# Jing Shuang (Lisa) Li

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## Academic Positions

Assistant Professor of Electrical Engineering and Computer Science — Sep 2023 – Present
Michigan Neuroscience Institute Affiliate
**University of Michigan**, Ann Arbor MI

## Education

Ph.D. in Control & Dynamical Systems — Sep 2018 – Jun 2023
Thesis: Distributed Control Theory for Cyberphysical and Biological Systems
**California Institute of Technology**, Pasadena CA

B.A.Sc. in Engineering Science, Electrical and Computer Engineering Major — Sep 2013 – Jun 2018
**University of Toronto**, Toronto ON

## Publications

* denotes equal contribution


[19] J. Ting, **J. S. Li**, "The Path Integral Bottleneck: Exploring the Control-Compute Tradeoff", *in submission* [pdf]

[18] J. Ting, **J. S. Li**, "Two-Layer Attention Optimization for Bimanual Coordination", *2025 IEEE American Control Conference (ACC)* , pp. 2748–2754, 2025

[17] **J. S. Li**, "Toward Neuronal Implementations of Delayed Optimal Control", *2025 IEEE American Control Conference (ACC)*, pp. 2715–2721, 2025

[16] Y. Du, **J. S. Li**, "State Feedback System Level Synthesis in Continuous Time", *in submission* [pdf]

[15] J. Zhao, M. Yang, **J. S. Li**, "Human Balancing on a Log: A Switched Multi-Layer Controller", *2025 IEEE American Control Conference (ACC)*, pp. 1926–1931, 2025

[14] L. Karashchuk*, **J. S. Li***, G. M. Chou, S. Walling-Bell, S. L. Brunton, J. C. Tuthill, B. W. Brunton, "Sensorimotor delays constrain robust locomotion in a 3D kinematic model of fly walking", *eLife* 13:RP99005, 2024

[13] A. Aspeel, J. Nylof, **J. S. Li**, N. Ozay, "A Low Rank Approach to Minimize Sensor-to-Actuator Communication in Finite Horizon Output Feedback", *IEEE Control Systems Letters (L-CSS)*, pp. 3609–3614, 2023

[12] **J. S. Li**, C. Amo Alonso, "Global Performance Guarantees for Localized Model Predictive Control", *IEEE Open Journal of Control Systems*, vol. 2, pp. 325–336, 2023

[11] **J. S. Li***, A. A. Sarma*, T. J. Sejnowski, J. C. Doyle, "Internal feedback in the cortical perception–action loop enables fast and accurate behavior", *Proceedings of the National Academy of Sciences (PNAS)*, vol. 120 (39), pp. e2300445120, 2023

[10] C. Amo Alonso, **J. S. Li**, N. Matni, J. Anderson, "Distributed and Localized Model Predictive Control—Part II: Theoretical Guarantees", *IEEE Transactions on Control of Network Systems (TCNS)*, vol. 10 (3), pp. 1113–1123, 2023. ***IEEE Transactions on Control of Network Systems Best Paper Award***

[9] F. Xiao, **J. S. Li**, J. C. Doyle, "Flux Exponent Control Enables Prediction of Metabolism Dynamics", *IEEE American Control Conference (ACC)*, pp. 1189–1194, 2023

[8] **J. S. Li**, J. C. Doyle, "Distributed Robust Control for Systems with Structured Uncertainties", *IEEE Conference on Decision and Control (CDC)*, pp. 1702–1707, 2022

[7] L. Conger, **J. S. Li**, E. Mazumdar, S. L. Brunton, "Nonlinear System Level Synthesis for Polynomial Dynamical Systems", *IEEE Conference on Decision and Control (CDC)*, pp. 3846–3852, 2022

[6] C. Amo Alonso, **J. S. Li**, J. Anderson, N. Matni, "Distributed and Localized Model Predictive Control—Part I: Synthesis and Implementation", *IEEE Transactions on Control of Network Systems (TCNS)*, vol. 10 (2), pp. 1058–1068, 2023

[5] **J. S. Li**, "Internal Feedback in Biological Control: Locality and System Level Synthesis", *IEEE American Control Conference (ACC)*, pp. 474–479, 2022. ***Best Student Paper Finalist***

[4] J. Stenberg, **J. S. Li**, A. A. Sarma, J. C. Doyle, "Internal Feedback in Biological Control: Diversity, Delays, and Standard Theory", *IEEE American Control Conference (ACC)*, pp. 462–467, 2022

[3] A. A. Sarma, **J. S. Li**, J. Stenberg, G. Card, E. S. Heckscher, N. Kasthuri, T. J. Sejnowski, J. C. Doyle, "Internal Feedback in Biological Control: Architectures and Examples", *IEEE American Control Conference (ACC)*, pp. 456–461, 2022

[2] **J. S. Li**, C. Amo Alonso, J. C. Doyle, "Frontiers in Scalable Distributed Control: SLS, MPC, and Beyond", *IEEE American Control Conference (ACC)*, pp. 2720–2725, 2021

[1] **J. S. Li**, D. Ho, "Separating Controller Design from Closed-Loop Design: A New Perspective on System-Level Controller Synthesis", *IEEE American Control Conference (ACC)*, pp. 3529–3534, 2020

## Toolboxes

[T2] S. H. Tseng, **J. S. Li**, "SLSpy: Python-Based System-Level Controller Synthesis Framework", 2020 [pdf] [code]

[T1] **J. S. Li**, "SLS-MATLAB: MATLAB Toolbox for System Level Synthesis", 2019. [code]

## Invited Talks

"Layered control in animal sensorimotor systems". *Telluride Neuromorphic Cognition Engineering Workshop*, Jul 2025

"Global Performance Guarantees for MPC Under Sparse Local Communication". *Leveraging Sparsity in Control* workshop at *European Control Conference*, Jun 2025

"What can control theory tell us about neural circuits?". *Dynamics of brain computations through the lens of control theory* workshop at Computational and Systems Neuroscience (COSYNE) Conference, Apr 2024

"Layered control in animal sensorimotor systems". *Control Architecture Theory* workshop at *IEEE Conference on Decision and Control*, Dec 2024

"Optimal control in sensorimotor systems". *Autonomy Talks*, Jun 2024

"Optimal control in animal sensorimotor systems". *10th Midwest Workshop on Control and Game Theory*, Apr 2024

"Optimal feedback control in sensorimotor systems: behavior and implementation". *Manifolds in Nature Workshop*, Mar 2024

"Optimal and distributed control in animals". University of Michigan, Jan 2024

"Control theory for neuroscience: from internal feedback to legged locomotion". *Woods Hole Workshop on Computational Neuroscience/Telluride Neuromorphic Cognition Engineering Workshop*, Jul 2023

"Introduction to System Level Synthesis". *System Level Synthesis: New Frontiers in Distributed Control* workshop at *IEEE Conference on Decision and Control*, Dec 2022

"Internal Feedback Pathways: From Control Theory to Sensorimotor Systems (and beyond)". Center for Computational Neuroscience, Flatiron Institute, Nov 2021

## Posters

J. C. Doyle, C. Amo Alonso, **J. S. Li**, F. Xiao, "Rule-Based Systems Theory for Regulation in Networks of Biomolecules, Microbial Cells and Populations", *8th Build-a-Cell Workshop*, 2022

**J. S. Li**, "Internal Feedback: From Optimal Control to the Sensorimotor System", *Chen Institute for Neuroscience Poster* Session, 2021

**J. S. Li**, S. H. Tseng, "SLS-MATLAB Toolbox: Do-It-Yourself System Level Synthesis", *IEEE American Control Conference*, 2020

**J. S. Li**, J. Yu, C. Amo Alonso, J. C. Doyle, "System Level Synthesis: Distributed Control Made Easy", Poster at *Center for Autonomous Systems and Technologies (CAST) Scientific Showcase*, Caltech, 2020

## Teaching

| | |
|---|---|
| Control Systems Analysis and Design (EECS 460) | F2024, F2025 |
| Special Topics: Control Theory for Biological Sensorimotor Systems (EECS 598) | W2024 |
| Linear Systems Theory (ECE 560) | F2023, W2025 |

## Advising & Mentorship

| PhD | Master's | Undergraduate |
|---|---|---|
| Yaozhi Du, W2025 – | Enxu Liu, F2024 | Aida Ruan, S/S2024 |
| Jaidev Gill, F2024 – | Riley Bridges, S/S2024 – F2024 | *WISE RP Summer Scholar* |
| Eric (Qin) He, F2024 – | Ethan Parham, S/S2024 – F2024 | Anisha Sharma, S/S2024 |
| Justin Ting, W2024 – | Prerana Lakshmanan, S/S2024 | Mo Yang, S/S2024 – F2024 |
| | Yaozhi Du, W2024 – | Jiayi Zhao, S/S2024 – F2024 |
| | Qunzhuo Feng, F2023 – W2024 | |

W: Winter term (Jan – Apr); S/S: Spring/Summer term (May – Aug); F: Fall term (Sep – Dec)

## Funding Awarded

NSERC PGSD (ranked 4/72 in electrical engineering) Apr 2021

NSERC USRA (awarded twice) May 2015, May 2016

## Academic Service

Reviewer:

| | |
|---|---|
| IEEE American Control Conference (ACC) | IEEE Trans. on Automatic Control (TAC) |
| IEEE Conference on Decision and Control (CDC) | IEEE Trans. on Control of Networked Systems (TCNS) |
| IEEE Control Systems Letters (L-CSS) | IEEE Trans. on Vehicular Technology |
| IEEE Open Journal of Control Systems (OJCSYS) | Neural Computation |

Panel reviewer: Directorate for Engineering (ENG), NSF

Session chair/co-chair: ACC2025 Switched Systems; ACC2025 Biological and Bioinspired Systems

Poster/demo chair, 2024 ACM/IEEE International Conference on Cyber-Physical Systems

Lead workshop organizer, "System Level Synthesis: New Frontiers in Distributed Control" at IEEE Conference on Decision and Control (2022)

## Additional Experience

**Piano and Voice Instructor, Lippert Music Center** Sep 2012 – Jun 2018
Taught private music lessons and prepared students for Royal Conservatory exams and competitions

**Undergraduate Thesis, Reconfigurable Antenna Lab** (advisor: S. Hum) Sep 2017 – Apr 2018
Project: Neural network inverse models for electromagnetic metasurface design

**Full-Time Software Engineering Intern, Verity Studios AG** Sep 2016 – Aug 2017
Wrote code in Python, C++, and SQL to support drone flight planning, evaluation, and simulation

**Student Researcher, Reconfigurable Antenna Lab** (advisor: S. Hum) May 2016 – Aug 2016
Project: C++ simulation tool for periodic electromagnetic scatterers

**Student Researcher, Lab for Advanced Power Conversion** (advisor: P. Lehn) May 2015 – Aug 2015
Project: Wireless energy harvester for smart-grid monitoring applications

**Student Researcher, Nanomaterials Lab** (advisor: H. G. Wei) May 2014 – Aug 2014

Project: Copper-based nanostructures for photocatalytic hydrogen production

## Additional Skills

**Programming and scripting**: MATLAB, Python, C++, SQL

**Foreign languages**: Mandarin Chinese (fluent), French (basic)

**Instruments**: piano, voice (classical, musical theatre, pop), cello, guitar
Certifications from the Royal Conservatory of Music:

Associate (ARCT) in Piano Performance, 1st Class Honours (practical only)
Grade 10 comprehensive certificate in Piano Performance, 1st Class Honours
Grade 10 comprehensive certificate in Vocal Performance, 1st Class Honours