

JUN CHEN

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Assistant Professor, Aerospace Engineering, San Diego State University
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RESEARCH INTERESTS

- Modeling, Control and Optimization of Large-Scale Networked Systems
- Real-time stochastic and robust optimization
- Distributed Control and Optimization of Autonomous Systems

EDUCATION

Purdue University, West Lafayette, IN *May 2018*
Ph.D. in School of Aeronautics and Astronautics
-Concentration on Computational Science & Engineering
-Dissertation: *Computational Optimization of Networks of Dynamical Systems under Uncertainties: Application to the Air Transportation System*

M.S. in School of Aeronautics and Astronautics *Dec 2014*
-Major in Dynamics and Control, Minor in Aerospace Systems
-Thesis: *Dynamic Stochastic Model for Converging Inbound Air Traffic*

Technical University of Munich, Munich, Germany *Aug 2012*
Summer School in Engineering & Management

Beihang University (BUAA), Beijing, China *July 2012*
B.S.E in Aeronautical Science & Engineering (with honors)

HONORS AND AWARDS

April 2018 Purdue College of Engineering Outstanding Research Award, Purdue University
Aug 2017 the John L. and Patricia R. Rich Scholarship, Purdue University
July 2012 Outstanding Graduates of Undergraduate Students, Beihang University
Dec 2011 1st-grade Scholarship of Academic Performance from Airbus, Airbus

ACADEMIC EXPERIENCE

Assistant Professor, Aerospace Engineering Department, San Diego State University *Aug 2018 - Onward*
Research Assistant, School of Aeronautics and Astronautics, Purdue University *Aug 2013 - May 2018*

PUBLICATION

Journal Publications

1. **Jun Chen**, Daniel DeLaurentis, and Dengfeng Sun, "Dynamic Stochastic Model for Converging Inbound Air Traffic," *Journal of Guidance, Control and Dynamics*, Vol.39, No.10 (2016), pp. 2273-2283.
2. **Jun Chen**, Lijian Chen and Dengfeng Sun, "Air Traffic Flow Management under Uncertainty Using Chance-Constrained Optimization," *Transportation Research Part B*, 102 (2017): 124-141
3. **Jun Chen**, Yi Cao and Dengfeng Sun, "Modeling, Optimization and Operation of Large-scale Air Traffic Flow Management on Spark," *Journal of Aerospace Information Systems*, Vol.14, No.9 (2017), pp. 504-516.
4. **Jun Chen**, and Dengfeng Sun, "Stochastic Ground Delay Program Planning in a Metroplex," *Journal of Guidance, Control and Dynamics*, Vol.41, No.1 (2018), pp. 231-239.

5. Lijian Chen, Chiang Wen-Chyuan, Robert Russell, **Jun Chen** and Dengfeng Sun "Probabilistic Vehicle Routing Problem with Service Guarantees" *Transportation Research Part E*, Vol.111 (2018), pp. 149-164.

Conference Publications

1. **Jun Chen**, Dengfeng Sun and Daniel DeLaurentis "Air Traffic Flow Management under Uncertainty Using Chance-Constrained Optimization," *poster session presented at the NEXTOR 20th Anniversary Workshop*, College Park, Maryland, Sep.2016.
2. **Jun Chen** and Meng Li, "Air Traffic Delay Prediction Based on Machine Learning and Delay Propagation," *AIAA Conference on Guidance, Navigation and Control*, 2019, Accepted.

INVITED TALKS

1. INFORMS Annual Meeting, "Ground Delay Program Planning with Uncertain Airport Capacity", Phoenix, AZ, Nov. 2018.
2. University of South Carolina, "Computational Optimization for Intelligent Air Transportation Systems", Columbia, SC, Feb. 2018.
3. Auburn University, "Networked Autonomous Systems Under Uncertainties: Modeling, Optimization, and Computation", Auburn, AL, Jan. 2018.

RESEARCH EXPERIENCE

Purdue University

Research Assistant

West Lafayette, IN

2013-2018

Major Contributions:

· **Large Scale Stochastic Optimization:**

- Developed a data-driven network model and a distributed computationally efficient algorithm to address uncertainty in large-scale Air Traffic Flow Management using chance constrained optimization.
- Formulated a convex approximation method to handle the chance constraints, which can decompose the original large-scale problem into massive convex approximation subproblems.
- The algorithm is demonstrated to be able to solve realistic large-scale stochastic optimization problems based on a distributed computational platform, such as Apache Spark.

· **Spark-based Data Analysis and Decentralized Optimization:**

- Built a customized Apache Spark cluster with 6 workstations, developed algorithms for large-scale air traffic data analysis on the Spark cluster, which is 20 times faster than the original method.
- Analyzed air traffic and weather data statistically, classified/clustered flight trajectories through machine learning and data mining algorithms.
- Developed a customized Spark-based decentralized optimization framework for a Integer Programming problem using dual decomposition, which improved computing efficiency to be 10 times faster.

· **Stochastic Ground-Delay-Program Planning in a Metroplex:**

- Developed an efficient algorithm to solve for the optimal landing schedules for all the NYC Metroplex airports under uncertainty simultaneously. The algorithm can be also applied for other large-scale stochastic planning problems of autonomous systems.
- Performed data mining and statistical analysis for the joint landing capacity distribution of the NYC Metroplex, which is evaluated based on the FAA Aviation System Performance Metric database.

Relevant Experience:

· **Decentralized Swarm Control of UAVs:**

- Formulated decentralized algorithms for swarm control of UAVs with cooperative tracking tasks.
- Developed multi-agent based simulations to evaluate the performance with Matlab GUI.

· **Probabilistic Vehicle Routing Problem:**

- Studied the probabilistic vehicle routing problem and designed algorithms to find the robust optimal solution.

The developed methods can also be implemented in the air transportation and logistics, such as the UAV delivery problem.

-Developed and implemented a decentralized optimization framework to solve the large-scale stochastic optimization problem efficiently.

· **Stochastic Trajectory Planning for Converging Flows:**

-Developed a distributed algorithm to solve large-scale stochastic flight trajectory planning problems.

-Implemented the algorithm to the converging flow scheduling problem in the terminal area with realistic data of the HartsfieldJackson Atlanta International Airport (ATL).

TEACHING EXPERIENCE

AE 280 Methods of Analysis, SDSU

Fall 2018

Instructor. Advanced math class for engineering students.

AAE 561 Introduction to Convex Optimization, Purdue University

Fall 2016, Fall 2017

Guest Lecturer. Invited lecturer to cover stochastic optimization topics for the graduate level course “AAE 561 Introduction to Convex Optimization” in the School of Aeronautics and Astronautics, Purdue University.

AAE 564 Systems Analysis and Synthesis (Graduate level), Purdue University

Fall 2017

Teaching Assistant. Assisted instructing for concepts and techniques used in the analysis and control design of linearizable systems. Subjects covered include state space modeling, linearization, controllability, observability, state feedback controllers and LQR.

AAE 203 Aeromechanics I, Purdue University

Fall 2016, Spring 2017

Guest Lecturer. Invited lecturer to cover flight dynamics topics for “AAE 203 Aeromechanics I” in the School of Aeronautics and Astronautics, Purdue University.

Teaching Assistant. Responsible for instruction and answering questions for fundamental concepts and principles of dynamics.

AAE 301 Signal Analysis For Aerospace Engineering, Purdue University

Spring 15, 18

Teaching Assistant. Responsible for instruction and answering questions for Fourier and fast Fourier transforms, estimation of natural frequencies and bode plots.

INDUSTRY EXPERIENCE

Research Engineer Intern, Control Group, TuSimple, San Diego

May 2017 - Aug 2017

Research Engineer in Control, Control Group, TuSimple, San Diego

May 2018 - Aug 2018

PROFESSIONAL SERVICES

Journal Referee

- AIAA Journal of Guidance, Control and Dynamics
- AIAA Journal of Aerospace Information Systems
- AIAA Journal of Air Transportation
- IEEE Transactions on Intelligent Transportation Systems
- Transportation Research Part B
- Transportation Research Part C
- Transportation Research Part E
- Transportation Science
- Operations Research
- Omega, The International Journal of Management Science

Conference Referee

- AIAA Conference on Guidance, Navigation, and Control (GNC)

- American Control Conference (ACC)
- COTA International Conference of Transportation Professionals (CICTP2015, CICTP 2016, CICTP2018)
- AIAA AVIATION Forum 2018
- 8th International Conference for Research in Air Transportation(ICRAT)

Membership

- American Institute of Aeronautics and Astronautics (AIAA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute for Operations Research and the Management Sciences (INFORMS)