

# QIUSHI (MAX) LIN

<https://qiushi-lin.github.io>

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## RESEARCH INTERESTS

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Developing theoretically principled machine learning algorithms, with a focus on reinforcement learning, online learning, and bandits

## EDUCATION

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**Simon Fraser University (SFU)**, Burnaby, Canada  
M.Sc. in Computing Science (Thesis-Based Program)

*2021 - 2023*

GPA: 4.06/4.33

- Advisor: Hang Ma
- Course:
  - CMPT 983: Theoretical Foundations of Reinforcement Learning [ongoing]
  - CMPT 981: Optimization for Machine Learning [A]
  - CMPT 727: Statistical Machine Learning [A]
  - CMPT 983: Graph Representation Learning [A]
  - CMPT 827: Intelligent Systems [A+]
  - CMPT 741: Data Mining [A]
- Thesis: Learning Cooperation for Partially Observable Multi-Agent Path Finding [pdf][slides]
- Committee: Oliver Schulte, Xue Bin (Jason) Peng

**Southern University of Science and Technology (SUSTech)**, Shenzhen, China  
B.Eng. in Computer Science and Technology

*2016 - 2020*

GPA: 3.75/4.00

- Departmental Highest Honors of Graduation

## RESEARCH EXPERIENCES

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**Research Assistant**, AIRob Lab (SFU Robotics Research Group)

*09/2021- 12/2023*

- supervised by Prof. Hang Ma
- focusing on reinforcement learning and multi-agent systems

**Summer Research Program**, Illinois Institute of Technology

*07/2019*

- supervised by Prof. Xin Chen from Northwestern University
- focusing on semantic segmentation of 3D point clouds for LiDAR sensor data

## PROJECTS

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**Convergence Rates of Log-Linear Policy Gradient Methods**

*09/2023- 12/2023*

- provide a general framework to analyze policy gradient in log-linear policy class by reducing the problem to tabular softmax settings
- extend theoretical guarantees of softmax (natural) policy gradient methods to the settings of linear function approximation

**A Survey of Apprenticeship Learning**

*09/2022- 12/2022*

- review literature for most widely used methods on apprenticeship learning
- empirically evaluate these methods in shared benchmarks

## Moving Decentralized Agents in Formation

02/2023- 09/2023

- propose a bi-objective multi-agent reinforcement learning framework to solve the tasks of formation control and path planning
- theoretically and empirically evaluate the performance of the proposed method and compare it to other centralized baselines

## Partially Observable Multi-Agent Path Finding

02/2023- 05/2022

- propose multi-agent actor-critic framework that utilizes attention mechanisms the heuristics
- empirically evaluate the proposed method over various instances in different environments

## Semantic Segmentation of LiDAR Perception Data

07/2019

- process LiDAR perception data of roadways via traditional computer vision methods
- achieve semantic object segmentation on 3D point clouds to identify lanes, poles, barriers, etc.

## PUBLICATIONS, PREPRINTS, AND REPORTS

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### Publications

- **SACHA: Soft Actor-Critic with Heuristic-Based Attention for Partially Observable Multi-Agent Path Finding**  
**Qiushi Lin** and Hang Ma.  
In IEEE Robotics and Automation Letters (RA-L) 2023 [pdf] [code]

### Preprints

- **Mean Field Control with Envelope Q-learning for Moving Agents in Formation**  
**Qiushi Lin** and Hang Ma.  
Preprint (Under Review) [pdf] [code]

### Reports

- **On the Convergence Rates of Log-Linear Policy Gradient Methods** [pdf]  
(by alphabetic order) Matin Aghaei, Anderson de Andrade, **Qiushi Lin**.
- **A Survey of Apprenticeship Learning** [pdf]  
(by alphabetic order) Ziqian Bai, Minh Bui, **Qiushi Lin**, Jiaqi Tan.

## AWARDS AND HONORS

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| • Westak International Sales, Inc. Graduate Scholarship, SFU | 2023 |
| • Departmental Highest Honors of Graduation, SUSTech         | 2020 |

## TEACHING EXPERIENCES

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### Teaching Assistant, SFU

- MACM 101: Discrete Mathematics
- CMPT 310: Introduction to Artificial Intelligence
- CMPT 417/827: Intelligent Systems

## TECHNICAL SKILLS

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**Programming Languages:** Python, C/C++, Matlab, SQL

**Frameworks and Tools:** Pytorch, Tensorflow, Linux, GitHub, LaTeX