Jing Shuang (Lisa) Li

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Academic Positions

Assistant Professor of Electrical Engineering and Computer Science — Aug 2023 –
University of Michigan, Ann Arbor MI

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

[10] C. Amo Alonso, **J. S. Li**, N. Matni, J. Anderson, "Distributed and Localized Model Predictive Control. Part II: Theoretical Guarantees", to appear in *IEEE Transactions on Control of Network Systems*, 2023 [preprint]

[9] F. Xiao, **J. S. Li**, J. C. Doyle, "Flux Exponent Control Enables Prediction of Metabolism Dynamics", to appear in *IEEE American Control Conference*, 2023 [preprint]

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

[7] L. Conger, **J. S. Li**, E. Mazumdar, S. L. Brunton, "Nonlinear System Level Synthesis for Polynomial Dynamical Systems", in *IEEE Conference on Decision and Control*, 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* 10 (2), pp. 1058–1068, 2023

[5] **J. S. Li**, "Internal Feedback in Biological Control: Locality and System Level Synthesis", in *IEEE American Control Conference*, 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", in *IEEE American Control Conference*, 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: Constraints and Layered Architectures", in *IEEE American Control Conference*, pp. 456–461, 2022

[2] **J. S. Li**, C. Amo Alonso, J. C. Doyle, "Frontiers in Scalable Distributed Control: SLS, MPC, and Beyond", in *IEEE American Control Conference*, 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", in *IEEE American Control Conference*, pp. 3529–3534, 2020

Papers in Preparation & Under Review

[P3] L. Karashchuk*, **J. S. Li***, J. C. Tuthill, B. W. Brunton, "A Layered Architecture Models Robust Multi-Legged Locomotion of *Drosophila*" (working title), in preparation

[P2] **J. S. Li**, C. Amo Alonso, "Global Performance Guarantees for Localized Model Predictive Control", in submission [preprint]

[R1] **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", under revision at *Proceedings of the National Academy of Sciences (PNAS)*, 2023 [preprint]

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]

Workshops, Talks, Posters

J. S. Li, J. Yu, C Amo Alonso, J. C. Doyle, "System Level Synthesis: New Frontiers in Distributed Control". Organizer and speaker for full-day workshop at *IEEE Conference on Decision and Control*, 2022

J. S. Li, "Control Theory for Biology: Internal Feedback and Other Models". Talk at *40th Southern California Control Workshop*, 2022

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". Poster at *8th Build-a-Cell Workshop*, 2022

J. S. Li, "Internal Feedback Pathways: From Control Theory to Sensorimotor Systems (and beyond)". Invited seminar talk at *Center for Computational Neuroscience, Flatiron Institute* (Simons Foundation), 2021

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

J. S. Li, S. H. Tseng, "SLS-MATLAB Toolbox: Do-It-Yourself System Level Synthesis". Poster at *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*, 2020

Academic Service

Conference reviewer: IEEE Conference on Decision and Control, IEEE American Control Conference

Journal reviewer: IEEE Transactions on Vehicular Technology, Neural Computation

Funding Awarded

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

NSERC USRA — May 2015, May 2016

Teaching

TA, Introduction to Distributed Algorithms (CS 142), Instructor: K. M. Chandy — F2021, F2022

TA, Robust Control Theory (CDS 231), Instructor: J. Doyle — W2020, W2022

TA, Introduction to Feedback Control Systems (CDS 110), Instructor: J. Seinfeld — S2021

Head TA, Relational Databases (CS 121), Instructor: M. Hovik — W2021

TA, Network Control Systems (CDS 141), Instructor: J. Doyle — S2020

Advising & Mentorship

Lauren Conger, PhD student at Caltech

Josefin Stenberg, summer student at Caltech

Diversity, Equity, & Inclusion (DEI)

Treasurer, Caltech Canadian Club — May 2021 – May 2023

Catalina Community Associate — Nov 2020 – Jun 2022

Mentor for international, departmental, and diversity programs — Oct 2020 – Jun 2022

Chair, Graduate Women in CMS — Feb 2020 – May 2022

Member (1 of 9), departmental Graduate Advisory Council — Oct 2019 – Oct 2021

Organizer (1 of 2), departmental PhD Preliminary Exam Prep Sessions — Oct 2019 – Aug 2020

Organizer (1 of 4), departmental town hall on diversity, equity, and inclusion — Jun 2020 – Jul 2020

Orientation leader and panelist, international and departmental orientation — Sep 2019 – Sep 2022

Additional Work and Research 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