Jingkai Chen

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Research Overview

My research interests are primarily in the areas of planning and scheduling, control, combinatorial search, and mathematical optimization with the applications in interconnected robotic systems for manufacturing and warehouse logistics. My Ph.D. thesis is to develop a hybrid concurrent planner to plan high-fidelity models with mixed discrete-continuous specifications (e.g., vehicles, robotic arms, embedded devices) [1] for multiple agents [2] and multiple temporally concurrent goals [3] with the purpose of minimizing costs or maximizing rewards.

Education

Massachusetts Institute of Technology
Ph.D. in Aeronautics and Astronautics

Cambridge, WA
Sept.2016-present

Advisors: Prof. Brian C. Williams and Prof. Chuchu Fan.
Research Interests: Cyber-physical Systems; Robotics; Planning and Scheduling.

Zhejiang University
B.S. in Control Science and Engineering

Hangzhou, China
Sept.2012-Jun.2016

Enrolled in Chu Kochen Honors College, Advisor: Prof. Jiming Chen.
Concentration on Control Theory and System Engineering.

Work Experience

Research Assistant, MIT CSAIL
Planning and Decision Making (mentored by Prof. Brian WIlliams)

Cambridge, CA
Sep.2016-present

· Leading to develop a multi-arm assembly planner for CAD models (Kawasaki Assembly project).
· Led and developed a hybrid planner for scientific exploration (DARPA Creative Problem Solver project).
· Developed a routing planner to optimize utilities with network uncertainties (DARPA EdgeCT project).
· Developed a constraint optimization solver, OpSat, supporting various search methods and propagators.

Research Intern, McGovern Institute of Brain Research at MIT
Data Mining in Brain Signals for Object Recognition (mentored by Dr. Dimitrios Pantazis)

Cambridge, CA
Oct.2015-Apr.2016

· Developed clustering methods to capture brain responses relevant to face identity and eye gaze processing in the MEG and fMRI date.

Undergraduate Research Trainee, UCLA
Adaptive Control Algorithm on Wireless Networks (mentored by Prof. Mario Gerla)

Los Angeles, CA
July.2015-Sep.2015

· Developed and tested an architecture to improve the client-slide experience for video streaming in MPEG-DASH protocol over mobile networks.

Honors and Awards

· Zhejiang University ECE Department Chunhui Scholarship   2016
· Chu Kochen Honors College Outstanding Talents Plan Fellowship   2015

· UCLA Cross-disciplinary Scholars in Science & Technology Scholarship   2015
· Zhejiang University First-Class Scholarship for Outstanding Students   2014
· The Dean Scholarship (Highest Honor in Zhejiang University Chu Kochen Honors College)   2014
· Zhejiang University First-Class Scholarship for Outstanding Students   2013
· First Prize of State Physics Competition for Undergraduate Students (China)   2013

Publications

1. Jingkai Chen, Brian C. Williams, and Chuchu Fan. Optimal mixed discrete-continuous planning for linear hybrid systems. In *The 24th ACM International Conference on Hybrid Systems: Computation and Control* (*HSCC 2021*), 2021

2. Jingkai Chen, Jiaoyang Li, Chuchu Fan, and Brian C. Williams. Scalable and safe multi-agent motion planning with nonlinear dynamics and bounded disturbances. In *Proceedings of the Thirty-Fifth AAAI Conference on Artificial Intelligence* (*AAAI 2021*), 2021

3. Jingkai Chen. Fast execution of temporal plans with mixed discrete-continuous state constraints, 2019

4. Jingkai Chen, Cheng Fang, David Wang, Andrew Wang, and Brian C. Williams. Efficiently exploring ordering problems through conflict-directed search. In *Proceedings of the International Conference on Automated Planning and Scheduling* (*ICAPS 2019*), volume 29, pages 97–105, 2019

5. Jingkai Chen, Cheng Fang, Christian J Muise, Howard Shrobe, Brian C. Williams, and Peng Yu. Radmax: Risk and deadline aware planning for maximum utility. In *AAAI Workshop on Artificial Intelligence for Cyber Security* (*AICS-2018*), 2018

Technical Skills

Programming Languages	Python, MATLAB, C++, Common Lisp
Technologies	ROS, PyBullet, Android, Arduino
Github	github.com/jkchengh

Leadership & Activities

3rd Summer School on Cognitive Robotics   University of Southern California, CA
Lecturer & Lab Assistant   *July.2019*

Designed lab and tutorials about the model based programming for autonomous systems with the applications in scientific exploration.

MIT-China Innovation and Entrepreneurship Forum   Cambridge, MA
Startup Mentor & Director & Vice President   *Feb.2017-Nov.2018*

Organized conference focusing on collaborations between China and the United States on innovation and entrepreneurship; Mentored and helped early-stage American startups to establish business in China.

Zhejiang University Internet of Things (IoT) Club   Hangzhou, China
Co-Founder & President   *Apr.2014 - Jun.2015*

Organized monthly events and invited renowned IT companies' executives to share their vision of Internet technologies; Organized Internet of Things innovation and entrepreneurial competition for commercializing research discoveries.

Tibetan Area Voluntary Teaching   Hongyuan, China
Team Leader   *Aug.2013 - Sep.2013*

Organized a voluntary teacher team with 11 people to remote Tibetan area in Hongyuan, China; provided detailed educational reports to the local government.

Selected Graduate Coursework

Autonomy and Robotics

16.413 Principles of Autonomy and Decision Making	Fall 2016
16.412 Cognitive Robotics	Spring 2017
16.322 Stochastic Estimation and Control	Fall 2017

Machine Learning and Optimization

6.252 Nonlinear Optimization	Spring 2017
6.867 Machine Learning	Fall 2017
6.435 Bayesian Modeling and Inference	Spring 2018