LIANGJIE (JEFFREY) CHEN

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SUMMARY

Ph.D. candidate specializing in control theory and mathematical optimization, with multiple merit-based corporate/government scholarships. Demonstrated leadership and problem-solving skills in both academic and professional settings. Passionate about rigorously applying theoretical knowledge in solving challenging and complex real-world problems. Bilingual Canadian citizen.

EDUCATION

University of Toronto

Ph.D. in Electrical and Computer Engineering (Focus: automatic control theory)	Expected 2027
M.A.Sc. in Electrical and Computer Engineering (Focus: numerical algorithms)	2022
B.A.Sc. (Honours) in Computer Engineering (Minors in AI engineering and robotics)	2020

KEY SKILLS

- **Theoretical expertise**: Mathematics (matrix algebra, convex optimization, fixed-point algorithms, algebraic graph theory, real analysis, mathematical finance); Control theory (data-driven and risk-aware control theory, game theory, signal processing, model predictive control, Markov decision process); Statistics (statistical machine learning, time series modeling, system identification)
- **Technical tools**: MATLAB, Python, Julia, C++, LaTeX, PyTorch, Numpy, Pandas, SciPy, YALMIP
- **Languages**: English (native), Mandarin (native), Cantonese (intermediate)
- **Soft skills**: communication, project management, strategic negotiation and decision-making, conflict resolution, leadership and teamwork, adaptability

RELEVANT PROJECT

Investment Performance Calculator   2024–Present

- Analyzed and demonstrated the effectiveness of the dollar-cost averaging strategy with different portfolio compositions and trading schedule using Yahoo Finance historical data, written in Python.
- Developed functionalities for rate of return calculation, graphical portfolio performance presentation, with comparative analysis using alternative trading strategies in progress.

RESEARCH EXPERIENCE

Data-driven disturbance rejection   2023–Present

- Developed a data-driven controller to solve the disturbance rejection problem on linear dynamical systems with minimal available system information.
- Achieved comparable or superior performance and robustness of more complicated multi-parameter controller designs with a novel and simpler controller design that depends on a *single* parameter.
- Presented preliminary results at the 2023 IEEE Conference in Decision and Control (Singapore), the top conference in systems control theory.

Fixed-point algorithm for the AC power flow problem   2020–2022

- Designed a fixed-point algorithm to solve the AC power flow problem subject to real-world transmission systems constraints, and achieved 99% algorithm robustness against voltage fluctuation.

- Derived theoretical conditions for the algorithm to converge to the desired solutions.
- Presented research results at the American Control Conference (USA), and at the University of British Columbia (Canada) at the invitation of Professor Ryozo Nagamune.

Machine learning for the AC power flow problem   2019–2020
- Designed an 1D convolutional neural network to find viable Newton-Raphson power flow algorithm initial conditions that lead to convergence to the desired solutions.
- Conducted neural networktraining on the Niagara cluster (Compute Canada) with parallelized power flow computations written in Julia.
- Reduced computation time by over 30% using the initial conditions generated by the trained neural networks on test transmission systems with 100–3000 nodes.

RELEVANT PUBLICATIONS

[1] L. Chen and J. W. Simpson-Porco, "Data-driven output regulation using single-gain tuning regulators," in *2023 IEEE Conference on Decision and Control*, (Singapore), pp. 2903–2909, Dec. 2023

[2] L. Chen and J. W. Simpson-Porco, "A fixed-point algorithm for the AC power flow problem," in *2023 American Control Conference*, (San Diego, CA, USA), pp. 4449–4456, May 2023

[3] L. Chen and J. E. Tate, "Hot-Starting the Ac Power Flow with Convolutional Neural Networks," Apr. 2020. arXiv: 2004.09342 [eess.SY]

OTHER EXPERIENCES

Teaching Assistant, University of Toronto   2020–Present
- Led tutorials and laboratory sessions for advanced mathematics and engineering courses, ensuring clear delivery of complex analytical topics and maintaining high student satisfaction ratings.
- Acted as Head TA for multiple courses and coordinated teams of 3 to 15 other Teaching Assistants to plan course content delivery and execute under time pressure.

Legal Advocate, British Columbia Residential Tenancy Board (RTB)   2024
- Acted as a full representative for my parents at two separate BC RTB dispute resolution hearings in January and November 2024, defending against malicious false allegations of a former tenant.
- Independently compiled more than 100 total pages of evidence and written arguments by studying the BC Residential Tenancy Act and interviewing multiple former tenants.
- Achieved favorable decisions for both hearings, averted reputational damage and financial losses of over $20,000 CAD though clear and detailed presentation of evidence and strategic negotiations in a high-stress environment, despite having no legal background.

SELECTED AWARDS

- **Postgraduate Scholarship**, Natural Sciences and Engineering Research Council   2024–2027
- **Ontario Graduate Scholarship** ($\times 3$, 1 declined), Government of Ontario   2022–2024
- **Hatch Graduate Scholarship for Sustainable Energy Research** ($\times 2$), Hatch Ltd.   2022–2023
- **Edward S. Rogers Sr. Graduate Scholarships** ($\times 3$), University of Toronto   2022–2023
- **H. W. Price Research Fellowship in Electrical Engineering**, Hydro One Ltd.   2021

VOLUNTEERING

Violinist, University of Toronto Campus Philharmonic Orchestra (UTCPO)   2022–Present

- Performed both classical symphonic and modern works as part of the UTCPO First Violin section in the Fall and Winter semester concerts since January 2022.

Conference Event Organizer, American Control Conference (ACC)   2024

- Organized a networking boat cruise event for 70+ early-career attendees at ACC 2024, coordinating logistics and budget approval with stakeholders located across North America.
- Ensured timely execution of event planning, advertising and payment processing, resulting in positive attendee feedback and enhanced professional connections among the attendees.