Jing Shuang (Lisa) Li

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Education

California Institute of Technology – Ph.D. in Control & Dynamical Systems

Sep 2018 – Jun 2023 (expected)

Thesis: Distributed Control Theory for Cyberphysical and Biological Systems (working title)

Advisor: John C. Doyle

University of Toronto – B.A.Sc. in Engineering Science, Electrical Engineering Major

Sep 2013 – Jun 2018

Awards

Best Student Paper Finalist at 2022 IEEE American Control Conference for [5] *Jun 2022*

NSERC PGS-D (ranked 4/72 in electrical engineering) *Apr 2021*

This award funds doctoral study for up to three years for Canadians; similar to NSF GRFP for Americans

Accepted Papers

[8] **J. S. Li**, J. C. Doyle, "Distributed Robust Control for Systems with Structured Uncertainties", to appear at *IEEE Conference on Decision and Control*, 2022 [pdf]

[7] L. Conger, **J. S. Li**, E. Mazumdar, S. L. Brunton, "Nonlinear System Level Synthesis for Polynomial Dynamical Systems", to appear at *IEEE Conference on Decision and Control*, 2022 [pdf]

[6] C. Amo Alonso, **J. S. Li**, J. Anderson, N. Matni, "Distributed and Localized Model Predictive Control. Part I: Synthesis and Implementation", to appear in *IEEE Transactions on Control of Network Systems*, 2022 [pdf]

[5] **J. S. Li**, "Internal Feedback in Biological Control: Locality and System Level Synthesis", in *IEEE American Control Conference*, pp. 474–479, 2022 [pdf]. ***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 [pdf]

[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 [pdf]

[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 [pdf]

[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 [pdf]

Papers in Preparation & Under Review

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

[P2] **J. S. Li**, C. Amo Alonso, "How to Use Localized Computations for Model Predictive Control without Sacrificing Performance", in preparation

[P1] **J. S. Li***, A. A. Sarma, T. J. Sejnowski, J. C. Doyle, "Internal Feedback in the Neural Control of Movement", in preparation

[R2] F. Xiao, **J. S. Li**, J. C. Doyle, "Flux Exponent Control Enables Prediction of Metabolism Dynamics", submitted to *IEEE American Control Conference*

[R1] C. Amo Alonso, **J. S. Li**, N. Matni, J. Anderson, "Distributed and Localized Model Predictive Control. Part II: Theoretical Guarantees", submitted to *IEEE Transactions on Control of Network Systems*, 2022 [pdf]

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 to appear 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

Funding History

NSERC PGS-D (ranked 4/72 in electrical engineering) *Awarded Apr 2021*

NSERC USRA *Awarded twice: May 2015, May 2016*

Teaching

TA, Introduction to Distributed Algorithms (CS 142), Instructor: K. M. Chandy *Fall 2021, 2022*

TA, Robust Control Theory (CDS 231), Instructor: J. Doyle *Winter 2020, 2022*

TA, Introduction to Feedback Control Systems (CDS 110), Instructor: J. Seinfeld *Spring 2021*

Head TA, Relational Databases (CS 121), Instructor: M. Hovik *Winter 2021*

TA, Network Control Systems (CDS 141), Instructor: J. Doyle *Spring 2020*

Advising & Mentorship

Lauren Conger, PhD student at Caltech

Josefin Stenberg, summer student at Caltech

Diversity, Equity, & Inclusion (DEI)

Treasurer, Caltech Canadian Club *May 2021 – Present*

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 – July 2020*

Orientation leader and panelist, international and departmental orientation *Sep 2019, Sep 2020, Sep 2022*

Academic Service

Conference reviewer: IEEE Conference on Decision and Control 2021, 2022; IEEE American Control Conference 2023

Journal reviewer: IEEE Transactions on Vehicular Technology

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 (with Prof. Sean 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 (with Prof. Sean Hum) *May 2016 – Aug 2016*
Project: C++ simulation tool for periodic electromagnetic scatterers

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

Student Researcher, Nanomaterials Lab (with Prof. Ho Ghim 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

References

John C. Doyle doyle@caltech.edu
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California Institute of Technology

Bing W. Brunton bbrunton@uw.edu
Associate Professor, Department of Biology
University of Washington, Seattle

Richard M. Murray murray@cds.caltech.edu
Professor of Control and Dynamical Systems and Bioengineering
Chair of Biology and Biological Engineering
California Institute of Technology

James Anderson james.anderson@columbia.edu
Assistant Professor, Department of Electrical Engineering
Columbia University

Steven L. Brunton sbrunton@uw.edu
Professor, Department of Mechanical Engineering
University of Washington, Seattle

Steven Low slow@caltech.edu
Professor of Computing and Mathematical Sciences and Electrical Engineering
California Institute of Technology