Ryann Sim Wei Jian

RESEARCH FELLOW · SUTD

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Research Interests

My primary research interest is in studying multiagent systems through the lens of game theory, machine learning and optimization. In particular, I seek to understand the algorithmic properties of discrete-time learning in games, while also drawing connections to continuous-time dynamics which are prevalent in evolutionary game theory. I am also broadly interested in the intersection between language, social choice theory and game theory, especially how consensus or conflict can emerge in the evolution of socio-linguistic conventions.

Education

Singapore University of Technology and Design   *Singapore*

PH.D., ENGINEERING SYSTEMS AND DESIGN   *Sep. 2019 - May 2024*

- Awarded SUTD President's Graduate Fellowship
- Supervised by Georgios Piliouras
- Thesis Committee: Rakesh Nagi, Antonios Varvitsiotis, Dario Poletti

Singapore University of Technology and Design   *Singapore*

B.ENG., ENGINEERING SYSTEMS AND DESIGN (SUMMA CUM LAUDE)   *May 2016 - Aug. 2019*

- Awarded Wilmar Scholarship
- Focus Track : Operations Research

Journal Publications

1. Wayne Lin, Georgios Piliouras, *Ryann Sim*, and Antonios Varvitsiotis. **Learning in Quantum Common-Interest Games and the Separability Problem**. *Quantum* 9 (2025): 1689.

2. Wayne Lin, Georgios Piliouras, *Ryann Sim*, and Antonios Varvitsiotis. **No-Regret Learning and Equilibrium Computation in Quantum Games**. *Quantum* 8 (2024): 1569.

Conference Publications

1. John Lazarsfeld, Georgios Piliouras, *Ryann Sim*, and Andre Wibisono. **Fast and Furious Symmetric Learning in Zero-Sum Games: Gradient Descent as Fictitious Play**. *Conference on Learning Theory*, 2025.

2. Volkan Cevher, Georgios Piliouras, *Ryann Sim*, and Stratis Skoulakis. **Min-Max Optimization Made Simple: Approximating the Proximal Point Method via Contraction Maps**. *SIAM Symposium on Simplicity in Algorithms*, 2023.

3. Rahul Jain, Georgios Piliouras, and *Ryann Sim*. **Matrix Multiplicative Weights Updates in Quantum Zero-Sum Games: Conservation Laws & Recurrence**. *Advances in Neural Information Processing Systems*, 35, 2022.

4. Georgios Piliouras, *Ryann Sim*, and Stratis Skoulakis. **Beyond Time-Average Convergence: Near-Optimal Uncoupled Online Learning via Clairvoyant Multiplicative Weights Update**. *Advances in Neural Information Processing Systems*, 35, 2022.

5. *Ryann Sim*, Stratis Skoulakis, Lillian J Ratliff, and Georgios Piliouras. **Fast Convergence of Optimistic Gradient Ascent in Network Zero-Sum Extensive Form Games**. In *International Symposium on Algorithmic Game Theory*. Springer, 2022.

6. Tanner Fiez, *Ryann Sim*, Stratis Skoulakis, Georgios Piliouras, and Lillian Ratliff. **Online Learning in Periodic Zero-Sum Games**. *Advances in Neural Information Processing Systems*, 34, 2021.

7. Stratis Skoulakis, Tanner Fiez, *Ryann Sim*, Georgios Piliouras, and Lillian Ratliff. **Evolutionary Game Theory Squared: Evolving Agents in Endogenously Evolving Zero-Sum Games**. In *AAAI Conference on Artificial Intelligence*, 2021.

Preprints

1. Vincent Leon, Iosif Sakos, *Ryann Sim*, and Antonios Varvitsiotis. **Certifying Concavity and Monotonicity in Games via Sum-of-Squares Hierarchies**. Preprint, 2025.

2. John Lazarsfeld, Georgios Piliouras, *Ryann Sim*, and Stratis Skoulakis. **Optimism Without Regularization: Constant Regret in Zero-Sum Games**. Preprint, 2025.

Experience

Singapore University of Technology and Design   *Singapore*
POSTDOCTORAL RESEARCH FELLOW   *Aug. 2024 - Present*
- Supervised by Antonios Varvitsiotis and Georgios Piliouras. Research focus on learning in quantum games and polynomial optimization techniques for learning in extensive-form games.

Shanghai University of Finance and Economics   *Shanghai, China*
RESEARCH INTERN   *Feb. 2023 - May 2023*
- Hosted by Wang Xiao in ITCS Department, focusing on studying the dynamical behavior of alternating online algorithms.

British Petroleum Singapore   *Singapore*
CORE DATA STRATEGY INTERN   *May 2018 - Aug. 2018*

Teaching

Engineering Systems and Design Pillar, SUTD, Singapore

- Co-Instructor, 40.002 Optimization (Instructor Rating: 4.56/5)   *Spring 2025*
- Graduate Teaching Assistant, 40.012 Manufacturing and Service Operations   *Spring 2021*
- Graduate Teaching Assistant, 40.015 Simulation Modeling and Analysis   *Fall 2020*
- Undergraduate Teaching Assistant, 40.014 Systems Architecture   *Spring 2019*

Faculty of Science and Math, SUTD, Singapore

- Undergraduate Teaching Assistant, 10.004 Advanced Mathematics   *Fall 2018*
- Instructor, Freshmore Learning Hub   *Fall 2018*
- Undergraduate Teaching Assistant, 10.007 Systems World   *Spring 2018*
- Undergraduate Teaching Assistant, 3.007 Introduction to Design   *Fall 2017*
- Undergraduate Teaching Assistant, 10.001 Mathematics Bootcamp   *Summer 2017*

Independent Activity Period, SUTD, Singapore

- Instructor, Introduction to LaTeX   *Jan. 2019*
- Instructor, Introduction to HTML and CSS   *Jan. 2017*

Honors & Awards

- **ESD Outstanding Graduate Teaching Assistant Award**, SUTD   *2021*
- **President's Graduate Fellowship**, SUTD   *2019*
- **ESD Outstanding Undergraduate Teaching Assistant Award**, SUTD   *2019*
- **Meritorious Winner**, COMAP Interdisciplinary Contest in Modeling (ICM) Problem D *2019*
- **Math II Honors Class (Linear Algebra)**, Faculty of Science and Math, SUTD   *2016*
- **Wilmar Scholarship**, Wilmar International   *2016*

Talks & Presentations

- Invited Talk: 'No-Regret Learning and Equilbrium Computation in Quantum Games'. *INFORMS International, Singapore, Jul. 2025*

- Invited Talk: 'Certifying Concavity and Monotonicity in Games via Sum-of-Squares Hierarchies'. *King's College London, UK, Jul. 2025*

- Invited Talk: 'On Un(der)-Regularized Learning in Symmetric Zero-Sum Games'. *University of Adelaide, Australia, Feb. 2025*

- Poster Presentation: 'Matrix Multiplicative Weights Update in Quantum Zero-Sum Games: Conservation Laws and Recurrence'. *NeurIPS, New Orleans, USA, Dec. 2022*

- Poster Presentation: 'Beyond Time-Average Convergence: Near-Optimal Uncoupled Online Learning via Clairvoyant Multiplicative Weights Update'. *NeurIPS, New Orleans, USA, Dec. 2022*

- Oral Presentation: 'Fast Convergence of Optimistic Gradient Ascent in Network Zero-Sum Extensive Form Games'. *SAGT, Colchester, UK, Sep. 2022*

- Virtual Talk: 'Online Learning in Periodic Zero-Sum Games'. *NeurIPS (Online), Dec. 2021*

- Virtual Poster Presentation: 'Evolutionary Game Theory Squared: Evolving Agents in Endogenously Evolving Zero-Sum Games'. *AAAI (Online), Feb. 2021*

- Invited Talk: 'Not-So-Simple Linear Regression'. *PyData Kuala Lumpur, Jul. 2020*

Relevant Coursework

Linear Optimization (40.510), Convex Optimization (40.613), Stochastic Modeling (40.520), Statistics (40.530), Optimization for Machine Learning (50.579), Algorithmic Game Theory (40.651), Algorithms (50.004), Networked Life (01.104), Statistical and Machine Learning (01.113), Game Theory (40.316).

Academic Service

- Journal reviewer: Royal Society Proceedings A.

- Conference reviewer: AAAI, NeurIPS, ICML and ICLR.

- Sub-reviewer: WINE, EC, STOC, AISTATS, ICDCS and AAMAS.

Other Projects

Data Driven Robust Portfolio Optimization   *Singapore*
UNDERGRADUATE RESEARCH OPPORTUNITY PROGRAM, SUTD   *Jan. 2019 - Sep. 2019*
- Supervised by Karthyek Murthy.

Predicting Driver State & Environment with LSTM   *Singapore*
UNDERGRADUATE RESEARCH OPPORTUNITY PROGRAM, SUTD   *Jan. 2018 - Jul. 2018*
- Supervised by Bikramjit Das.

Augmented Human (Asian Leadership Program)   *Hangzhou, China*
INTERNATIONAL DESIGN CENTER, ZHEJIANG UNIVERSITY   *Sep. 2016 - Mar. 2017*

Extracurricular Activities

- Vice-President, SUTD Graduate Student Association (GSA)   *Mar. 2020 - Mar. 2021*

- Deputy Vice-President of Communications, SUTD Student Government (ROOT)   *Sep. 2017 - Sep. 2018*

- Deputy Programs Director, SUTD Freshman Orientation Committee   *Sep. 2016 - May 2017*

- President, SUTD Choir   *Nov. 2016 - Nov. 2017*

- Music Director, SUTD Vocomotives   *Nov. 2016 - Nov. 2017*

- SUTD University Ambassador   *Jun. 2016 - Sep. 2019*

Languages and Skills

Programming
Proficient in Python, R, LaTeX, SQL, HTML and CSS
Intermediate in Julia, JavaScript, Mathematica, MATLAB, AMPL, VBA and PyTorch

Languages
Fluent in English, Mandarin and Malay (written and spoken)
Intermediate in Cantonese and Hokkien