

# Hang Ma

## Curriculum Vitæ

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### EDUCATION

- 2014– **Ph.D. Computer Science**, *University of Southern California*, Los Angeles, CA, United States.  
Advisor: Sven Koenig.
- 2012–2014 **M.Sc. Computer Science**, *McGill University*, Montreal, QC, Canada.  
Advisor: Joelle Pineau.
- 2010–2012 **B.Sc. Computing Science (First Class with Distinction)**, *Simon Fraser University*, Burnaby, BC, Canada.  
Ranked 1st in the Faculty. Graduated on the President’s and Dean’s Honour Rolls.
- 2008–2012 **B.Eng. Computer Science and Technology**, *Zhejiang University*, Hangzhou, Zhejiang, China.  
Excellent Student Award. Outstanding Student Leader Award.

### RESEARCH INTERESTS

Artificial intelligence, machine learning and robotics. Applications of probabilistic methods and other topics related to graphs, combinatorial optimization, and algorithms.

### PUBLICATIONS

#### Journals and Magazines

- 2017 [J1] **Hang Ma**, Wolfgang Hönig, Liron Cohen, Tansel Uras, Hong Xu, T. K. Satish Kumar, Nora Ayanian, and Sven Koenig. “Overview: A Hierarchical Framework for Plan Generation and Execution in Multi-Robot Systems”. *IEEE Intelligent Systems* 32(6). 2017, pp. 6–12.
- [J2] Wolfgang Hönig, T. K. Satish Kumar, **Hang Ma**, Liron Cohen, Hong Xu, Sven Koenig, and Nora Ayanian. “Path Finding for Multi-Robot Systems with Kinematic Constraints in Occluded Environments”. *Journal of Artificial Intelligence Research (JAIR)*. 2017. TO APPEAR.
- [J3] **Hang Ma** and Sven Koenig. “AI Buzzwords Explained: Multi-Agent Path Finding (MAPF)”. *AI Matters* 3(3). 2017, pp. 15–19.

#### Conferences

- 2018 [C1] **Hang Ma**, Glenn Wagner, Ariel Felner, Jiaoyang Li, T. K. Satish Kumar, and Sven Koenig. “Multi-Agent Path Finding with Deadlines”. *International Joint Conference on Artificial Intelligence (IJCAI)*. 2018. ACCEPTED. ACCEPTANCE RATE:  $710/3470 = 20.64\%$ .
- [C2] Liron Cohen, **Hang Ma**, T. K. Satish Kumar, Sven Koenig, Matías Greco, Carlos Hernandez, and Ariel Felner. “Anytime Focal Search with Applications”. *International Joint Conference on Artificial Intelligence (IJCAI)*. 2018. ACCEPTED. ACCEPTANCE RATE:  $710/3470 = 20.64\%$ .
- [C3] **Hang Ma**, Glenn Wagner, Ariel Felner, Jiaoyang Li, T. K. Satish Kumar, and Sven Koenig. “Multi-Agent Path Finding with Deadlines: Preliminary Results [Extended Abstract]”. 2018. ACCEPTED. ACCEPTANCE RATE:  $(151+132)/597 = 47.40\%$ .
- [C4] Ariel Felner, Jiaoyang Li, Eli Boyarski, **Hang Ma**, Liron Cohen, T. K. Satish Kumar, and Sven Keonig. “Adding Heuristics to Conflict-Based Search for Multi-Agent Pathfinding”. 2018. ACCEPTED. ACCEPTANCE RATE:  $69/209 = 33.01\%$ .

- 2017** [C5] **Hang Ma**, T. K. Satish Kumar, and Sven Koenig. “Multi-Agent Path Finding with Delay Probabilities”. *AAAI Conference on Artificial Intelligence (AAAI)*. 2017, pp. 3605–3612. ACCEPTANCE RATE: 638/2590 = 24.63%.
- [C6] **Hang Ma**, Jiaoyang Li, T. K. Satish Kumar, and Sven Koenig. “Lifelong Multi-Agent Path Finding for Online Pickup and Delivery Tasks”. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2017, pp. 837–845. ACCEPTANCE RATE: 155/595 = 26.05%.
- [C7] **Hang Ma**, Jingxing Yang, Liron Cohen, T. K. Satish Kumar, and Sven Koenig. “Feasibility Study: Moving Non-Homogeneous Teams in Congested Video Game Environments [Demonstration Abstract]”. *AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. 2017, pp. 270–272.
- [C8] Wolfgang Hönig, T. K. Satish Kumar, Liron Cohen, **Hang Ma**, Hong Xu, Nora Ayanian, and Sven Koenig. “Summary: Multi-Agent Path Finding with Kinematic Constraints”. *International Joint Conference on Artificial Intelligence (IJCAI)*. 2017, pp. 4869–4873. SISTER CONFERENCE BEST PAPER TRACK.
- 2016** [C9] **Hang Ma**, Craig Tovey, Guni Sharon, T. K. Satish Kumar, and Sven Koenig. “Multi-Agent Path Finding with Payload Transfers and the Package-Exchange Robot-Routing Problem”. *AAAI Conference on Artificial Intelligence (AAAI)*. 2016, pp. 3166–3173. ACCEPTANCE RATE: 549/2132 = 25.75%.
- [C10] **Hang Ma** and Sven Koenig. “Optimal Target Assignment and Path Finding for Teams of Agents”. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2016, pp. 1144–1152. ACCEPTANCE RATE: 137/550 = 24.91%. INVITED FOR JOURNAL PUBLICATION.
- [C11] Wolfgang Hönig, T. K. Satish Kumar, Liron Cohen, **Hang Ma**, Hong Xu, Nora Ayanian, and Sven Koenig. “Multi-Agent Path Finding with Kinematic Constraints”. *International Conference on Automated Planning and Scheduling (ICAPS)*. 2016, pp. 477–485. ACCEPTANCE RATE: 65/184 = 35.33%. THIS PAPER WON THE **OUTSTANDING PAPER AWARD IN THE ROBOTICS TRACK** OF ICAPS 2016.
- [C12] Wolfgang Hönig, T. K. Satish Kumar, **Hang Ma**, Nora Ayanian, and Sven Koenig. “Formation Change for Robot Groups in Occluded Environments”. *IEEE/RSJ International Conference on Intelligent Robots and System (IROS)*. 2016, pp. 4836–4842. ACCEPTANCE RATE: 832/1719 = 48.40%.
- 2015** [C13] **Hang Ma** and Joelle Pineau. “Information Gathering and Reward Exploitation of Subgoals for POMDPs”. *AAAI Conference on Artificial Intelligence (AAAI)*. 2015, pp. 3320–3326. ACCEPTANCE RATE: 531/1991 = 26.67%.
- [Workshops and Symposia](#)
- 2016** [W1] **Hang Ma**, Sven Koenig, Nora Ayanian, Liron Cohen, Wolfgang Hönig, T. K. Satish Kumar, Tansel Uras, Hong Xu, C. Tovey, and G. Sharon. “Overview: Generalizations of Multi-Agent Path Finding to Real-World Scenarios”. *IJCAI-16 Workshop on Multi-Agent Path Finding (WOMPF)*. 2016.
- [W2] **Hang Ma**, Craig Tovey, Guni Sharon, T. K. Satish Kumar, and Sven Koenig. “Multi-Agent Path Finding with Payload Transfers and the Package-Exchange Robot-Routing Problem [Abstract]”. *International Symposium on Combinatorial Search (SoCS)*. 2016, p. 149.
- [W0] **Hang Ma** and Sven Koenig. “Optimal Target Assignment and Path Finding for Teams of Agents [Abstract]”. *International Symposium on Combinatorial Search (SoCS)*. 2016, p. 151.
- [W4] Robert Morris, Corina Pasareanu, Kasper Luckow, Waqar Malik, **Hang Ma**, T. K. Satish Kumar, and Sven Koenig. “Planning, Scheduling and Monitoring for Airport Surface Operations”. *AAAI-16 Workshop on Planning for Hybrid Systems (PlanHS)*. 2016.
- [W5] Wolfgang Hönig, T. K. Satish Kumar, Liron Cohen, **Hang Ma**, Sven Koenig, and Nora Ayanian. “Path Planning with Kinematic Constraints for Robot Groups”. *Southern California Robotics Symposium (SCR)*. 2016.

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## HONORS AND AWARDS

- 2014–2019 Annenberg Graduate Fellowship, *University of Southern California*
- 2016, 2017 2× AAMAS Student Scholarship, *AAMAS*
- 2016 Outstanding Paper Award in the Robotics Track (publication [C11]), *ICAPS*
- 2016 GSG Travel Grant, *University of Southern California*
- 2016 PhD Fellowships Travel/Research Award, *University of Southern California*
- 2013, 2014 2× Graduate Scholarship, *McGill University*
- 2013 Differential Fee Waiver, *McGill University*
- 2012 2× Open Scholarship, *Simon Fraser University*
- 2011–2012 3× Alumni Scholarship, *Simon Fraser University*
- 2010 Entrance Scholarship, *Simon Fraser University*
- 2009, 2010 2× Scholarship for Outstanding Merits, *Zhejiang University*
- 2009, 2010 2× Scholarship for Outstanding Students, *Zhejiang University*
- 2009, 2010 2× Excellent Student Award, *Zhejiang University*
- 2009 Outstanding Student Leader Award, *Zhejiang University*

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## ACADEMIC ACTIVITIES AND EXPERIENCE

### Talks and Presentations

#### Conference Presentations.

- 05/11/2017 “Lifelong Multi-Agent Path Finding for Online Pickup and Delivery Tasks”, *AAMAS*.
- 02/06/2017 “Multi-Agent Path Finding with Delay Probabilities”, *AAAI*.
- 05/12/2016 “Optimal Target Assignment and Path Finding for Teams of Agents”, *AAMAS*.
- 02/14/2016 “Multi-Agent Path Finding with Payload Transfers and the Package-Exchange Robot-Routing Problem”, *AAAI*.
- 01/27/2015 “Information Gathering and Reward Exploitation of Subgoals for POMDPs”, *AAAI*.

#### Invited Talks and Presentations.

- 01/08/2018 “Progress on Multi-Agent Path Finding in Real-World Scenarios”, *School of Data and Computer Science, Sun Yat-Sen University*.
- 12/20/2017 “Progress on Multi-Agent Path Finding in Real-World Scenarios”, *Cainiao Network Technology Co., Alibaba Group*.
- 06/08/2016 “Generalizations of Multi-Agent Path Finding to Real-World Scenarios”, *School of Data and Computer Science, Sun Yat-Sen University*.
- 04/13/2016 “Optimal Target Assignment and Path Finding for Teams of Agents”, *U.S. Army Research Lab West Open House*.
- 10/30/2015 “POMDP Planning and Its Applications for Optimizing Building Energy”, *Civil Engineering Department, University of Southern California*.
- 02/13/2014 “Information Gathering and Reward Exploitation of Subgoals for POMDPs”, *Graduate Seminar Series, School of Computer Science, McGill University*.

### Service to the Research Community

#### Executive Position.

- 2017– Information Officer (Appointed) of the *ACM Special Interest Group on Artificial Intelligence (SIGAI)*

#### Journal Reviewer.

- 2017 *Artificial Intelligence Journal (AIJ)*

#### Conference and Workshop Reviewer.

- 2016, 2018 *International Symposium on Combinatorial Search (SoCS)*

- 2018 *ICAPS Workshop on Planning and Robotics (PlanRob)*
- 2018 *International Conference of the Florida Artificial Intelligence Research Society (FAIRS)*
- 2018 *AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)*
- 2018 *AAAI Spring Symposium on Integrating Representation, Reasoning, Learning, and Execution for Goal Directed Autonomy (SIRLE)*
- 2016, 2017 *AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*
- 2017 *IEEE Conference on Computational Intelligence and Games (CIG)*
- 2017 *International Workshop on Optimisation in Multi-Agent Systems (OptMAS)*
- 2016, 2017 *International Conference on Automated Planning and Scheduling (ICAPS)*
- 2017 *AAAI Workshop on Knowledge-Based Techniques for Problem Solving and Reasoning (KnowProS)*
- 2016 *International Workshop on the Algorithmic Foundations of Robotics (WAFR)*

**Conference Volunteer.**

- 2016, 2017 *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*

**Service to the University**

- 2017– Advisor of the USC’s Chapter of AAAI, *University of Southern California*.

**Teaching**

**Teaching Assistant**, *McGill University*.

- Winter 2014 Information Structures, (*COMP-610, 17 students*)
- Winter 2014 Algorithms and Data Structures, (*COMP-252, 43 students*)
- Fall 2013 Theory of Computation, (*COMP-330A, 77 students*)
- Fall 2013 Foundations of Computing, (*COMP-202, 668 students*)
- Fall 2012 Theory of Computation, (*COMP-330A, 97 students*)

**Research Supervision and Student Mentoring**

**Research Project Supervisor**, *University of Southern California*.

- Summer 2018 Minghua Liu (Undergraduate Student in Computer Science at Tsinghua University)
- Summer 2017 Jingxing Yang (Undergraduate Student in Computer Science at USC), *Summer Research Project*.
- Summer 2016 Jiaoyang Li (Undergraduate Student in Automation at Tsinghua University, joined UCS as a PhD student in Fall 2017), *USC-Tsinghua Summer Experience Program*.
- Summer 2016 James Drain (Undergraduate Student in Mathematics at Dartmouth College, joined UCLA as a PhD student in Fall 2017), *Viterbi Summer Undergraduate Research Experience (SURE) Program*.
- Summer 2016 Zhi Wang (Undergraduate Student in Computer Science at USC, joined UC San Diego as a PhD student in Fall 2018), *Summer Research Project*.
- Summer 2016 Zhaowei Xu (Undergraduate Student in Computer Science at USC), *Summer Research Project*.
- Spring 2015 Maxwell Weiner (Undergraduate Student in Computer Science at USC), *Directed Research Project*.

**Academic Conference Mentor.**

- 02/2017 Aishwarya Reganti (Undergraduate Student in Electronics and Communication Engineering at the Indian Institute of Information Technology, Sri City), *ACM-W Scholarship Program, AAAI*.

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**INDUSTRIAL EXPERIENCE**

- 06/2016– **Research Intern**, *U.S. Army Research Laboratory West, Playa Vista, CA, United States.*
- 08/2016
  - o Robot Planning.
  - o Deformable Haptic Surfaces.

- 05/2011– **Automated Test Associate**, *SV&V JDE Tools Team, BlackBerry Ltd (formerly Research in Motion*  
12/2011 *Ltd)*, Waterloo, ON, Canada.
- Developed test cases for Java APIs for BlackBerry devices and executed automation test runs.
  - Developed software applications for BlackBerry Playbook based on Playbook Webworks platform with HTML5 and JQuery.