Jiaoyang Li

Curriculum Vitae

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Current Appointment

2022-present	Assistant Professor,	**Robotics Institute, Carnegie Mellon University (CMU)**, USA.

Education

2017-2022	Ph.D. in Computer Science,	**University of Southern California (USC)**, USA
2013-2017	B.Eng. in Automation,	**Tsinghua University**, China

Research Experience

2017-2022	Research Assistant, - Advisor: Sven Koenig,	**University of Southern California**, USA. Department of Computer Science.
02/2020	Visiting Researcher (11 months), - Host: Daniel Harabor and Peter J. Stuckey,	**Monash University**, Australia. Faculty of Information Technology.
05/2019	Research Intern (14 weeks), - Mentor: Andrew Tinka; Supervisor: Joseph W. Durham.	**Amazon Robotics**, USA.
12/2018, 11/2019	Visiting Student (twice, 5 weeks in total), - Advisor: Ariel Felner,	**Ben-Gurion University**, Israel. Department of Software and Information Systems Engineering.
08/2016	Visiting Student (5 weeks), - Advisor: Zuojun (Max) Shen,	**University of California, Berkeley**, USA. Department of Industrial Engineering and Operations Research.
06/2016	Visiting Student (6 weeks), - Advisor: Sven Koenig,	**University of Southern California**, USA. Department of Computer Science.

Honors and Awards

2023	Best Dissertation Award,	*International Conference on Automated Planning and Scheduling*.
2023	Best Student Paper Award Runner Up,	*International Conference on Automated Planning and Scheduling*.
2023	William F. Ballhaus, Jr. Prize for Best Dissertation,	*USC Viterbi School of Engineering*.
2023	Victor Lesser Distinguished Dissertation Award,	*International Foundation for Autonomous Agents and Multiagent Systems*.
2023	AAAI New Faculty Highlights,	*AAAI Conference on Artificial Intelligence*.
2021	Selected Participant for Rising Stars: An Academic Career Workshop in EECS,	*MIT*.
2021	Best System Demonstration Award,	*International Conference on Automated Planning and Scheduling*.
2021	WiSE Merit Award for Doctoral Students (4 recipients in Viterbi School of Engineering),	*USC*.
2021	Best Research Assistant Award (2 recipients in Computer Science Department),	*USC*.
2020	Winner Team (team leader) of both rounds of the Flatland Challenge: NeurIPS Competition on Multi-Agent Reinforcement Learning on Trains (>700 participants with >2000 submissions over 4 months), *Conference on Neural Information Processing Systems*.	
2020	Outstanding Student Paper Award,	*International Conference on Automated Planning and Scheduling*.
2020	WiSE Qualcomm Top-Off Fellowship (8 recipients in Viterbi School of Engineering),	*USC*.
2018	Technology Commercialization Award,	*USC*.
2017	Viterbi/Graduate School Fellowship,	*USC*.
2017	Excellent Graduate Award of Beijing,	*Beijing Municipal Education Commission*.
2017	Excellent Graduate Award of Department of Automation,	*Tsinghua*.
2015	Fellowship of Spark Talents Program (50 recipients in Tsinghua),	*Tsinghua*.

2015 "12.9" Scholarship (1 recipient in Department of Automation), *Tsinghua.*
2015 Weimin Zheng Scholarship (2 recipients in Department of Automation), *Tsinghua.*

Publications

Conferences

2023 **[C47] Multi-Robot Coordination and Layout Design for Automated Warehousing**.
Yulun Zhang, Matthew Fontaine, Varun Bhatt, Stefanos Nikolaidis and <u>Jiaoyang Li</u>.
International Joint Conference on Artificial Intelligence (**IJCAI**), (in print), 2023.
Acceptance rate: 15%.

[C46] Binary Branching Multi-Objective Conflict-Based Search for Multi-Agent Path Finding.
Zhongqiang Ren, <u>Jiaoyang Li</u>, Han Zhang, Sven Koenig, Sivakumar Rathinam and Howie Choset.
International Conference on Automated Planning and Scheduling (**ICAPS**), (in print), 2023.
Acceptance rate: $79/258 = 30.6\%$.

[C45] Deadline-Aware Multi-Agent Tour Planning. Best Student Paper Award Runner Up.
Taoan Huang, Vikas Shivashankar, Michael Caldara, Joseph W. Durham, <u>Jiaoyang Li</u>, Bistra Dilkina and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), (in print), 2023.
Acceptance rate: $79/258 = 30.6\%$.

[C44] Beyond Pairwise Reasoning in Multi-Agent Path Finding.
Bojie Shen, Zhe Chen, <u>Jiaoyang Li</u>, Muhammad Aamir Cheema, Daniel Harabor and Peter J. Stuckey.
International Conference on Automated Planning and Scheduling (**ICAPS**), (in print), 2023.
Acceptance rate: $79/258 = 30.6\%$.

[C43] Cost Splitting for Multi-Objective Conflict-Based Search.
Cheng Ge, Han Zhang, <u>Jiaoyang Li</u> and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), (in print), 2023.
Acceptance rate: $79/258 = 30.6\%$.

[C42] Exact Anytime Multi-Agent Path Finding Using Branch-and-Cut-and-Price and Large Neighborhood Search (short paper).
Edward Lam, Daniel Harabor, Peter J. Stuckey and <u>Jiaoyang Li</u>.
International Conference on Automated Planning and Scheduling (**ICAPS**), (in print), 2023.
Acceptance rate: $79/258 = 30.6\%$.

[C41] Intersection Coordination with Priority-Based Search for Autonomous Vehicles.
<u>Jiaoyang Li</u>, The Anh Hoang, Eugene Lin, Hai L. Vu and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), (in print), 2023.
Acceptance rate: $1,721/8,777 = 19.6\%$.

2022 **[C40] Multi-Goal Multi-Agent Pickup and Delivery**.
Qinghong Xu, <u>Jiaoyang Li</u>, Sven Koenig and Hang Ma.
IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), pages 9964-9971, 2022.

[C39] A MIP-Based Approach for Multi-Robot Geometric Task-and-Motion Planning.
Hejia Zhang, Shao-Hung Chan, Jie Zhong, <u>Jiaoyang Li</u>, Sven Koenig and Stefanos Nikolaidis.
IEEE International Conference on Automation Science and Engineering (**CASE**), pages 2102-2109, 2022.

[C38] Which MAPF Model Works Best for Automated Warehousing?
Sumanth Varambally, <u>Jiaoyang Li</u> and Sven Koenig.
Symposium on Combinatorial Search (**SoCS**), pages 190-198, 2022.
Acceptance rate: $31/79 = 39.2\%$.

[C37] Learning a Priority Ordering for Prioritized Planning in Multi-Agent Path Finding.
Shuyang Zhang, <u>Jiaoyang Li</u>, Taoan Huang, Sven Koenig and Bistra Dilkina.
Symposium on Combinatorial Search (**SoCS**), pages 208-216, 2022.
Acceptance rate: $31/79 = 39.2\%$.

[C36] Multi-Train Path Finding Revisited.
Zhe Chen, <u>Jiaoyang Li</u>, Daniel Harabor, Peter Stuckey and Sven Koenig.
Symposium on Combinatorial Search (**SoCS**), pages 38-46, 2022.
Acceptance rate: $31/79 = 39.2\%$.

[C35] **Mutex Propagation in Multi-Agent Path Finding for Large Agents** (short paper).
Han Zhang, Yutong Li, **Jiaoyang Li**, T. K. Satish Kumar and Sven Koenig.
Symposium on Combinatorial Search (**SoCS**), pages 249-253, 2022.
Acceptance rate: $31/79 = 39.2\%$.

[C34] **Optimal and Bounded-Suboptimal Multi-Goal Task Assignment and Path Finding**.
Xinyi Zhong, **Jiaoyang Li**, Sven Koenig and Hang Ma.
IEEE International Conference on Robotics and Automation (**ICRA**), pages 10731-10737, 2022.

[C33] **Multi-Agent Path Finding for Precedence-Constrained Goal Sequences**.
Han Zhang*, Jingkai Chen*, **Jiaoyang Li**, Brian C. Williams and Sven Koenig.
International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**), pages 1464-1472, 2022.
Acceptance rate: $166/629 = 26.4\%$.

[C32] **MAPF-LNS2: Fast Repairing for Multi-Agent Path Finding via Large Neighborhood Search**.
Jiaoyang Li, Zhe Chen, Daniel Harabor, Peter J. Stuckey and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 10256-10265, 2022.
Acceptance rate: $1,349/9,251 = 14.9\%$.

[C31] **Anytime Multi-Agent Path Finding via Machine Learning-Guided Large Neighborhood Search**.
Taoan Huang, **Jiaoyang Li**, Sven Koenig and Bistra Dilkina.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 9368-9376, 2022.
Acceptance rate: $1,349/9,251 = 14.9\%$.

[C30] **Shard Systems: Scalable, Robust and Persistent Multi-Agent Path Finding with Performance Guarantees**.
Christopher Leet, **Jiaoyang Li** and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 9386-9395, 2022.
Acceptance rate: $1,349/9,251 = 14.9\%$.

[C29] **Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding**.
Shao-Hung Chan, **Jiaoyang Li**, Graeme Gange, Daniel Harabor, Peter J. Stuckey and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 9313-9322, 2022.
Acceptance rate: $1,349/9,251 = 14.9\%$.

2021 [C28] **Anytime Multi-Agent Path Finding via Large Neighborhood Search**.
Jiaoyang Li, Zhe Chen, Daniel Harabor, Peter J. Stuckey and Sven Koenig.
International Joint Conference on Artificial Intelligence (**IJCAI**), pages 4127-4135, 2021.
Acceptance rate: $587/4204 = 13.9\%$.

[C27] **Scalable Rail Planning and Replanning: Winning the 2020 Flatland Challenge**. Winner of the Flatland Challenge at NeurIPS'20.
Jiaoyang Li, Zhe Chen, Yi Zheng, Shao-Hung Chan, Daniel Harabor, Peter J. Stuckey, Hang Ma and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 477-485, 2021.

[C26] **Conflict-Based Increasing Cost Search**.
Thayne T. Walker, Nathan R. Sturtevant, Ariel Felner, Han Zhang, **Jiaoyang Li** and T. K. Satish Kumar.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 385-395, 2021.

[C25] **EECBS: A Bounded-Suboptimal Search for Multi-Agent Path Finding**.
Jiaoyang Li, Wheeler Ruml and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 12353-12362, 2021.
Acceptance rate: $1692/7911 = 21.4\%$.

[C24] **Lifelong Multi-Agent Path Finding in Large-Scale Warehouses**.
Jiaoyang Li, Andrew Tinka, Scott Kiesel, Joseph W. Durham, T. K. Satish Kumar and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 11272-11281, 2021.
Acceptance rate: $1692/7911 = 21.4\%$.

[C23] **Scalable and Safe Multi-Agent Motion Planning with Nonlinear Dynamics and Bounded Disturbances**.
Jingkai Chen, **Jiaoyang Li**, Chuchu Fan and Brian Williams.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 11237-11245, 2021.
Acceptance rate: $1692/7911 = 21.4\%$.

[C22] **Symmetry Breaking for k-Robust Multi-Agent Path Finding**.
Zhe Chen, Daniel Harabor, <u>Jiaoyang Li</u> and Peter J. Stuckey.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 12267-12274, 2021.
Acceptance rate: $1692/7911 = 21.4\%$.

2020 [C21] **Flatland Competition 2020: MAPF and MARL for Efficient Train Coordination on a Grid World**.
Florian Laurent, Manuel Schneider, Christian Scheller, Jeremy Watson, <u>**Jiaoyang Li**</u>, Zhe Chen, Yi Zheng, Shao-Hung Chan, Konstantin Makhnev, Oleg Svidchenko, Vladimir Egorov, Dmitry Ivanov, Aleksei Shpilman, Evgenija Spirovska, Oliver Tanevski, Aleksandar Nikov, Ramon Grunder, David Galevski, Jakov Mitrovski, Guillaume Sartoretti, Zhiyao Luo, Mehul Damani, Nilabha Bhattacharya, Shivam Agarwal, Adrian Egli, Erik Nygren and Sharada Mohanty.
NeurIPS 2020 Competition and Demonstration Track, Proceedings of Machine Learning Research (**PMLR**), volume 133, pages 275-301, 2020.

[C20] **Mutex Propagation for SAT-Based Multi-Agent Path Finding**.
Pavel Surynek, <u>**Jiaoyang Li**</u>, Han Zhang, T. K. Satish Kumar and Sven Koenig.
International Conference on Principles and Practice of Multi-Agent Systems (**PRIMA**), pages 248-258, 2020.
Acceptance rate: $19/50 = 38.0\%$.

[C19] **Multi-Directional Heuristic Search**.
Dor Atzmon, <u>**Jiaoyang Li**</u>, Ariel Felner, Eliran Nachmani, Shahaf Shperberg, Nathan R. Sturtevant and Sven Koenig.
International Joint Conference on Artificial Intelligence (**IJCAI**), pages 4062-4068, 2020.
Acceptance rate: $592/4717 = 12.6\%$.

[C18] **Iterative-Deepening Conflict-Based Search**.
Eli Boyarski, Ariel Felner, Daniel Harabor, Peter J. Stuckey, Liron Cohen, <u>**Jiaoyang Li**</u> and Sven Koenig.
International Joint Conference on Artificial Intelligence (**IJCAI**), pages 4084-4090, 2020.
Acceptance rate: $592/4717 = 12.6\%$.

[C17] **New Techniques for Pairwise Symmetry Breaking in Multi-Agent Path Finding**.
<u>**Jiaoyang Li**</u>, Graeme Gange, Daniel Harabor, Peter J. Stuckey, Hang Ma and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 193-201, 2020.
Acceptance rate: $69/216 = 31.9\%$.

[C16] **Multi-Agent Pathfinding with Mutex Propagation**. Outstanding Student Paper Award.
Han Zhang, <u>**Jiaoyang Li**</u>, Pavel Surynek, Sven Koenig and T. K. Satish Kumar.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 323-332, 2020.
Acceptance rate: $69/216 = 31.9\%$.

[C15] **Moving Agents in Formation in Congested Environments**.
<u>**Jiaoyang Li**</u>, Kexuan Sun, Hang Ma, Ariel Felner, T. K. Satish Kumar and Sven Koenig.
International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**), pages 726-734, 2020.
Acceptance rate: $186/808 = 23.0\%$.

[C14] **Model AI Assignments 2020**.
Todd W.Neller, Stephen Keeley, Michael Guerzhoy, Wolfgang Hoenig, <u>**Jiaoyang Li**</u>, Sven Koenig, Ameet Soni, Krista Thomason, Lisa Zhang, Bibin Sebastian, Cinjon Resnick, Avital Oliver, Surya Bhupatiraju, Kumar Krishna Agrawal, James Allingham, Sejong Yoon, Johnathan Chen, Tom Larsen, Marion Neumann, Narges Norouzi, Ryan Hausen and Matthew Evett.
Symposium on Educational Advances in Artificial Intelligence (**EAAI**), 2020.

2019 [C13] **Scheduling and Airport Taxiway Path Planning under Uncertainty**.
<u>**Jiaoyang Li**</u>, Han Zhang, Mimi Gong, Zi Liang, Weizi Liu, Zhongyi Tong, Liangchen Yi, Robert Morris, Corina Pasareanu and Sven Koenig.
AIAA Aviation and Aeronautics Forum and Exposition (**AIAA AVIATION Forum**), 2019.

[C12] **Multi-Agent Pathfinding: Definitions, Variants, and Benchmarks** (position paper).
Roni Stern, Nathan R. Sturtevant, Ariel Felner, Sven Koenig, Hang Ma, Thayne T. Walker, <u>**Jiaoyang Li**</u>, Dor Atzmon, Liron Cohen, T. K. Satish Kumar, Eli Boyarski and Roman Bartak.
Symposium on Combinatorial Search (**SoCS**), pages 151-159, 2019.
Acceptance rate: $14/31 = 45.2\%$.

[C11] **Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding**.
<u>Jiaoyang Li</u>, Ariel Felner, Eli Boyarski, Hang Ma and Sven Koenig.
International Joint Conference on Artificial Intelligence (**IJCAI**), pages 442-449, 2019.
Acceptance rate: $850/4752 = 17.9\%$.

[C10] **Using FastMap to Solve Graph Problems in a Euclidean Space** (short paper).
<u>Jiaoyang Li</u>, Ariel Felner, Sven Koenig and T. K. Satish Kumar.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 273-278, 2019.

[C9] **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search** (short paper).
<u>Jiaoyang Li</u>, Daniel Harabor, Peter J. Stuckey, Ariel Felner, Hang Ma and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 279-283, 2019.

[C8] **Task and Path Planning for Multi-Agent Pickup and Delivery**.
Minghua Liu, Hang Ma, <u>Jiaoyang Li</u> and Sven Koenig.
International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**), pages 1152-1160, 2019.
Acceptance rate: $189/781 = 24.2\%$.

[C7] **Multi-Agent Path Finding for Large Agents**.
<u>Jiaoyang Li</u>, Pavel Surynek, Ariel Felner, Hang Ma, T. K. Satish Kumar and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 7627-7634, 2019.
Acceptance rate: $1150/7095 = 16.2\%$.

[C6] **Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding**.
<u>Jiaoyang Li</u>, Daniel Harabor, Peter J. Stuckey, Hang Ma and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 6087-6095, 2019.
Acceptance rate: $1150/7095 = 16.2\%$.

[C5] **Searching with Consistent Prioritization for Multi-Agent Path Finding**.
Hang Ma, Daniel Harabor, Peter J. Stuckey, <u>Jiaoyang Li</u> and Sven Koenig.
AAAI Conference on Artificial Intelligence (**AAAI**), pages 7643-7650, 2019.
Acceptance rate: $1150/7095 = 16.2\%$.

2018 [C4] **Adding Heuristics to Conflict-Based Search for Multi-Agent Path Finding** (short paper).
Ariel Felner, <u>Jiaoyang Li</u>, Eli Boyarski, Hang Ma, Liron Cohen, T. K. Satish Kumar and Sven Koenig.
International Conference on Automated Planning and Scheduling (**ICAPS**), pages 83-87, 2018.
Acceptance rate: $69/209 = 33.0\%$.

[C3] **Multi-Agent Path Finding with Deadlines**.
Hang Ma, G. Wagner, Ariel Felner, <u>Jiaoyang Li</u>, T. K. Satish Kumar and Sven Koenig.
International Joint Conference on Artificial Intelligence (**IJCAI**), pages 417-423, 2018.
Acceptance rate: $710/3470 = 20.5\%$.

2017 [C2] **Lifelong Multi-Agent Path Finding for Online Pickup and Delivery Tasks**.
Hang Ma, <u>Jiaoyang Li</u>, T. K. Satish Kumar and Sven Koenig.
International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**), pages 837-845, 2017.
Acceptance rate: $155/595 = 26.1\%$.

[C1] **Planning for Electric Taxi Charging System from the Perspective of Transport Energy Supply Chain: A Data-Driven Approach in Beijing**.
Yinghao Jia, Huimiao Chen, <u>Jiaoyang Li</u>, Fang He, Meng Li, Zechun Hu and Zuo-Jun Max Shen.
IEEE Transportation Electrification Conference & EXPO Asia-Pacific (**ITEC-AP**), pages 1-6, 2017.

Journals

2023 [J4] **Conflict-Tolerant and Conflict-Free Multi-Agent Meeting**.
Dor Atzmon, Ariel Felner, <u>Jiaoyang Li</u>, Shahaf Shperberg, Nathan Sturtevant and Sven Koenig.
Artificial Intelligence, (in print), 2023.

2022 [J3] **Multi-Agent Path Finding with Mutex Propagation**.
Han Zhang, <u>Jiaoyang Li</u>, Pavel Surynek, T. K. Satish Kumar and Sven Koenig.
Artificial Intelligence, volume 311, page 1034766, 2022.

2021 [J2] **Pairwise Symmetry Reasoning for Multi-Agent Path Finding Search**.
<u>Jiaoyang Li</u>, Daniel Harabor, Peter J. Stuckey, Hang Ma, Graeme Gange and Sven Koenig.
Artificial Intelligence, volume 301, page 103574, 2021.

2017 [J1] **Optimal Combinations and Variable Departure Intervals for Micro Bus System**.
<u>Jiaoyang Li</u>, Jianming Hu and Yi Zhang.
Tsinghua Science and Technology (**TST**), 22(3):282-292, 2017.

Book Chapters

2021 [B1] **Artificial Intelligence and Automation**.
Sven Koenig, Shao-Hung Chan, <u>Jiaoyang Li</u> and Yi Zheng.
In Handbook of Automation, Shimon Y. Nof (editor), Springer, 2021.

Workshops

Workshop papers with a conference version are not listed below.

2023 [W3] **Load Balancing in Distributed Multi-Agent Path Finder (DMAPF)**.
Poom Pianpak, <u>Jiaoyang Li</u> and Tran Cao Son.
AAMAS Workshop on Engineering Multi-Agent Systems (**EMAS**), 2023.

2021 [W2] **A Hierarchical Approach to Multi-Agent Path Finding**.
Han Zhang, Mingze Yao, Ziang Liu, <u>Jiaoyang Li</u>, Lucas Terr, Shao-Hung Chan, T. K. Satish Kumar and Sven Koenig.
ICAPS Workshop on Hierarchical Planning (**HPLAN**), 2021.

2020 [W1] **Nested ECBS for Bounded Suboptimal Multi-Agent Path Finding**.
Shao-Hung Chan, <u>Jiaoyang Li</u>, Daniel Harabor, Peter J. Stuckey, Graeme Gange, Liron Cohen and Sven Koenig.
IJCAI Workshop on Multi-Agent Path Finding (**WoMAPF**), 2020.

Demos

2021 [D1] **Scalable Rail Planning and Replanning: Winning the 2020 Flatland Challenge**. Best System Demonstration Award.
<u>Jiaoyang Li</u>, Zhe Chen, Yi Zheng, Shao-Hung Chan, Daniel Harabor, Peter J. Stuckey, Hang Ma and Sven Koenig.
System Demonstrations and Exhibits Program at International Conference on Automated Planning and Scheduling (**ICAPS**), 2021.

Extended Abstracts

Extended abstracts with a conference or workshop version are not listed below.

2023 [E2] **A Fast Rescheduling Algorithm for Real-time Multi-robot Coordination** (extended abstract).
Adittyo Paul, Ying Feng and <u>Jiaoyang Li</u>.
Symposium on Combinatorial Search (**SoCS**), (in print), 2023.

2019 [E1] **A New Constraint Satisfaction Perspective on Multi-Agent Path Finding: Preliminary Results** (extended abstract).
Jiangxing Wang, <u>Jiaoyang Li</u>, Hang Ma, Sven Koenig and T. K. Satish Kumar.
International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**), pages 2253-2255, 2019.
Acceptance rate: 407/781=52.1%.

Media Coverage

03/2021	Making the (Virtual) Trains Run On Time: USC Team World Champs in AI Challenge,	USC Press
05/2020	Amazon Studies Anti-Collision Method for Robots to Increase Throughput,	Supply Chain Dive
05/2020	Amazon's AI Tool Can Plan Collision-Free Paths for 1,000 Warehouse Robots,	Venture Beat
	- *Also distributed via ACM TechNews*.	

Teaching

Teaching at CMU

Fall 2023   Manipulation, Estimation, and Control, 16-642 (graduate level) -revised.
Spring 2023   Multi-Robot Planning and Coordination, 16-891 (graduate level) -new.

Teaching Assistants at USC

Summer 2021   Research Coach at Viterbi Summer Institute (VSI).
- *A program designed to enhance the transition of engineering students from underrepresented backgrounds to USC.*

Spring 2021   Teaching Assistant at Advanced Analysis of Algorithms, CSCI670 (graduate level).

Fall 2019   Teaching Assistant at Introduction to Artificial Intelligence, CSCI360 (undergraduate level).   USC

Summer 2019   Lab Assistant at the Third Summer School on Cognitive Robotics.
- *Co-developed a lab project on multi-agent path finding, which was later chosen as a Model AI Assignment 2020 by the Symposium on Educational Advances in Artificial Intelligence.*

Student Supervision and Advising

Ph.D. Students at CMU

2023-present   Yorai Shaoul (Ph.D. in Robotics), co-advised with Maxim Likhachev

2022-present   Yulun Zhang (Ph.D. in Robotics)

Master's Students at CMU

2023-present   He Jiang (Master of Science in Robotics)

2023-present   Jingtian Yan (Master in Electrical & Computer Engineering)

2022-present   Harvey Mei (Master of Science in Mechanical Engineering - Research)

2022-2023   Yimin Tang (Master of Science in Robotics)

Undergraduate Students at CMU

2023-present   Fangji Wang (Undergraduate in Mechanical Engineering at Tsinghua University)

2023-present   Yifan Su (CS Undergraduate)

2022-present   Adittyo Paul (CS Undergraduate w/ Concentration in Machine Learning and Minor in Statistics)

2022-present   Ying Feng (CS Undergraduate w/ Minor in Algorithms and Complexity Theory)

M.S. Thesis Committee at CMU

2023   Ziwen Ye (Master of Science in Computer Science-Research)
Evolutionary Topology in Truss Optimization via Dissolvable Beams, Lining Yao

2023   Yimin Tang (Master of Science in Robotics),
Solving Multi-Agent Target Assignment and Path Finding with a Single Constraint Tree, Katia Sycara

Undergraduate and Master's Students at USC

2021-2022   Sumanth Varambally (Undergraduate Student at Indian Institute of Technology Delhi), *IUSSTF-Viterbi Summer Research Program.*
- *His paper was published at SoCS'22.*

2021-2022   Shuyang Zhang (Undergraduate Student at USC), *Center for Undergraduate Research in Viterbi Engineering (CURVE) Program.*
- *Her poster was selected as a winner of the CURVE Symposium at USC.*
- *She won a Best Research Award in Computer Science at USC.*
- *Her paper was published at SoCS'22.*

2021   Qinghong Xu (Master's Student at Simon Fraser University).
- *Her paper was published at IROS'22.*

2020-2021   Xinyi Zhong (Master's Student at Simon Fraser University).
- *Her paper was published at ICRA'22.*

2020-2021   Eugene (Zijun) Lin (Master's Student at USC).
- *His paper was published at AAAI'23.*

2018   Jiangxing Wang (Master's Student at USC), *Directed Research Project.*
- *He won a Best Research Award in Computer Science at USC.*
- *His paper was published at AAMAS'19.*

Summer 2018   Minghua Liu (Undergraduate Student at Tsinghua University), *USC-Tsinghua Summer Research Program.*
- *His paper was published at AAMAS'19.*

Academic Activities

Conference and Workshop Organizing Committee

2024	System Demonstration Track Co-Chair at International Conference on Automated Planning and Scheduling (ICAPS)
2024	Co-Chair at Symposium of Combinatorial Search (SoCS)
2023	AAAI Fall Symposium on Agent Teaming in Mixed-Motive Situations
2023	Doctoral Consortium Co-Chair at Symposium of Combinatorial Search (SoCS)
2023	Co-chair at AAAI Workshop on Multi-Agent Path Finding (WoMAPF)
2022, 2023	Co-chair at AAMAS Workshop on Optimization and Learning in Multi-Agent Systems (OptLearnMAS)
2022	Local organizing committee at International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR)
2020	Co-chair at IJCAI Workshop on Multi-Agent Path Finding (WoMAPF)

Conference Senior Program Committee

2021	PC and Senior PC at International Joint Conference on Artificial Intelligence (IJCAI)

Conference and Workshop Program Committee

2024	Student Program at AAAI Conference on Artificial Intelligence (AAAI)
2021-2024	AAAI Conference on Artificial Intelligence (AAAI)
2023	Robotics: Science and Systems (RSS)
2023	International Symposium on Combinatorial Search (SoCS)
2023	International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)
2022, 2023	International Conference on the Integration of Constraint Programming, Artificial Intelligence, and Operations Research (CPAIOR)
2021-2023	International Conference on Automated Planning and Scheduling (ICAPS)
2021-2023	Special track on Autonomous Robots and Agents at International Conference of the Florida Artificial Intelligence Research Society (FLAIRS)
2020,2022,2023	International Joint Conference on Artificial Intelligence (IJCAI)
2021	System demonstrations track at International Conference on Automated Planning and Scheduling (ICAPS)
2019, 2020	International Conference on Autonomic and Autonomous Systems (ICAS)
2019	IJCAI Workshop on Multi-Agent Path Finding (WoMAPF)

Conference and Workshop Reviewer (of Individual Papers)

2023	Workshop Proposal for IEEE International Conference on Robotics and Automation (ICRA)
2021-2023	4x IEEE International Conference on Robotics and Automation (ICRA)
2021	2x IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS)
2021	IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
2021	Undergraduate Consortium at AAAI Conference on Artificial Intelligence (AAAI-UC)
2018-2021	3x AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)
2020	Workshop on the Algorithmic Foundations of Robotics (WAFR)
2019	Global Conference on Artificial Intelligence (GCAI)
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	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

2021,2023	Journal of Artificial Intelligence Research (JAIR)
2022	Autonomous Agents and Multi-Agent Systems (JAAMAS)
2022	2x IEEE Transactions on Robotics (T-RO)
2021,2022	3x Artificial Intelligence (AIJ)
2019-2022	6x IEEE Robotics and Automation Letters (RA-L)
2020,2021	IEEE Transactions on Automation Science and Engineering (T-ASE)
2020	IEEE Transactions on Control of Network Systems (TCNS)
2020	Journal of Aerospace Information Systems (JAIS)
2020	Aerospace Lab (AL)
2017	Tsinghua Science and Technology (TST)

Grant Proposal Reviewer

2022	Natural Sciences and Engineering Research Council of Canada - Discovery Grants Program

Others

2022	Invited Panelist of Academic Job Market at SCS, CMU
2022	Chair of Session (16a) "Multi-Agent Planning" at International Conference on Automated Planning and Scheduling (ICAPS)
2021	Mentor of the WiSE PhD Mentorship Program at USC
2021	Judge of the Symposium of the Center for Undergraduate Research in Viterbi Engineering (CURVE) Program at USC
2021	Invited Panelist of Grad Student Panel at AAAI Undergraduate Consortium
2020	Invited Panelist of Flatland Townhall Panel at NeurIPS Competition Track

Talks and Presentations

Invited Talks

05/2023	**Large-Scale Multi-Agent Path Finding** (virtual). OMRON corporation.
04/2023	**Large-Scale Multi-Agent Path Finding** (virtual). Robotics and Controls Seminar at the University of North Carolina at Charlotte.
06/2022	**Intelligent Planning for Large-Scale Multi-Agent Coordination** (virtual). AAAI'23 New Faculty Highlights.
06/2022	**Intelligent Planning for Large-Scale Multi-Agent Coordination** (virtual). ICAPS'22 Workshop on Heuristics and Search for Domain-independent Planning.
03/2022	**Introduction to Multi-Agent Path Finding** (virtual). Guest Lecturer at the MIT Course on Cognitive Robotics.
03/2021	**Large Scale Multi-Agent Path Finding** (virtual, in Chinese). AI TIME.
10/2019	**Fast and Realistic Multi-Agent Path Finding**. Amazon Research Awards - Robotics Symposium.

Conference Tutorials

05/2022	AAMAS tutorial on **Recent Advances in Multi-Agent Path Finding** (with Daniel Harabor, Sven Koenig, and Ariel Felner).
02/2022	AAAI tutorial on **Recent Advances in Multi-Agent Path Finding** (with Daniel Harabor, Sven Koenig, and Ariel Felner).

Paper Presentations at Conferences and Symposiums

07/2023	**Efficient and Effective Techniques for Large-Scale Multi-Agent Path Finding** (dissertation award talk). International Conference on Automated Planning and Scheduling (ICAPS).
06/2023	**Efficient and Effective Techniques for Large-Scale Multi-Agent Path Finding** (dissertation award talk). International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).
02/2023	**Intersection Coordination with Priority-Based Search for Autonomous Vehicles**. AAAI Conference on Artificial Intelligence (AAAI).

02/2022   **MAPF-LNS2: Repairing Multi-Agent Path Finding via Large Neighborhood Search** (virtual). AAAI Conference on Artificial Intelligence (AAAI).

08/2021   **Anytime Multi-Agent Path Finding via Large Neighborhood Search** (virtual). International Joint Conference on Artificial Intelligence (IJCAI).

08/2021   **Scalable Rail Planning and Replanning: Winning the 2020 Flatland Challenge** (virtual). International Conference on Automated Planning and Scheduling (ICAPS).

02/2021   **EECBS: A Bounded-Suboptimal Search on Multi-Agent Path Finding** (virtual). AAAI Conference on Artificial Intelligence (AAAI).

02/2021   **Lifelong Multi-Agent Path Finding in Large-Scale Warehouses** (virtual). AAAI Conference on Artificial Intelligence (AAAI).

12/2020   **Winning the 2020 Flatland Challenge** (virtual). Conference on Neural Information Processing Systems (NeurIPS).

10/2020   **New Techniques for Pairwise Symmetry Breaking in Multi-Agent Path Finding** (virtual). International Conference on Automated Planning and Scheduling (ICAPS).

10/2020   **Pairwise Symmetry Reasoning for Multi-Agent Path Finding** (virtual). Doctoral Consortium at the International Conference on Automated Planning and Scheduling (ICAPS).

05/2020   **Moving Agents in Formation in Congested Environments** (virtual). Symposium on Combinatorial Search (SoCS).

05/2020   **New Techniques for Pairwise Symmetry Breaking in Multi-Agent Path Finding** (virtual). Symposium on Combinatorial Search (SoCS).

05/2020   **Moving Agents in Formation in Congested Environments** (virtual). International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).

05/2020   **Lifelong Multi-Agent Path Finding in Large-Scale Warehouses** (virtual). International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).

02/2020   **A Project on Multi-Agent Path Finding**. Educational Advances in Artificial Intelligence (EAAI).

08/2019   **Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding**. International Joint Conference on Artificial Intelligence (IJCAI).

08/2019   **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search**. IJCAI-19 Workshop on Multi-Agent Path Finding (WoMAPF).

07/2019   **Using FastMap to Solve Graph Problems in a Euclidean Space**. International Conference on Automated Planning and Scheduling (ICAPS).

07/2019   **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search**. International Conference on Automated Planning and Scheduling (ICAPS).

01/2019   **Multi-Agent Path Finding for Large Agents**. AAAI Conference on Artificial Intelligence (AAAI).

01/2019   **Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding**. AAAI Conference on Artificial Intelligence (AAAI).