

Guillaume SARTORETTI

Assistant Professor, National University of Singapore, Mechanical Engineering Dpt. (2019-)

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Born in Geneva (Switzerland). Nationality: Swiss.

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<https://scholar.google.com/citations?user=n7NzZ0sAAAAJ>

Education

June 2018 – June 2019	Manufacturing Futures Initiative (MFI) Postdoctoral Fellow, Robotics Institute, CMU <u>Project Title:</u> <i>Distributed Learning for large-scale multi-robot path planning in complex environments.</i> <u>Advisor:</u> Prof. Howie Choset.
June 2016 – June 2018	Postdoctoral Fellow, Robotics Institute, Carnegie Mellon University <u>Advisor:</u> Prof. Howie Choset.
April 2016	PhD in <i>Robotics, Control and Intelligent Systems</i>, EPFL, Switzerland <u>Title:</u> <i>Control of Agent Swarms in Random Environments</i> <u>Advisor:</u> Prof. Max-Olivier Hongler.
March 2012	Master of Science in Mathematics and Computer Science, University of Geneva.
June 2010	Bachelor of Science in Mathematics and Computer Science, University of Geneva.

Professional and Teaching Experience

2019 - Current	Lecturer Activities, Mechanical Engineering Department, NUS. <ul style="list-style-type: none">▪ “Microprocessor applications”, ME3241, (Bachelor, 3rd year).▪ “Deep learning for robotics”, ME5406, (Master’s level course).▪ “Machine Vision”, ME5405 (Master’s level course).
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Student Mentoring

	<u>Postgraduate students supervised to date</u>
2021 – 2022	CAO Yuhong, M.Eng, <i>Multi-robot Exploration via Deep Reinforcement learning</i>
2021 – 2022	HOU Tianxiang, M.Sc, <i>DRL-based Robot Exploration of Unknown Environments</i>
2021 – 2022	WAN Yi, M.Sc, <i>Distributed RL for Pedestrian- and Vehicle-optimized Traffic Signal Control</i>
2021 – 2022	LI Hainuo, M.Sc, <i>RL for decentralized Adaptive Traffic Signal Control in Urban Networks</i>
2021 – 2022	GAO Xinwei, M.Sc, <i>Individual Voting for Combined Learning/Conventional based MAPF</i>
2021 – 2022	FAN Haolin, M.Sc, <i>Attention-based Network for 3D Adaptive Informative Path Planning</i>
2021 – 2022	LU Yujie, M.Sc, <i>Active-SLAM For Hexapod Robot Based On LiDAR</i>
2021 – 2022	XIA Langmeng, M.Sc, <i>Decentralized Attention-based Neural Network for the CVRP</i>
2020 - 2021	WANG Yutong, M.Sc, <i>Communication Learning for Multi-Agent Cooperation.</i>
2020 - 2021	ZHANG Yifeng, M.Sc, <i>dRL for Decentralized Traffic Management in Urban Environments.</i>
2020 - 2021	WANG Yizhuo, M.Sc, <i>Reinforcement Learning for Multi-Agent Search and Rescue.</i>

2020 - 2021	ZHANG Xiaoyang, M.Sc, Visual/LiDAR-based SLAM on legged articulated robot.
2020 - 2021	HUANG Jiangeng, M.Sc, Multi-agent Search based on Distributed RL.
2020 - 2021	LI Aijia, M.Sc, Urban Traffic Management and Optimization for Pedestrians.
2019 - 2020	LUO Zhiyao, M.Sc, Deep Reinforcement Learning Based Multi-Agent Pathfinding.
2019 - 2020	DAI Weiheng, M.Sc, Multi-Agent Search based on distributed Deep RL.
2019 - 2020	XIA Yixuan, M.Sc, Obstacle Avoidance for A Legged Robot Based on FFT Control.
2019 - 2020	GE Sun, M.Sc, Bio-inspired Visual Servoing for a Legged Robot.
2019 - 2020	XING Yan, M.Sc, Model-based Dynamic Obstacle Avoidance on Inclined Surface.

Research Grants and Funded Projects

2022 - 2024	Funded Research Project, T-Lab@NUS and DSO (main PI). <u>Title:</u> <i>Decentralized Search of Evasive Agents.</i> <u>Amount:</u> S\$ 260k.
2022 - 2025	Maritime Transformation Programme White Space Funding <u>Title:</u> <i>Robotic Systems for Securing/Un-securing of Containers in Vessels.</i> <u>Co-PIs:</u> Profs. G. Chirikjian (PI), M. ANG, C M CHEW, H.ZHANG. <u>Amount:</u> S\$ 4.8M.
2021 - 2026	Project 3, Work Package 4 of “Cisco-NUS Corporate Laboratory” (Co-PI). <u>Title:</u> <i>Scalable, Decentralized Urban Traffic Management for Autonomous Vehicles.</i> <u>Co-PIs:</u> Profs. Biplab Sidkar (PI), Marcelo ANG. <u>Amount:</u> S\$ 650k.
2021 - 2022	Seed Research Project, T-Lab@NUS (main PI). <u>Title:</u> <i>Learning Based Approaches for Advanced Multi-Agent Search Problems.</i> <u>Co-PIs:</u> Dr. Jiawei CAO. <u>Amount:</u> S\$ 60k.
2021 - 2024	MOE Academic Research Fund (AcRF) Tier 1 FRC Research Grant (main PI). <u>Title:</u> <i>Communication-Based AI Methods for Multi-Robot Decentralized Cooperation.</i> <u>Amount:</u> S\$ 226,5k.
2020 - 2022	Work Package 3 of “Urban Traffic Flow Smoothing Models” (Co-PI). <u>Title:</u> <i>Traffic Light Control for Optimal Traffic Flow.</i> <u>Co-PIs:</u> Profs. Kien Ming Ng (PI), Marcelo ANG, and Gerard LENG. <u>Amount:</u> S\$ 780k.
2020 - 2021	Seed Research Project, T-Lab@NUS (main PI). <u>Title:</u> <i>Scalable Decentralized Multi-Robot Search via Distributed RL.</i> <u>Co-PIs:</u> Drs. Swee Huat Rodney TEO and Jiawei CAO. <u>Amount:</u> S\$ 60k.
2018 - 2019	Manufacturing Futures Initiative (MFI) Postdoctoral Fellowship. <u>Title:</u> <i>Distributed Learning for large-scale multi-robot path planning in complex environments.</i> <u>Advisor:</u> Prof. Howie Choset.
2018 - 2019	Extreme Science and Engineering Discovery Environment (XSEDE) Startup grant in the form of 2’500 additional hours of GPU computation at the PSC.

Prizes and Awards

2022	Best Student Paper Award at the International Symposium on Distributed Autonomous Robotic Systems (DARS 2022). See details in publication list below.
2022	Best Paper Award at the IEEE International Conference on Unmanned Systems (ICUS 2022). See details in publication list below.

2021	Best Paper Award at the International Symposium on Distributed Autonomous Robotic Systems (DARS 2021). See details in publication list below.
2020	First place at the first round of the NeurIPS 2020 “Flatland” Competition (https://www.aicrowd.com/challenges/flatland), and fourth place overall.

Invited Lectures, Seminars and Colloquia

17/10/2022	Machine Learning and Its Applications Intl. Workshop, NUS-IMS. Invited Seminar.
20/05/2022	Amazon Robotics, Boston, USA, Invited Seminar.
27/09/2021	ETHZ Autonomy Talk, 1h Invited Seminar (virtual), https://youtu.be/2Jts4uFbbBM
02/12/2019	National University of Singapore, Invited Seminar, Temasek Laboratory.
06/11/2019	Case Western Reserve University, Invited Seminar, Mechanical & Aerospace Eng. Dpt.
09/19/2018	Invited Seminar at the National Robotics Engineering Center (NREC).
08/09/2018	Tufts University, Invited Seminar, Computer Science Department.
01/28/2016	EPFL, Informal private presentation, DISAL laboratory.
09/29/2015	Drexel University, Private presentation, SAS and GRASP laboratories.

Other Academic Activities

2023 - Current	Associate Editor for SAGE’s International Journal of Robotics Research.
2022 - Current	Section Editor for Springer Nature’s () Encyclopedia of Robotics (“Multiple Mobile Robot Systems”).
2021 - Current	Associate Editor for the IEEE International Conference on Robotic and Automation (ICRA), in the “Mechanism, Design, and Control” area.
2021 - Current	Senior Program Committee Member (SPC) for the International Joint Conference on Artificial Intelligence (IJCAI), the AAAI Conference on Artificial Intelligence, and the Conference on Robot Learning (CoRL).
2021 - Current	Associate Editor for the Intl. Symp. on Multi-Robot and Multi-Agent Systems (MRS).
2020 - Current	Associate Editor for IEEE RA-L (in the <i>Multiple and Distributed Systems</i> area).
2019 - Current	Guest Editor for Springer Nature Applied Sciences’ topical collection on “Distributed Mobile Robotic Systems.”
2019 - Current	Reviewer for <i>Science Robotics</i> (ScienceMag), JAAMAS (Springer), <i>SICOMP</i> (Sage), <i>Robotics and Automation Letters</i> (RA-L, IEEE), as well as various international conferences on robotics and AI (ICRA, IROS, WAFR, AAMAS, ECC, ACC, IJCAI, CASE).
2018	Session chair at the Int. Symp. on Distributed Autonomous Robotic Systems (DARS).
2015	Session chair at the <i>Inter. Symposium on Swarm Behavior and Bio-Inspired Robotics</i> .

2013 Session chair at the *International Conference on Agents and Artificial Intelligence*.

Publications: Thesis and Refereed Book Chapters

- 2016 **PhD Thesis:** G. Sartoretti and M.-O. Hongler. *Control of Agent Swarms in Random Environments*. EPFL, Lausanne (CH).
- 2013 G. Sartoretti and M.-O. Hongler. Soft control of self-organized locally interacting Brownian planar agents. *Lecture Notes in Computer Science*, pp.45-52. Springer.
- 2012 G. Sartoretti, J.-L. Falcone, B. Chopard, and M. J. Gander. Decentralized method for traffic monitoring. *Lecture Notes in Computer Science*, pp.464-473. Springer.

Publications: Refereed Journal Papers

- 2022 M. Fan, Y. Wu, G. Wu, Z. Cao, H. Guo, and G. Sartoretti. Deep Reinforcement Learning for UAV Routing in The Presence of Multiple Charging Stations. **Accepted for Publication in IEEE Transactions on Vehicular Technology**.
- 2022 Y. Wang, M. Damani, P. Wang, Y. Cao, and G. Sartoretti. Distributed Reinforcement Learning for Robot Teams: A Review. **In Press at Springer's Current Robotics Reports**.
- 2022 G. Sun and G. Sartoretti. Joint-Space CPG for Safe Foothold Planning and Body Pose Control during Locomotion and Climbing. *IEEE Robotics and Automation Letters*.
- 2022 B. Chong, Y. Ozkan-Aydin, J. Rieser, G. Sartoretti, et al. A general locomotion control framework for multi-legged locomotors. *Bioinspiration & Biomimetics*.
- 2022 S. Shaw, E. Wenzel, A. Walker, and G. Sartoretti. ForMIC: Foraging via Multiagent RL with Implicit Communication. *Robotics and Automation Letters (RA-L)*, 7(2):4877-4884.
- 2021 M. Damani, Z. Luo, E. Wenzel, and G. Sartoretti. PRIMAL₂: Pathfinding via Reinforcement and Multiagent Imitation Learning - Lifelong. *IEEE RA-L*, 6(2):2666-2673.
- 2021 B. Chong, Y.O. Aydin, C. Gong, G. Sartoretti, Y. Wu, J.M. Rieser, H. Xing, P.E. Schiebel, J.W. Rankin, K.B. Michel, A. Nicieza, J.R. Hutchinson, D.I. Goldman and H. Choset. Coordination of lateral body bending and leg movements for sprawled posture quadrupedal locomotion. *The International Journal of Robotics Research*.
- 2020 B. Freed, G. Sartoretti, and H. Choset. Simultaneous policy and discrete communication learning for multi-agent cooperation. *IEEE RA-L*, 5(2):2498-2505.
- 2019 G. Sartoretti, W. Paivine, Y. Shi, Y. Wu, H. Choset. Distributed learning of decentralized control policies for articulated mobile robots. *Transactions in Robotics*, 35(5):1109-1122.
- 2019 G. Sartoretti, J. Kerr, Y. Shi, G. Wagner, T. K. S. Kumar, S. Koenig, H. Choset. PRIMAL: Pathfinding via Reinforcement and Imitation Multi-Agent Learning. *IEEE RA-L*, 4(3):2378-2385.
- 2016 G. Sartoretti. Leader-based versus soft control of multi-agent swarms. *Artificial Life and Robotics*, 21(3):302-307.
- 2016 G. Sartoretti and M.-O. Hongler. Interacting Brownian swarms: Analytical results. *Entropy*, 18, 27.
- 2014 G. Sartoretti, M.-O. Hongler, M. Elias de Oliveira, and F. Mondada. Decentralized self-

	selection of swarm trajectories: From dynamical system theory to robotic implementation. <i>Swarm Intelligence</i> , vol. 8(no. 4):329-351.
2013	G. Sartoretti and M.-O. Hongler. Self-organized mixed canonical-dissipative dynamics for Brownian planar agents. <i>Cybernetics and Physics</i> , 2(1):41-46.
2013	B. Barbieri, G. Sartoretti , J.-L. Falcone, B. Chopard, and M. J. Gander. Traffic prediction based on a local exchange of information. <i>Journal of Cellular Automata</i> , 8(5-6):429-441.

Publications: Refereed Conference Papers

2023	Y. Cao, T. Hou, Y. Wang, X. Yi, and G. Sartoretti . ARiADNE: A Reinforcement learning approach using Attention-based Deep Networks for Exploration. Accepted for presentation at ICRA 2023.
2023	H. Goel, Y. Zhang, M. Damani, and G. Sartoretti . SocialLight: Distributed Cooperation Learning towards Network-Wide Traffic Signal Control. Accepted for presentation at AAMAS 2023.
2023	Y. Wang, B. Xiang, S. Huang, and G. Sartoretti . SCRIMP: Scalable Communication for Reinforcement- and Imitation-Learning-Based Multi-Agent Pathfinding. Accepted for presentation at AAMAS 2023 (extended abstract).
2022	Y. Cao, Y. Wang, A. Vashisth, H. Fan, and G. Sartoretti . CATNIPP: Context-Aware Attention-based Network for Informative Path Planning. <i>6th Annual Conference on Robot Learning (CoRL 2022)</i> .
2022	S. Shaw and G. Sartoretti . Keyframe-based CPG for Stable Gait Design and Online Transitions in Legged Robots. <i>IEEE Conference on Decision and Control (CDC 2022)</i> .
2022	Y. Cao, Z. Sun, and G. Sartoretti . DAN: Decentralized Attention-based Neural Network for the MinMax Multiple Traveling Salesman Problem. <i>International Symposium on Distributed Autonomous Robotics Systems (DARS 2022)</i> . Best Student Paper Award.
2022	Q. Ge, G. Sartoretti , J. Duan, S. E. Li, Y. Yin, and S. Zheng. Distributed Model Predictive Control of Connected Multi-Vehicle Systems at Unsignalized Intersections. <i>IEEE International Conference on Unmanned Systems (ICUS 2022)</i> . Best Paper Award.
2022	A. Rao, I. Abraham, G. Sartoretti , and H. Choset. Sparse Sensing in Ergodic Optimization. <i>International Symposium on Distributed Autonomous Robotics Systems (DARS 2022)</i>
2022	Y. Zhang, M. Damani, and G. Sartoretti . Multi-Agent Traffic Signal Control via Distributed RL with Spatial and Temporal Feature Extraction. <i>International Workshop on Agent-Based Modelling of Urban Systems (ABMUS) @ AAMAS</i> .
2022	H. Coffin, I. Abraham, G. Sartoretti , T. Dillstrom, and H. Choset. Multi-Agent Dynamic Ergodic Search with Low-Information Sensors. <i>International Conference on Robotics and Automation (ICRA)</i> , pages 11480-11486.
2022	Y. Wang and G. Sartoretti . FCMNet: Full Communication Memory Net for Team-Level Cooperation in Multi-Agent Systems. <i>International Conference on Autonomous Agents and Multiagent Systems (AAMAS)</i> , pages 1355-1363.
2021	F. Laurent, [18 authors omitted], G. Sartoretti , Z. Luo, M. Damani, N. Bhattacharya, S. Agarwal, A. Egli, E. Nygren, and S. Mohanty. Flatland competition 2020: MAPF and MARL for efficient train coordination on a grid world. <i>In NeurIPS 2020 Competition and Demonstration Track</i> , pp. 275-301.

- 2021 **G. Sartoretti**, A. Rao, and H. Choset. Spectral-based distributed Ergodic coverage for heterogeneous multi-agent search. *15th International Symposium on Distributed Autonomous Robotics Systems (DARS 2021)*. **Best Paper Award**.
- 2021 **G. Sartoretti**, T. Wang, G. Chuang, Q. Li, and H. Choset. Autonomous decentralized shape-based navigation for snake robots in dense environments. *International Conference on Robotics and Automation (ICRA 2021)*.
- 2020 B. Freed, R. James, **G. Sartoretti**, and H. Choset. Sparse discrete communication learning for multi-agent cooperation through backpropagation. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020)*.
- 2020 B. Freed, **G. Sartoretti**, J. Hu, and H. Choset. Communication learning via backpropagation in discrete channels with unknown noise. *Proceedings of AAAI 2020 - 34th Conference on Artificial Intelligence*, pp.7160-7168.
- 2019 B. Chong, Y. Ozkan Aydin, **G. Sartoretti**, J. Rieser, C. Gong, H. Xing, H. Choset, and D. Goldman. A hierarchical geometric framework to design locomotive gaits for highly articulated robots. *Proceedings of Robotics: Science and Systems (RSS)*.
- 2019 S. Shaw, **G. Sartoretti**, J. Olkin, W. Paivine, and H. Choset. Workspace CPG with body pose control for stable, directed vision during omni-directional locomotion. *International Conference on Robotics and Automation (ICRA) 2019*, pp.6316-6322.
- 2018 **G. Sartoretti**, Y. Wu, W. Paivine, T. K. Satish Kumar, S. Koenig, and H. Choset. Distributed reinforcement learning for multi-robot decentralized collective construction. *International Symposium on Distributed Autonomous Robotic Systems (DARS)*, pp.35-49.
- 2018 B. Chong, Y. Ozkan Aydin, C. Gong, **G. Sartoretti**, Y. Wu, J. Rieser, H. Xing, J. Rankin, K. Michel, A. Nicieza, J. Hutchinson, D. Goldman, and H. Choset. Coordination of back bending and leg movements for quadrupedal locomotion. *RSS 2018*.
- 2018 **G. Sartoretti**, Y. Shi, W. Paivine, M. Travers, and H. Choset. Distributed learning for the decentralized control of articulated mobile robots. *ICRA 2018*, pp.3789-3794.
- 2018 **G. Sartoretti**, S. Shaw, K. Lam, N. Fan, M. Travers, and H. Choset. Central pattern generator with inertial feedback for stable locomotion and climbing in unstructured terrain. *ICRA 2018*, pp.5769-5775.
- 2018 F. Ruscelli, **G. Sartoretti**, J. Nan, Z. Feng, M. Travers, and H. Choset. Proprioceptive-inertial autonomous locomotion for articulated robots. *ICRA 2018*, pp.3436-3441.
- 2016 **G. Sartoretti**, S. Shaw, and M. Ani Hsieh. Distributed planar manipulation in fluidic environments. *ICRA 2016*, pp.5322-5327.
- 2015 **G. Sartoretti**. Leader-based versus soft control of multi-agent swarms. *SWARM 2015 - International Symposium on Swarm Behavior and Bio-Inspired Robotics*.
- 2014 **G. Sartoretti**, M.-O. Hongler, and R. Filliger. The estimation problem and heterogenous swarms of autonomous agents. *SMTDA 2014 - Stochastic Modeling Techniques and Data Analysis International Conference*, volume 1.
- 2013 **G. Sartoretti** and M.-O. Hongler. Self-organized mixed canonic-dissipative dynamics for Brownian planar agents. *EUROCAST 2013 - International Conference on Computer Aided Systems Theory*, volume 1, pp.45-52.

2013	G. Sartoretti and M.-O. Hongler. Soft control of swarms: Analytical approach. <i>ICAART 2013 - Proceedings of the 5th International Conference on Agents and Artificial Intelligence</i> , volume 1, pp.147-153.
2012	G. Sartoretti , J.-L. Falcone, B. Chopard, M. J. Gander. Decentralized method for traffic monitoring. <i>ACRI 2012: Cellular Automata for Research and Industry</i> , Vol. 1, pp.464-73.

Languages

<i>French</i>	mother tongue		
<i>English</i>	fluent	<i>Spanish</i>	oral comprehension
<i>German</i>	good knowledge	<i>Hungarian</i>	weak oral comprehension

References for Guillaume Sartoretti

Available upon request.