Ashish Cherukuri

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Employment

Assistant Professor, ENTEG, University of Groningen (Feb 2019-Present)

Postdoctoral Researcher, Automatic Control Laboratory, ETH, Zürich (Sep 2017-Jan 2019)
Advisor: Prof. John Lygeros *Key words:* Data-driven optimization, Network routing under uncertainty

Education

PhD, University of California, San Diego (Jul 2012-Aug 2017)
Advisor: Prof. Jorge Cortés
Dissertation: "Coordination and competition in optimal dispatch: distributed algorithms, saddle-point dynamics, and iterative bidding"

MSc, ETH, Zürich (Sep 2008-Aug 2010)
Advisors: Prof. John Lygeros, Prof. Debasish Chatterjee, Dr. Peter Al-Hokayem
Thesis: "A comparison of robust and stochastic receding horizon control of discrete-time systems"

BTech, Indian Institute of Technology, Delhi (Jul 2004-Jun 2008)

Research Interests

I am broadly interested in the design and analysis of cooperation and competition in networked engineering systems/cyber-physical systems. My current research involves

1. Distributed algorithms for network optimization problems
2. Asymptotic analysis of continuous-time algorithmic solutions for optimization problems
3. Dynamic analysis and learning in games
4. Data-driven stochastic optimization
5. Application of the above theoretical topics to electrical power networks and transportation

Awards and Honors

Robert E. Skelton systems and control dissertation award, University of California, San Diego, 2017
Outstanding graduate student award in MAE, University of California, San Diego, 2016
MAE Distinguished fellowship award, University of California, San Diego, 2016
Best student paper award finalist for paper (C5), American Control Conference, Chicago, IL, 2015
Focht-Powell fellowship, University of California, San Diego, 2012-2015
Excellence scholarship, ETH, Zürich, 2008-2010
Dean's merit award, Indian Institute of Technology, Delhi, 2005,'06,'07,'08

Teaching

Course Coordinator

Introduction to Stochastic Programming (Graduate course), University of Groningen (Semester IIb, '19-'20)
Data-driven Optimization (Graduate course), University of Groningen (Semester IIb, '20)

Talks

SCCW, California Institute of Technology (Apr'17) • EE, IISc Bangalore (Aug'18) • SysCon, IIT Bombay (Aug'18, Jan'16) • EE, IIT Delhi (Aug'18) • Mini Symposium, SIAM CT'21 (Jul'21) • DCSC, TU Delft (Jan'17) • Energy-Open, University of Groningen (Nov'19) • ENTEG, University of Groningen (Apr'18, Jan'17) • ECE, University of Illinois, Urbana-Champaign (Apr'18, Oct'15) • ECE, University of Minnesota (Oct'15) • ESE, University of Pennsylvania (Apr'17) • SCCW, University of Southern California (Nov'15) • ECE, University of Toronto (Apr'18)

Research Grants

Co-applicant and Work Package leader, MOOI42009: "The Heat Is On (THIO)", Share of RuG: 300k €, Duration: 09/2021-09/2025

Mentoring

PhD student at University of Groningen
Jasper Verbree (2019-present)
Alireza Zolanvari (2020-present)
Amin Maghami (2020-present) [Co-supervised with Dr. E. Ursavas]
Ashwin Aravind (2020-present) [Co-supervised with Prof. D. Chatterjee]
Ping Liu (2021-present) [Co-supervised with Prof. B. Jayawardhana] [Dual-degree Program]

Masters research projects supervised at University of Groningen
Nico de Melo (University of Groningen, M.Sc. IEM 2021)
Thomas Koekoek (University of Groningen, M.Sc. IEM 2021)
Jasper Annema (University of Groningen, M.Sc. IEM 2020)
Job Spenkelink (University of Groningen, M.Sc. IEM 2020)
Bas Wieringa (University of Groningen, M.Sc. IEM 2020)
Henny Meijer (University of Groningen, M.Sc. IEM 2020)
Stefan de Groot (University of Groningen, M.Sc. IEM 2020)
Nick de Vries (University of Groningen, M.Sc. IEM 2020)
Sara Scheffer (University of Groningen, M.Sc. IEM 2019)

Bachelor integration projects supervised at University of Groningen
Emiel ter Veen (University of Groningen, B.Sc. IEM 2021)
Vincent M. Pellegrom (University of Groningen, B.Sc. IEM 2021)
Lucas Snijder (University of Groningen, B.Sc. IEM 2021)
Storm de Quaij (University of Groningen, B.Sc. IEM 2021)
Gabriele Ansaldo (University of Groningen, B.Sc. IEM 2020)
Bjarne Frons (University of Groningen, B.Sc. IEM 2020)
Daan Romkema (University of Groningen, B.Sc. IEM 2020)

Co-advised with Prof. John Lygeros during Postdoc
Harleen Hanspal (ETH, Zürich, M.Sc. student, Feb 2018-May 2018)
Luca Stroppa (ETH, Zürich, M.Sc. student, Feb 2018-May 2018)
Jonathan Dietrich [joint supervision with Dr. A.R. Hota] (ETH, Zürich, M.Sc. student, Mar 2018-May 2018)

Co-advised with Prof. Jorge Cortés during Ph.D.
Tjerk Stegink (University of Groningen, PhD student, visiting UC San Diego, Mar 2017-May 2017)
Yiou Huang (University of California, San Diego, MS student, Jun 2016-Oct 2016)

Professional Service

Editorial activities
Associate Editor, Conference Editorial Board, IEEE Control Systems Society, 2019-present

Program Committees
ICC - *Indian Control Conference:* ICC 2019 (18-20 December, 2019, Hyderabad, India), ICC 2021 (20-22 De-

cember, 2021, Mumbai, India)

Conference and Workshop Organization
Co-organizer: Energy-Open 2019, University of Groningen, Groningen, 2019
Co-organizer: 30th Southern California Controls Workshop, University of California, San Diego, 2016

Reviewer for Journals
Automatica • IEEE Control Systems Letters • IEEE Control Systems Magazine • IEEE Power Engineering Letters • IEEE Transactions on Automatic Control • IEEE Transactions on Control of Network Systems • IEEE Transactions on Power Systems • IEEE Transactions on Signal Processing • IEEE Transactions on Smart Grid • IEEE Transactions on Sustainable Energy • IEEE Transactions on Systems, Man, and Cybernetics: Systems • IMA Journal of Mathematical Control and Information • International Journal of Control • Journal of Geometric Mechanics • Journal of Computational and Applied Mathematics • SIAM Journal on Control and Optimization • SIAM Journal on Optimization • Systems and Control Letters

Reviewer for Conferences
American Control Conference • Conference on Decision and Control • European Control Conference • Indian Control Conference • International Conference on Cyber-Physical Systems • International Conference on Smart Grid Communications • Learning for Dynamics & Control • Mathematical Theory of Network Systems • Multi-Conference on Systems and Control • World Congress of the International Federation of Automatic Control

Member of Professional Societies
Control Systems Society (CSS) (2012-present) • Institute of Electrical and Electronics Engineers (IEEE) (2012-present) • Institute for Operations Research and Management Sciences (INFORMS) (2016-2019) • Society of Industrial and Applied Mathematics (SIAM) (2015-present)

University Service
University of Groningen, Board of Admissions IEM, member, (2019-present)

Publications
Submitted journal preprints

(J-15) J. Verbree and A. Cherukuri. Inferring the prior in routing games using public signalling. *IEEE Transactions on Control of Network Systems*, 2021. Submitted. Available at `https://arxiv.org/abs/2109.05895`

(J-14) S. Das, A. Aravind, A. Cherukuri, and D. Chatterjee. Near-optimal solutions of convex semi-infinite programs via targeted sampling. *Annals of Operations Research*, 2021. Submitted

Journal articles (published/in press)

(J-13) M. Shakarami, A. Cherukuri, and N. Monshizadeh. Steering the aggregative behavior of non-cooperative agents: a nudge framework. *Automatica*, 2020. To appear. Available at `https://arxiv.org/abs/2012.06376`

(J-12) A. Cherukuri, T. Stegink, C. De Persis, A. J. van der Schaft, and J. Cortés. Frequency-driven market mechanisms for optimal dispatch in power networks. *Automatica*, 133:109861, 2021

(J-11) A. Cherukuri and A. R. Hota. Consistency of distributionally robust risk- and chance-constrained optimization under Wasserstein ambiguity sets. *IEEE Control Systems Letters*, 5(5):1729–1734, 2021

(J-10) B. K. Poolla, A. R. Hota, S. Bolognani, D. S. Callaway, and A. Cherukuri. Wasserstein distributionally robust look-ahead economic dispatch. *IEEE Transactions on Power Systems*, 36(3):2010–2022, 2020

(J-9) A. Cherukuri and J. Cortés. Cooperative data-driven distributionally robust optimization. *IEEE Transactions on Automatic Control*, 65(10):4400–4407, 2020

(J-8) A. Cherukuri and J. Cortés. Iterative bidding in electricity markets: rationality and robustness. *IEEE Transactions on Network Science and Engineering*, 7(3):1265–1281, 2020

(J-7) T. Stegink, A. Cherukuri, C. De Persis, A. J. van der Schaft, and J. Cortés. Hybrid interconnection of iterative bidding and power network dynamics for frequency regulation and optimal dispatch. *IEEE Transactions on Control of Network Systems*, 6(2):572–585, 2019

(J-6) A. Cherukuri, E. Mallada, S. H. Low, and J. Cortés. The role of convexity in saddle-point dynamics: Lyapunov function and robustness. *IEEE Transactions on Automatic Control*, 63(8):2449–2464, 2018

(J-5) A. Cherukuri and J. Cortés. Distributed coordination of DERs with storage for dynamic economic dispatch. *IEEE Transactions on Automatic Control*, 63(3):835–842, 2018

(J-4) A. Cherukuri, B. Gharesifard, and J. Cortés. Saddle-point dynamics: conditions for asymptotic stability of saddle points. *SIAM Journal on Control and Optimization*, 55(1):486–511, 2017

(J-3) A. Cherukuri and J. Cortés. Initialization-free distributed coordination for economic dispatch under varying loads and generator commitment. *Automatica*, 74:183–193, 2016

(J-2) A. Cherukuri, E. Mallada, and J. Cortés. Asymptotic convergence of constrained primal-dual dynamics. *Systems & Control Letters*, 87:10–15, 2016

(J-1) A. Cherukuri and J. Cortés. Distributed generator coordination for initialization and anytime optimization in economic dispatch. *IEEE Transactions on Control of Network Systems*, 2(3):226–237, 2015

Conference proceedings

(C-21) M. Shakarami, A. Cherukuri, and N. Monshizadeh. Adaptive interventions for social welfare maximization in network games. In *IEEE Conf. on Decision and Control*, December 2021. To appear

(C-20) M. Shakarami, A. Cherukuri, and N. Monshizadeh. Nudging the aggregative behavior of non-cooperative agents. In *IEEE Conf. on Decision and Control*, pages 2579–2584, Jeju island, Republic of Korea, December 2020

(C-19) J. Verbree and A. Cherukuri. Stochastic approximation for cvar-based variational inequalities. In *IEEE Conf. on Decision and Control*, pages 2216–2221, Jeju island, Republic of Korea, December 2020

(C-18) A. Cherukuri. Sample average approximation of CVaR-based Wardrop equilibrium in routing under uncertain costs. In *IEEE Conf. on Decision and Control*, pages 3164–3169, Nice, France, December 2019

(C-17) J. Dietrich, A. R. Hota, and A. Cherukuri. Data-driven regret minimization in routing games under uncertainty. In *European Control Conference*, pages 1702–1707, Naples, Italy, June 2019

(C-16) A. R. Hota, A. Cherukuri, and J. Lygeros. Data-driven chance constrained optimization under wasserstein ambiguity sets. In *American Control Conference*, pages 1501–1506, Philadelphia, PA, July 2019

(C-15) T. Stegink, A. Cherukuri, C. De Persis, A. J. van der Schaft, and J. Cortés. Stable interconnection of continuous-time price-bidding mechanisms with power network dynamics. In *Power Systems Computation Conference*, Dublin, Ireland, June 2018. Electronic proceedings

(C-14) T. Stegink, A. Cherukuri, C. De Persis, A. J. van der Schaft, and J. Cortés. Integrating iterative bidding in electricity markets and frequency regulation. In *American Control Conference*, pages 6182–6187, Milwaukee, WI, May 2018

(C-13) A. Cherukuri and J. Cortés. Data-driven distributed optimization using Wasserstein ambiguity sets. In *Allerton Conf. on Communications, Control and Computing*, pages 38–44, Monticello, IL, 2017

(C-12) A. Cherukuri and J. Cortés. Decentralized Nash equilibrium seeking by strategic generators for DC optimal power flow. In *Annual Conference on Information Systems and Sciences*, Baltimore, MD, March 2017. Electronic proceedings

(C-11) A. Cherukuri, A. D. Domínguez-García, and J. Cortés. Distributed coordination of power generators for a linearized optimal power flow problem. In *American Control Conference*, pages 3962–3967, Seattle, WA, May 2017

(C-10) A. Cherukuri and J. Cortés. Distributed algorithms for convex network optimization under non-sparse equality constraints. In *Allerton Conf. on Communications, Control and Computing*, pages 452–459, Monticello, IL, September 2016

(C-9) A. Cherukuri, E. Mallada, S. H. Low, and J. Cortés. The role of strong convexity-concavity in the convergence and robustness of the saddle-point dynamics. In *Allerton Conf. on Communications, Control and Computing*, pages 504–510, Monticello, IL, September 2016

(C-8) A. Cherukuri and J. Cortés. Decentralized Nash equilibrium learning by strategic generators for economic dispatch. In *American Control Conference*, pages 1082–1087, Boston, MA, July 2016

(C-7) A. Cherukuri and J. Cortés. Distributed dynamic economic dispatch of power generators with storage. In *IEEE Conf. on Decision and Control*, pages 2365–2370, Osaka, Japan, 2015

(C-6) A. Cherukuri, E. Mallada, and J. Cortés. Convergence of Caratheodory solutions for primal-dual dynamics in constrained concave optimization. *SIAM Conference on Control and Its Applications*, pages 290–296, July 2015

(C-5) A. Cherukuri and J. Cortés. Asymptotic stability of saddle points under the saddle-point dynamics. In *American Control Conference*, pages 2020–2025, Chicago, IL, July 2015 **(Best Student Paper Award Finalist)**

(C-4) A. Cherukuri and J. Cortés. Distributed coordination for economic dispatch with varying load and generator commitment. In *Allerton Conf. on Communications, Control and Computing*, pages 475–482, Monticello, IL, October 2014

(C-3) A. Cherukuri, S. Martinez, and J. Cortés. Distributed, anytime optimization in power-generator networks for economic dispatch. In *American Control Conference*, pages 172–177, Portland, OR, 2014

(C-2) A. Cherukuri, D. Chatterjee, P. Hokayem, and J. Lygeros. Stochastic receding horizon control: stability results. In *IFAC World Congress*, pages 150–155, Milan, Italy, July 2011

(C-1) Z. Nagy, S. Miyashita, S. Muntwyler, A. Cherukuri, J. J. Abbott, R. Pfeifer, and B. J. Nelson. Morphology detection for magnetically self-assembled modular robots. In *IEEE/RSJ Int. Conf. on Intelligent Robots & Systems*, pages 5281–5286, St. Louis, MO, USA, October 2009