UAS Onboard Pedestrian Detection”, AIAA Aviation, Reno, NV, June 2020.
12. J. Hu, X. Yang, W. Wang, **P. Wei**, L. Ying, and Y. Liu, “UAS Conflict Resolution in Continuous Action Space Using Deep Reinforcement Learning”, AIAA Aviation, Reno, NV, June 2020.
13. S. Shihab, **P. Wei**, J. Shi, and N. Yu, “Optimal eVTOL Fleet Dispatch with Power Grid Compensation and Battery Degradation Cost”, AIAA Aviation, Reno, NV, June 2020.
14. X. Yang, M. Egorov, A. Evans, S. Munn, and **P. Wei**, “Stress Testing of UAS Traffic Management Decision Making Systems”, AIAA Aviation, Reno, NV, June 2020.
15. J. Bertram, and **P. Wei**, “An Efficient Algorithm for Self-Organized Terminal Arrival in Urban Air Mobility”, AIAA SciTech, Orlando, FL, Jan. 2020.
16. J. Bertram, and **P. Wei**, “Distributed Computational Guidance for High-Density Urban Air Mobility with Cooperative and Non-Cooperative Collision Avoidance”, AIAA SciTech, Orlando, FL, Jan. 2020.
17. X. Yang, L. Deng, J. Liu, **P. Wei**, and H. Li, “Multi-Agent Autonomous Operations in Urban Air Mobility with Communication Constraints”, AIAA SciTech, Orlando, FL, Jan. 2020.
18. M. Brittain, J. Bertram, X. Yang, and **P. Wei**, “Prioritized Sequence Experience Replay”, Deep Reinforcement Learning Workshop, Neural Information Processing Systems (NeurIPS), Vancouver, Canada, Dec. 2019.

19. M. Brittain and **P. Wei**, “Autonomous Separation Assurance in An High-Density En Route Sector: A Deep Multi-Agent Reinforcement Learning Approach”, IEEE Intelligent Transportation Systems Conference (ITSC), Auckland, New Zealand, Oct. 2019.
20. M. Brittain and **P. Wei**, “Autonomous Air Traffic Control: A Deep Multi-Agent Reinforcement Learning Approach”, Workshop on Reinforcement Learning for Real Life, International Conference on Machine Learning (ICML), Long Beach, CA, June 2019.
21. S.A.M Shihab, C. Logemann, D.G Thomas, and **P. Wei**, “Autonomous Airline Revenue Management: A Deep Reinforcement Learning Approach to Seat Inventory Control and Overbooking”, Workshop on Reinforcement Learning for Real Life, International Conference on Machine Learning (ICML), Long Beach, CA, June 2019.
22. J. Bertram, X. Yang and **P. Wei**, “Online Flight Planner with Dynamic Obstacles for Urban Air Mobility”, AIAA Aviation, Dallas, TX, June 2019.
23. G. Zhu and **P. Wei**, “Pre-Departure Flight Planning for Urban Air Mobility Flights with Dynamic Aerospace Reservation”, AIAA Aviation, Dallas, TX, June 2019.
24. X. Yang and **P. Wei**, “Multi-Agent Autonomous On-Demand Free Flight Operations in Urban Air Mobility using Monte Carlo Tree Search”, AIAA Aviation, Dallas, TX, June 2019.
25. X. Zheng and **P. Wei**, “Air Transportation Direct Share Time Series Analysis and Forecast”, AIAA Aviation, Dallas, TX, June 2019.
26. S.A.M. Shihab, **P. Wei**, D. Jurado, R.M. Arango and C. Bloebaum, “By Schedule or On Demand? - A Hybrid Operation Concept for Urban Air Mobility”, AIAA Aviation, Dallas, TX, June 2019.
27. S.A.M. Shihab, **P. Wei** and C. Bloebaum, “A Data-Driven Decision Making Framework for Value-Based Engineering Design of Complex Network Systems”, AIAA Aviation, Dallas, TX, June 2019.
28. G. Hunter and **P. Wei**, “Service-Oriented Separation Assurance for Small UAS Traffic Management”, Integrated Communication, Navigation and Surveillance technologies (ICNS) Conference, Herndon, VA, Apr. 2019.
29. N. Polaczyk, E. Trombino, **P. Wei** and M. Mitici, “A Review of Current Technology and Research in Urban On-Demand Air Mobility Applications”, 8th Biennial Autonomous VTOL Technical Meeting & 6th Annual Electric VTOL Symposium, Mesa, AZ, Jan. 2019.
30. G. Zhu, **P. Wei**, R. Hoffman, and B. Hackney, “Risk-hedged Multistage Stochastic Programming Model for Setting Flow Rates in Collaborative Trajectory Options Programs (CTOP)”, AIAA SciTech, San Diego, CA, Jan. 2019.
31. G. Zhu, **P. Wei**, R. Hoffman, and B. Hackney, “Saturation Technique for Optimizing Planned Acceptance Rates in Traffic Management Initiatives”, IEEE International Conference on Intelligent Transportation Systems, Maui, Hawaii, Nov. 2018.
32. P. Pradeep and **P. Wei**, “Heuristic Approach for Arrival Sequencing and Scheduling for eVTOL Aircraft in On-Demand Urban Operations”, AIAA/IEEE Digital Avionics Systems Conference (DASC), London, England, UK, Sept. 2018.
33. I.C. Kleinbekman, M. Mitici and **P. Wei**, “eVTOL Arrival Sequencing and Scheduling for On-Demand Urban Air Mobility”, AIAA/IEEE Digital Avionics Systems Conference (DASC), London, England, UK, Sept. 2018.
34. G. Zhu, **P. Wei**, R. Hoffman, and B. Hackney, “Centralized Disaggregate Stochastic Allocation Models for Collaborative Trajectory Options Program (CTOP)”, AIAA/IEEE Digital Avionics Systems Conference (DASC), London, England, UK, Sept. 2018.
35. P. Pradeep and **P. Wei**, “Energy Optimal Speed Profile for Arrival of Tandem Tilt-Wing eVTOL Aircraft with RTA Constraint”, IEEE/CSAA Guidance, Navigation and Control Conference (GNCC), Xiamen, China, Aug. 2018.
36. M. Brittain and **P. Wei**, “Towards Autonomous Air Traffic Control for Sequencing and Separation - A Deep Reinforcement Learning Approach”, AIAA Aviation, Atlanta, GA, June 2018.
37. G. Zhu and **P. Wei**, “An Interval-based TOS Allocation Model for Collaborative Trajectory Options Program (CTOP)”, AIAA Aviation, Atlanta, GA, June 2018.
38. R. Hoffman, B. Hackney, G. Zhu and **P. Wei**, “Enhanced Stochastic Optimization Model (ESOM) for Setting Flow Rates in Collaborative Trajectory Options Programs (CTOP)”, AIAA Aviation, Atlanta, GA, June 2018.
39. G. Zhu, C. Matthews, **P. Wei**, M. Lorch, and S. Chakravarty, “En Route Flight Time Prediction Under Convective Weather Events”, AIAA Aviation, Atlanta, GA, June 2018.

40. M. Brittain and **P. Wei**, “Autonomous Aircraft Sequencing and Separation with Hierarchical Deep Reinforcement Learning”, International Conference on Research in Air Transportation (ICRAT), Barcelona, Spain, June 2018.
41. G. Zhu, **P. Wei**, R. Hoffman, and B. Hackney, “Aggregate Multi-commodity Stochastic Models for Collaborative Trajectory Options Program (CTOP)”, International Conference on Research in Air Transportation (ICRAT), Barcelona, Spain, June 2018.
42. X. Yang and **P. Wei**, “Autonomous On-Demand Free Flight Operations in Urban Air Mobility using Monte Carlo Tree Search”, International Conference on Research in Air Transportation (ICRAT), Barcelona, Spain, June 2018.
43. P. Pradeep, S.G. Park and **P. Wei**, “Trajectory Optimization of Multirotor Agricultural UAVs”, IEEE Aerospace Conference, Big Sky, MT, Mar. 2018.
44. P. Pradeep and **P. Wei**, “Energy Efficient Arrival with RTA Constraint for Urban eVTOL Operations”, AIAA SciTech, Kissimmee, FL, Jan. 2018.
45. A. Alnaqeb, Y. Li, Y.H. Lui, P. Pradeep, J. Wallin, C. Hu, S. Hu, and **P. Wei**, “Online Prediction of Battery Discharge and Flight Mission Assessment For Electrical Rotorcraft”, AIAA SciTech, Kissimmee, FL, Jan. 2018.
46. P. Pradeep and **P. Wei**, “Predictability, Variability and Operational Feasibility Aspect of CDA”, IEEE Aerospace Conference, Big Sky, MT, Mar. 2017.
47. G. Zhu, and **P. Wei**, “Low-Altitude UAS Traffic Coordination with Dynamic Geofencing”, AIAA Aviation, Washington DC, June 2016.
48. L. Du, S. Peeta, **P. Wei**, and D. Sun, “A Quantitative and Systematic Methodology to Investigate Energy Consumption in Multimodal Transportation Systems”, Transportation Research Board 93rd Annual Meeting, Jan. 2014.
49. **P. Wei**, B. Sridhar, N. Chen, and D. Sun, “Vertical Grid Shifting Approach to the Development of Contrail Reduction Strategies with Sector Capacity Constraints”, AIAA Conference on Guidance, Navigation and Control, Boston, MA, Aug. 2013.
50. J. Ponton, **P. Wei**, and D. Sun, “Weighted clustering coefficient maximization in the Air Transportation Network”, European Control Conference, Zurich, Switzerland, July 2013.
51. **P. Wei**, Q. Gu, and D. Sun, “Wireless sensor network data collection by connected cooperative UAVs”, American Control Conference, Washington DC, June 2013.
52. C. Surakitbanharn, **P. Wei**, S. Landry, and D. Sun, “Evaluation of Stream Air Traffic Operations by Adapting Dynamic Density Complexity Measure”, 12th AIAA Aviation Technology, Integration, and Operations (ATIO) Conference, Indianapolis, IN, Sept. 2012.
53. G. Spiers, **P. Wei**, and D. Sun, “Algebraic Connectivity Optimization of Large Scale and Directed Air Transportation Network”, 13th IFAC Symposium on Control in Transportation Systems, Sofia, Bulgaria, Sept. 2012.
54. **P. Wei**, B. Sridhar, N. Chen and D. Sun, “A Linear Programming Approach to the Development of Contrail Reduction Strategies Satisfying Operationally Feasible Constraints”, AIAA Conference on Guidance, Navigation and Control, Minneapolis, MN, Aug. 2012.
55. G. Spiers, **P. Wei** and D. Sun, “Algebraic Connectivity Optimization of the Air Transportation Network”, American Control Conference, Montreal, Canada, June 2012.
56. **P. Wei**, T. Kim, S. Landry, D. Sun and D. DeLaurentis, “An Optimal Routing Paradigm For Flexible Flights”, American Control Conference, Montreal, Canada, June 2012.
57. **P. Wei**, A. Meksoub and D. Sun, “Optimal Sequential Backward Flow Saturation For Cell Transmission Model”, American Control Conference, Montreal, Canada, June 2012.
58. H. Nagarajan, **P. Wei**, S. Rathinam and D. Sun, “Air transportation network robustness optimization under limited legs itinerary constraint”, the 5th International Conference on Research in Air Transportation (ICRAT 2012), Berkeley, CA, May 2012.
59. **P. Wei**, C. Surakitbanharn, S. Landry and D. Sun, “Workload Comparison Between Sectorized Air Traffic Control and Stream Management”, Integrated Communications, Navigation, and Surveillance (ICNS) Conference, Herndon, VA, Apr. 2012.

60. **P. Wei** and D. Sun, “Total Unimodularity and Degeneracy-Aware Dantzig-Wolfe Decomposition for Large-Capacity Cell Transmission Model”, the 50th IEEE Conference on Decision and Control and European Control Conference, Orlando, FL, Dec. 2011.
61. **P. Wei** and D. Sun, “Weighted Algebraic Connectivity: An Application to Air Transportation Network”, 18th IFAC World Congress 2011, Milan, Italy, Aug. 2011.
62. **P. Wei**, J. Chen, D. Andrisani and D. Sun, “Routing Flexible Traffic into Metroplex”, AIAA Conference on Guidance, Navigation and Control, Portland, OR, Aug. 2011.
63. **P. Wei**, S. Chu, X. Wang and Y. Zhou, “Deployment of a Reinforcement Backbone Network with Constraints of Connection and Resources”, IEEE International Conference on Distributed Computing Systems, Genoa, Italy, June 2010.

### Technical Reports

1. X. Yang, G. Zhu and P. Wei, “Flight Planning, Trajectory Prediction and Collision Resolution for Urban Air Mobility Operations”, *A<sup>3</sup>* by Airbus, 2018.
2. G. Zhu and P. Wei, “En Route Flight Time Prediction Under Convective Weather Events”, Rockwell Collins, 2017.

### Doctoral Thesis

- P. Wei, “*Maximizing algebraic connectivity in air transportation networks*”, Ph.D. dissertation, School of Aeronautics and Astronautics, Purdue University, May 2013.

## RESEARCH GRANTS

### Grants and donations obtained as a sole PI

1. *National Science Foundation*, FY 21-26 \$500K  
Project title: "CAREER: Safe and Scalable Learning-based Control for Autonomous Air Mobility"
2. *Amazon AWS Research Credits*, FY 19-20 \$2.4K  
Project title: "Advancements for Priority Experience Replay"
3. *NVIDIA GPU Grant*, FY 18-19 \$1.5K  
Project title: "Hierarchical Deep Reinforcement Learning for Autonomous Air Traffic Control"
4. *Airbus A<sup>3</sup>*, FY 17-18 \$133K  
Project title: "Safe Integration of Autonomous Aircraft to National Airspace"
5. *Rockwell Collins*, FY 16-17 \$65K  
Project title: "Convective Weather Impact on Flight En Route Time"
6. *National Science Foundation*, FY 16-18 \$175K  
Project title: "Towards an Intelligent Low-Altitude UAS Traffic Management System"
7. *Federal Aviation Administration*, FY 17-18 \$30K  
Project title: "Passenger Direct Share Forecast"

### Grants obtained as the PI for a multiple investigator grant

1. *National Aeronautics and Space Administration*, FY 20-23 \$2.5M  
Project title: "Demonstration of the In-Time Learning-Based Safety Management for Scalable AAM Operations"  
Co-Investigators: Prof. Gautam Biswas (Vanderbilt University), Prof. Ufuk Topcu (University of Texas at Austin), Dr. James Jones (MIT Lincoln Lab), Dr. Marc Brittain (MIT Lincoln Lab)
2. *National Science Foundation*, FY 17-19 \$1M  
Project title: "Intelligent Low-Altitude Air Traffic Management System"  
Co-Investigators: Prof. Kristin Rozier (Iowa State), Prof. Thomas Schnell (University of Iowa), Prof. Ella Atkins (University of Michigan), Dr. George Hunter (Mosaic ATM)

### Grants obtained as a co-PI on multiple investigator grants

1. *National Science Foundation*, FY 21-24 \$500K  
Project title: "SHF: Small: High-Performance Multi-Agent Reinforcement Learning"  
Co-investigators: Prof. Guru Venkataramani, PI (GW), Prof. Tian Lan (GW)
2. *National Aeronautics and Space Administration*, FY 20-21 \$125K  
Project title: "UAM Demand Capacity Modeling through Ensemble Learning"  
Co-investigators: Dr. Sricharan Ayyalasomayajula, PI (Intelligent Automation Inc.)
3. *Federal Aviation Administration*, FY 21-23 \$400K  
Project title: "Safety Verification Framework for Learning-Based Aviation Systems (SVF-LAS)"  
Co-investigators: Prof. Ali Baheri, PI (West Virginia University), Dr. Hao Ren (Honeywell Aerospace)
4. *Virginia Commonwealth Cyber Initiative*, FY 20-21 \$200K  
Project title: "Smart City Infrastructures for Safeguarding Autonomous Vehicles Against Cyber Attacks"  
Co-investigators: Prof. Felix Lin, PI (University of Virginia), Prof. Lance Sherry (George Mason University)
5. *National Science Foundation*, FY 17-21 \$2.4M  
Project title: "Cyber-based Decision Support Strategies to Achieve Consensus for FEW System Sustainability using Incentive and Policy Structures"  
Co-investigators: Prof. Christina Bloebaum, PI (Iowa State), Prof. James Oliver (Iowa State), Prof. Clark Wolf (Iowa State), Prof. Amy Kaleita (Iowa State), Prof. Ali Abbas (University of Southern California)
6. *Federal Aviation Administration*, FY 16 \$46K  
Project title: "Airport Safety Database and Analysis"  
Co-investigators: Prof. Halil Ceylan, PI (Iowa State), Michael Dorneich (Iowa State)