Shao-Hung Chan

Curriculum Vitae

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Education

2017–Present **Ph.D. in Computer Science**, *University of Southern California*, USA
- Thesis: "Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding."
  - Advisor: Sven Koenig
  - Based on work published in AAAI and SoCS.

2017–2019 **M.Sc. in Electrical Engineering**, *National Taiwan University*, Taiwan
- Focus on task and motion planning for human-robot interaction.
- Master thesis: "Optimal Navigation System for a Mobile Robot to Execute Dynamical Multiple Social Tasks."
  - Advisor: Li-Chen Fu
  - Best Master Thesis Award of the year 2019 in NTUEE.

2013–2017 **B.Sc. in Electrical Engineering**, *National Cheng Kung University*, Taiwan
- Focus on analog circuit design for bioengineering.
- Exchange program to the University of California, Berkeley in 2016.
- Awarded as the outstanding student for academic achievement in 2015.

Research Experience

2019–Present **Research Assistant**, *University of Southern California*, USA
- Advisor: Sven Koenig
- Focus on developing algorithms for bounded-suboptimal and suboptimal Multi-Agent Path Finding (MAPF).

2024 **Research Intern**, *Robert Bosch GmbH*, Germany
- Advisor: Isabelle Barz
- Focus on safe execution for the automated warehouse system.

2022 **Visiting Scholar**, *Ben Gurion University of the Negev*, Israel
- Advisor: Ariel Felner and Roni Stern
- Focus on improving the efficiency of Priority-Based Search for suboptimal MAPF.

Honors and Awards

2024 **Best System Demonstration Award Honorable Mention**, *International Conference on Automated Planning and Scheduling (ICAPS)*
Title: The League of Robot Runners: Competition Goals, Designs, and Implementation.

2022 **Best Paper Award**, *International Symposium on Combinatorial Search (SoCS)*
Title: On Merging Agents in Multi-Agent Pathfinding Algorithms.

2022 **Fellowship for the PhD Sandwich Program**, *Ben-Gurion University of the Negev*

2020 **First Place in Flatland Challenge in NeurIPS 2020 Competition**, *NeurIPS*
Rank 1 in both round 1 and round 2.

2019 **Best Master Thesis Award of the year in NTUEE**, *National Taiwan University*
Title: Optimal Navigation System for a Mobile Robot to Execute Dynamical Multiple Social Tasks.

2018 **Best Student Paper Award Finalist**, *IEEE International Conference on System, Man, and Cybernetics (SMC)*
Title: Robust 2D Indoor Localization through Laser SLAM and Visual SLAM Fusion.

2016 **Fellowship for the Exchange Program to University of California, Berkeley**, *National Cheng Kung University*
Be the only recipient of 4000 USD exchange student fellowship from NCKUEE to UCB.

Selected Publications

Conferences

2025 [C16] **New Mechanisms in Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding**
Shao-Hung Chan, Thomy Phan, Jiaoyang Li, and Sven Koenig.
International Symposium on Combinatorial Search (SoCS), 2025.

[C15] **Anytime Multi-Agent Path Finding with an Adaptive Delay-Based Heuristic**
Thomy Phan, Benran Zhang, **Shao-Hung Chan**, and Sven Koenig.
AAAI Conference on Artificial Intelligence (AAAI), pages 23286-23294, 2025.

[C14] **Counterfactual Online Learning for Open-Loop Monte Carlo Planning**
Thomy Phan, **Shao-Hung Chan**, and Sven Koenig.
AAAI Conference on Artificial Intelligence (AAAI), pages 26651–26658, 2025.

2024 [C13] **Theoretical Study on Multi-objective Heuristic Search**
Shawn Skyler, Shahaf Shperberg, Dor Atzmon, Ariel Felner, Oren Salzman, **Shao-Hung Chan**, Han Zhang, Sven Koenig, William Yeoh, and Carlos Hernandez.
International Joint Conference on Artificial Intelligence (IJCAI), pages 7021–7028, 2023.

2023 [C12] **Greedy Priority-Based Search for Suboptimal Multi-Agent Path Finding**
Shao-Hung Chan, Roni Stern, Ariel Felner and Sven Koenig.
International Symposium on Combinatorial Search (SoCS), pages 11–19, 2023.

[C11] **Heuristic-Search Approaches for the Multi-Objective Shortest-Path Problem: Progress and Research Opportunities**
Oren Salzman, Ariel Felner, Carlos Hernandez, Han Zhang, **Shao-Hung Chan**, and Sven Koenig.
International Joint Conference on Artificial Intelligence (IJCAI), pages 6759-6768, 2023.

[C10] **Multi-Objective Search via Lazy and Efficient Dominance Checks**
Carlos Hernández, William Yeoh, Jorge A. Baier, Ariel Felner, Oren Salzman, Han Zhang, **Shao-Hung Chan**, and Sven Koenig.
International Joint Conference on Artificial Intelligence (IJCAI), pages 7223-7230, 2023.

2022 [C09] **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.

[C08] **On Merging Agents in Multi-Agent Pathfinding Algorithms**
Best Student Paper Award of SOCS 2022.
Eli Boyarski, **Shao-Hung Chan**, Dor Atzmon, Ariel Felner, and Sven Koenig.
International Symposium on Combinatorial Search (SoCS), pages 11-19, 2022.

[C07] **A MIP-Based Approach for Multi-Robot Geometric Task-and-Motion Planning**
Hejia Zhang, **Shao-Hung Chan**, Jie Zhong, Jiaoyang Li, Sven Koenig, and Stefanos Nikolaidis.
IEEE International Conference on Automation Science and Engineering (CASE), pages 2102-2109, 2022.

2021 [C06] **Scalable Rail Planning and Replanning: Winning the 2020 Flatland Challenge**
Winner of the NeurIPS'20 Flatland Challenge.
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.

[C05] **Flatland Competition 2020: MAPF and MARL for Efficient Train Coordination on a Grid World**
Florian Laurent, Manuel Schneider, Christian Scheller, Jeremy Watson, Jiaoyang Li, 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, PMLR, pages 275-301, 2021.

2019 [C04] **Real-time Obstacle Avoidance using Supervised Recurrent Neural Network with Automatic Data Collection and Labeling**
Shao-Hung Chan, Xiaoyue Xu, Ping-Tsang Wu, Ming-Li Chiang, and Li-Chen Fu.
IEEE International Conference on System, Man, and Cybernetics (SMC), pages 472-477, 2019.

[C03] **Multi-Layer Environmental Affordance Map for Robust Indoor Localization, Event Detection and Social Friendly Navigation**
Ping-Tsang Wu, Chee-An Yu, **Shao-Hung Chan**, Ming-Li Chiang, and Li-Chen Fu.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pages 2945-2950, 2019.

2018 [C02] **Robust 2D Indoor Localization through Laser SLAM and Visual SLAM Fusion**
Best Student Paper Award Finalist of IEEE SMC Society.
Shao-Hung Chan, Ping-Tsang Wu, and Li-Chen Fu.
IEEE International Conference on Systems, Man, and Cybernetics (SMC), pages 1263-1268, 2018.

[C01] **Distribution Deep Reinforcement Learning based Indoor Visual Naviation**
Shih-Hsi Hsu, **Shao-Hung Chan**, Ping-Tsang Wu, Kun Xiao, and Li-Chen Fu.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pages 2532-2537, 2018.

Journals and Books

2023 [J03] **Multi-Robot Geometric Task-and-Motion Planning for Collaborative Manipulation Tasks**
Hejia Zhang, **Shao-Hung Chan**, Jie Zhong, Jiaoyang Li, Peter Kolapo, Sven Koenig, Zach Agioutantis, Steven Schafrik, and Stefanos Nikolaidis.
Autonomous Robots, 2023.

2020 [J02] **Artificial Intelligence and Automation**
Sven Koenig, **Shao-Hung Chan**, Jiaoyang Li, and Yi Zheng.

2016 [J01] **Integration of Bioelectronics and Bioinformatics: Future Direction of Bioengineering Research**
Shao-Hung Chan, Shuenn-Yuh Lee, Qiang Fang, and Huimin Ma.
Journal of Medical and Biological Engineering (JMBE), 2016.

Workshops and Extended Abstracts

2024 [W06] **Anytime Multi-Agent Path Finding using Operation Parallelism in Large Neighborhood Search**
Shao-Hung Chan, Zhe Chen, Dian-Lun Lin, Yue Zhang, Daniel Harabor, Sven Koenig, Tsung-Wei Huang, and Thomy Phan.
International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS), 2024.

2024 [W05] **The League of Robot Runners: Competition Goals, Designs, and Implementation**
Shao-Hung Chan, Zhe Chen, Teng Guo, Han Zhang, Yue Zhang, Daniel Harabor, Sven Koenig, Cathy Wu, and Jingjin Yu.
ICAPS 2024 System's Demonstration Track, 2024.

2023 [W04] **Must-Expand Nodes in Multi-Objective Search**
Shawn Skyler, Shahaf Shperberg, Dor Atzmon, Ariel Felner, Oren Salzman, **Shao-Hung Chan**, Han Zhang, Sven Koenig, William Yeoh, and Carlos Hernández Ulloa.
International Symposium on Combinatorial Search (SoCS), pages 183-184, 2023.

2021 [W03] **ECBS with Flex Distribution for Bounded-Suboptimal Multi-Agent Path Finding**
Shao-Hung Chan, Jiaoyang Li, Graeme Gange, Daniel Harabor, Peter J. Stuckey, and Sven Koenig.
International Symposium on Combinatorial Search (SoCS), pages 159-161, 2021.

[W02] **A Hierarchical Approach to Multi-Agent Path Finding**
Han Zhang, Mingze Yao, Ziang Liu, Jiaoyang Li, Lucas Terr, **Shao-Hung Chan**, T. K. Satish Kumar, and Sven Koenig.
ICAPS Workshop on Hierarchical Planning (HPLAN), 2021.

2020 [W01] **Nested ECBS for Bounded-Suboptimal Multi-Agent Path Finding**
Shao-Hung Chan, Jiaoyang Li, Daniel Harabor, Peter J. Stuckey, Graeme Gange, Liron Cohen, and Sven Koenig.
IJCAI Workshop on Multi-Agent Path Finding (WoMAPF), 2020.