

# Jiaoyang Li

## Curriculum Vitae

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### Education

- 2017-Present **Ph.D. in Computer Science**, *University of Southern California (USC)*, Los Angeles, CA, USA.  
- Advisor: Sven Koenig.  
- Viterbi/Graduate School Fellowship.
- 2013-2017 **B.Eng. in Automation**, *Tsinghua University (THU)*, Beijing, China.  
- GPA: 91/100; Rank: 5/118.  
- Excellent Graduate Awards of Department of Automation, Tsinghua and of Beijing.

### Research Interests

I am interested in many topics related to Artificial Intelligence, such as combinatorial algorithms, heuristic search, scheduling and planning for robotics and transportation.

### Research Experience

- 2017-Present Research Assistant, **University of Southern California**, USA  
- Advisor: Sven Koenig, Department of Computer Science.
- 05/2019 Research Intern (14 weeks), **Amazon Robotics**, USA  
- Mentor: Andrew Tinka.  
- Project: Scalable algorithms for Multi-Agent Path Finding in warehouse applications.
- 12/2018 Visiting Student (3 weeks), **Ben-Gurion University**, Israel  
- Advisor: Ariel Felner, Department of Software and Information Systems Engineering.  
- Project: Heuristics for Multi-Agent Path Finding. Paper accepted by IJCAI, 2019.
- 08/2016 Visiting Student (5 weeks), **University of California, Berkeley**, USA  
- Advisor: Zuojun (Max) Shen, Department of Industrial Engineering and Operations Research.  
- Supported by Tsinghua Top Open Program and Tsinghua Spark Talents Program.  
- Project: Electric Taxi Fleets Dispatching System. Paper accepted by ITEC-AP, 2017.
- 06/2016 Visiting Student (6 weeks), **University of Southern California**, USA  
- Advisor: Sven Koenig, Department of Computer Science.  
- Supported by USC-Tsinghua Summer Research Program.  
- Project: Lifelong Multi-Agent Pickup and Delivery Problem. Paper accepted by AAMAS, 2017.
- 2014-2017 Research Assistant, **Tsinghua University**, China  
- Advisor: Jianming Hu, Department of Automation.  
- Project 1: Bus Routing and Scheduling Problem. Supported by Tsinghua Student Research Training program (with a Second Prize) and Chinese National Innovation and Entrepreneurship Training program (with an invited talk at the 10th National Innovation and Entrepreneurship Symposium). Paper accepted by TST, 2017.  
- Project 2 (Bachelor Thesis): Decision Making and Trajectory Planning for Teams of Autonomous Vehicles. Nominated for Best Bachelor Thesis Award.

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## Publications

### Conferences

- 2019 [C11] **J. Li**, E. Boyarski, A. Felner, H. Ma and S. Koenig. **Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding**. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, (in print), 2019. acceptance rate: 850/4752=17.9%.
- [C10] **J. Li**, A. Felner, S. Koenig and S. Kumar. **Using FastMap to Solve Graph Problems in a Euclidean Space** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS)*, (in print), 2019.
- [C9] **J. Li**, D. Harabor, P. Stuckey, A. Felner, H. Ma and S. Koenig. **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS)*, (in print), 2019.
- [C8] M. Liu, H. Ma, **J. Li** and S. Koenig. **Task and Path Planning for Multi-Agent Pickup and Delivery**. In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, (in print), 2019. Acceptance rate: 189/781=24.2%.
- [C7] **J. Li**, P. Surynek, A. Felner, H. Ma, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding for Large Agents**. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, (in print), 2019. Acceptance rate: 1150/7095=16.2%.
- [C6] **J. Li**, D. Harabor, P. Stuckey, H. Ma and S. Koenig. **Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding**. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, (in print), 2019. Acceptance rate: 1150/7095=16.2%.
- [C5] H. Ma, D. Harabor, P. Stuckey, **J. Li** and S. Koenig. **Searching with Consistent Prioritization for Multi-Agent Path Finding**. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, (in print), 2019. Acceptance rate: 1150/7095=16.2%.
- 2018 [C4] A. Felner, **J. Li**, E. Boyarski, H. Ma, L. Cohen, T. K. S. Kumar and S. Koenig. **Adding Heuristics to Conflict-Based Search for Multi-Agent Path Finding** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS)*, pages 83-87, 2018. Acceptance rate: 69/209=33.0%.
- [C3] H. Ma, G. Wagner, A. Felner, **J. Li**, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding with Deadlines**. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, pages 417-423, 2018. Acceptance rate: 710/3470=20.5%.
- 2017 [C2] H. Ma, **J. Li**, T. K. S. Kumar and S. Koenig. **Lifelong Multi-Agent Path Finding for Online Pickup and Delivery Tasks**. In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 837-845, 2017. Acceptance rate: 155/595=26.1%.
- [C1] Y. Jia, H. Chen, **J. Li**, F. He, M. Li, Z. Hu, and Z. Shen. **Planning for Electric Taxi Charging System from the Perspective of Transport Energy Supply Chain: A Data-Driven Approach in Beijing**. In *Proceedings of IEEE Transportation Electrification Conference & EXPO Asia-Pacific (ITEC-AP)*, pages 1-6, 2017.

### Journals

- 2017 [J1] **J. Li**, J. Hu and Y. Zhang. **Optimal Combinations and Variable Departure Intervals for Micro Bus System**. *Tsinghua Science and Technology (TST)*, 22(3):282-292, 2017.

### Symposiums, Forums and Workshops

- 2019 [W6] J. Wang, **J. Li**, H. Ma, S. Koenig and T. K. S. Kumar. **A New Constraint Satisfaction Perspective on Multi-Agent Path Finding**. In *Proceedings of the AAAI-19 Workshop on Multi-Agent Path Finding (WoMAPF)*, 2019.
- [W5] E. Boyarski, L. Cohen, **J. Li**, A. Felner and S. Koenig. **Using Incremental Search For The Low Level of Conflict-Based Search**. In *Proceedings of the AAAI-19 Workshop on Multi-Agent Path Finding (WoMAPF)*, 2019.

- [W4] J. Li, D. Harabor, P. Stuckey, A. Felner, H. Ma and S. Koenig. **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search**. In *Proceedings of the AAAI-19 Workshop on Multi-Agent Path Finding (WoMAPF)*, 2019.
- [W3] H. Ma, D. Harabor, P. Stuckey, J. Li and S. Koenig. **Searching with Consistent Prioritization for Multi-Agent Path Finding**. In *Proceedings of the AAAI-19 Workshop on Multi-Agent Path Finding (WoMAPF)*, 2019.
- [W2] R. Stern, N. R. Sturtevant, A. Feler, S. Koenig, H. Ma, T. Walker, J. Li, D. Atzmon, L. Cohen, T. K. S. Kuamr, E. Boyarski and R. Bartak. **Multi-Agent Pathfinding: Definitions, Variants, and Benchmarks** (position paper). In *Proceedings of the Symposium on Combinatorial Search (SoCS)*, (in print), 2019. Acceptance rate: 14/31=45.2%.
- [W1] J. Li, H. Zhang, M. Gong, Z. Liang, W. Liu, Z. Tong, L. Yi, R. Morris, C. Pasareanu and S. Koenig. **Scheduling and Airport Taxiway Path Planning under Uncertainty**. In *Proceedings of the AIAA Aviation and Aeronautics Forum and Exposition (AIAA AVIATION Forum)*, (in print), 2019.

#### Extended Abstracts

- 2019 [E5] J. Li, E. Boyarski, A. Felner, H. Ma and S. Koenig. **Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding: Preliminary Results** (extended abstract). In *Proceedings of the Symposium on Combinatorial Search (SoCS)*, (in print), 2019.
- [E4] J. Li, P. Surynek, A. Felner, H. Ma, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding for Large Agents** (extended abstract). In *Proceedings of the Symposium on Combinatorial Search (SoCS)*, (in print), 2019.
- [E3] J. Li, D. Harabor, P. Stuckey, H. Ma and S. Koenig. **Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding** (extended abstract). In *Proceedings of the Symposium on Combinatorial Search (SoCS)*, (in print), 2019.
- [E2] J. Wang, J. Li, H. Ma, S. Koenig and T. K. S. Kumar. **A New Constraint Satisfaction Perspective on Multi-Agent Path Finding: Preliminary Results** (extended abstract). In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, (in print), 2019.
- 2018 [E1] H. Ma, G. Wagner, A. Felner, J. Li, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding with Deadlines: Preliminary Results** (extended abstract). In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 2004–2006, 2018.

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## Honors and Awards

- 2019 Technology Commercialization Award, *USC Stevens Center for Innovation Technology*.
- 2018 Nomination of Microsoft Research Ada Lovelace Fellowship, *CS Department, USC*.
- 2017 Viterbi/Graduate School Fellowship, *USC*.
- 2017 Excellent Graduate Award of Beijing, *Beijing Municipal Education Commission*.
- 2016 Fellowship of USC-Tsinghua Summer Research Program, *Tsinghua and USC*.
- 2016 Top Open Program Summer Research Funding, *Tsinghua*.
- 2016 Tsinghua-AVIC Scholarship, *Tsinghua*.
- 2014-2016 3x Academic Excellence Award, *Tsinghua*.
- 2015 Fellowship of Spark Talents Program, *Tsinghua*.
- 2015 “12.9” Scholarship, *Tsinghua*.
- 2015 Weimin Zheng Scholarship, *Tsinghua*.
- 2014 Tsinghua-Evergrande Scholarship, *Tsinghua*.

#### Competition Awards

- 2016 Honorable Mention of Interdisciplinary Contest in Modeling.

- 2015 3rd Price in the 26th Beijing College Students Math Competition.
- 2014 3rd Price in the 31th Chinese National College Physics Competition.
- 2013 Silver Medal of the 28th Chinese Mathematical Olympiad (CMO) (Top 4 in Gansu Province).
- 2012 Silver Medal of the 26th Chinese Chemistry Olympiad (CChO) (Top 2 in Gansu Province).
- 2012 Silver Medal of the 11th Chinese Girls' Mathematical Olympiad (CGMO).

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## Academic Activities

### Conference and Workshop Program Committee

- 2019 IJCAI Workshop on Multi-Agent Path Finding (WoMAPF)
- 2019 International Conference on Autonomic and Autonomous Systems (ICAS)

### Conference and Workshop Reviewer

- 2019 International Joint Conference on Artificial Intelligence (IJCAI)
- 2019 International Conference on Automated Planning and Scheduling (ICAPS)
- 2019 International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)
- 2018, 2019 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)
- 2018, 2019 International Symposium on Combinatorial Search (SoCS)
- 2018 AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)
- 2018 ACM Siggraph Conference on Motion, Interaction and Games (MIG)
- 2018 IEEE Conference on Computational Intelligence and Games (CIG)
- 2018 ICAPS Workshop on Planning and Robotics (PlanRob)

### Journal Reviewer

- 2019 IEEE Robotics and Automation Letters (RA-L)
- 2017 Tsinghua Science and Technology (TST)

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## Teaching and Mentoring Experience

### Teaching Assistant

- Fall 2019 Introduction to Artificial Intelligence, CSCI360 at USC.

### Student Mentor

- Summer, Fall 2018 Jiangxing Wang (Undergraduate Student in Computer Science at USC), *Directed Research Project*.
- Summer 2018 Minghua Liu (Undergraduate Student in Computer Science at Tsinghua University, Now a PhD student at UCSD), *USC-Tsinghua Summer Research Program*.

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## Talks and Presentations

- 2019 International Joint Conference on Artificial Intelligence (IJCAI)
- 2019 International Conference on Automated Planning and Scheduling (ICAPS)

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## Professional Skills

- Programming Proficient in C/C++, Python and MATLAB. Familiar with C#, Java, R, VHDL and Verilog.
- Languages Proficient in English. Native in Mandarin Chinese.