Harsha Gangammanavar

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Education	**Ohio State University**	**Columbus, OH**
	Ph.D. Integrated Systems Engineering,	August 2013

Dissertation Title: Multiple Timescale Stochastic Optimization with Application to Integrating Renewable Resources in Power Systems
Advisor: Prof. Suvrajeet Sen
Minors: Computer Science and Statistics

M.S. Electrical and Computer Engineering   December 2009

Visvesvaraya Technological University   **Bangalore, India**
B.E. Electronics and Communications Engineering   May 2007

Appointments   **Southern Methodist University**   **Dallas, TX**
Operations Research and Engineering Management
Associate Professor   2023 - present
Assistant Professor   2016 - 2023

Clemson University   **Clemson, SC**
Industrial Engineering
Postdoctoral Fellow   2015 - 2016
(*Advisors*: Prof. Scott Mason and Sandra Eksioglu)
Adjunct Assistant Professor   2017 - 2021

University of Southern California   **Los Angeles, CA**
Industrial and Systems Engineering
Visiting Assistant Professor   2013 - 2015

Ohio State University   **Columbus, OH**
Integrated Systems Engineering
Graduate Research and Teaching Assistant   2010 - 2013

Research Interests   *Methodologies*: Operations research; stochastic programming; large-scale optimization.
Applications: Renewable energy integration in power systems; healthcare logistics; communication networks.

Journal Publications

J1. Sakhavand, N. and Gangammanavar, H. (2022). Subproblem sampling vs. scenario reduction: efficacy comparison for stochastic programs in power systems applications, *Energy Systems*, 1-29; (DOI).

J2. H. Gangammanavar and M. Bansal, Stochastic Decomposition Method for Two-Stage Distributionally Robust Linear Optimization, *SIAM Journal on Optimization*, vol. 32, issue 3, pp. 1901-1930, 2022; (DOI).

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*Graduate student advisee
†Undergraduate student advisee
‡Ph.D. student coauthor/mentee

J3. D. Wood‡, S. Çetinkaya, H. Gangammanavar, L. Weiguo, and J. Wang, On the Value of a Multistage Optimization Approach for Intensity-Modulated Radiation Therapy Planning, *Physics in Medicine and Biology*, vol. 67, no. 14, July 2022; (DOI).

J4. S. Ariyarathne*, H. Gangammanavar, and R. Sundararajan, Change Point Detection in Nonstationary Sub-Hourly Wind Time Series, *Applied Energy*, vol. 310, 118501, March 2022; (DOI).

J5. S. Atakan, H. Gangammanavar, and S. Sen, Stochastic Hierarchical Planning for High Renewable Power Systems, *European Journal on Operational Research*, vol. 302, issue 1, pp. 381-391, October 2022; (DOI).

J6. D. Troxell†, H. Ahn, and H. Gangammanavar, A Cardinality Minimization Approach to Security-Constrained Economic Dispatch, *IEEE Transactions on Power Systems*, vol. 37, no. 5, pp. 3642-3652, September 2022; (DOI).

J7. A. Alobaidi‡, M. Khodayar, A. Vafamehr, H. Gangammanavar, and M. Khodayar, Security Constrained Expansion Planning of Battery Energy Storage in Distribution Network with Data Centers, in *International Journal of Electrical Power and Energy Systems*, vol. 133, 107231, December 2021; (DOI).

J8. H. Gangammanavar and S. Sen, Stochastic Dynamic Linear Program: A Distribution-free Multistage Stochastic Programming Algorithm, *SIAM Journal on Optimization*, vol. 31, issue 3, pp. 2111-2140, 2021; (DOI).

J9. S. Yin‡, J. Wang, and H. Gangammanavar, Stochastic Market Operation for Coordinated Transmission and Distribution Systems, in *IEEE Transactions on Sustainable Energy*, vol. 12, no. 4, pp. 1996-2007, October 2021; (DOI).

J10. H. Gangammanavar, Y. Liu, and S. Sen, Stochastic decomposition for two-stage stochastic linear programs with random cost coefficients, *INFORMS Journal on Computing*, vol. 33, no. 1, pp 51–71, January 2021; (DOI).

J11. S. Wang‡, S. J. Mason, and H. Gangammanavar, Stochastic optimization for flow-shop scheduling with on-site renewable energy generation using a case in the United States, *Computers and Industrial Engineering*, vol. 149, 106812, November 2020; (DOI).

J12. S. Wang‡, H. Gangammanavar, S. Ekşioğlu, and S. J. Mason, Statistical estimation of operating reserve requirements using rolling horizon stochastic optimization, *Annals of Operations Research*, vol. 292, issue 1, pp. 371–397, 2020; (DOI).

J13. Z. Azadi‡, H. Gangammanavar, and S. Ekşioğlu, Developing childhood vaccine administration and inventory replenishment policies that minimize open vial wastage. *Annals of Operations Research*, vol. 292, issue 1, pp. 215–247, 2020; (DOI).

J14. S. Wang‡, H. Gangammanavar, S. D. Ekşioğlu, and S. J. Mason, Stochastic Optimization for Energy Management in Power Systems With Multiple Microgrids, in *IEEE Transactions on Smart Grid*, vol. 10, no. 1, pp. 1068-1079, Jan. 2019; (DOI).

J15. H. Gangammanavar and S. Sen, Two-scale Stochastic Optimization for Controlling Distributed Storage Devices, in *IEEE Transactions on Smart Grid*, vol. 9, no. 4, pp. 2691-2702, July 2018; (DOI).

J16. H. Gangammanavar, S. Sen, and V. M. Zavala, Stochastic Optimization of Sub-Hourly Economic Dispatch With Wind Energy, in *IEEE Transactions on Power Systems*, vol. 31, no. 2, pp. 949-959, March 2016; (DOI).

J17. R. Li, H. Gangammanavar, and A. Eryilmaz, Optimal Dynamic Coding and Rate-Control for Serving Deadline-Constrained Traffic over Time-Varying Channels, in *IEEE Transactions on Information Theory*, vol. 58, no. 10, pp. 6556-6571, 2012; (DOI).

Conference Proceedings

C1. Z. Azadi[‡], H. Gangammanavar, and S. D. Ekşioğlu, Stochastic Optimization for Vaccine Vial Replenishment, in *Proceedings of the 2016 Industrial and Systems Engineering Research Conference (ISERC)*, Anaheim, CA.

C2. H. Gangammanavar and A. Eryilmaz, Dynamic Coding and Rate-Control for Serving Deadline-Constrained Traffic over Fading Channels, in *Proceedings of IEEE International Symposium on Information Theory (ISIT)* Austin TX, pp. 1788–1792, 13-18 June 2010.

Under Review

R1. N. Fadavi* and H. Gangammanavar, Active Set-based Inexact Proximal Bundle Algorithm for Stochastic Quadratic Programming, 2024 (first review). .

R2. Z. Hoobakht[‡], H. Gangammanavar, and D. Rajan, Optimal Spectral Allocation in Citizens Broadband Radio Service, 2023 (first review).

R3. D. L. Cole, H. Gangammanavar, and V. M. Zavala, Hierarchical Graph Modeling for Multi-Scale Optimization of Power Systems, 2023 (first review).

R4. S. Ariyarathne* and H. Gangammanavar, New Formulations and Pricing Mechanisms for Stochastic Electricity Market Clearing Problem, 2023 (first review).

R5. M. Ahn, H. Gangammanavar, and D. Troxell[‡], Tractable Continuous Approximations for Constraint Selection via Cardinality Minimization, 2022 (under second review).

R6. N. Sakhavand[‡], J. Rosenberger, V. Chen, and H. Gangammanavar, Design of Experiments for the Stochastic Unit Commitment with Economic Dispatch Models, 2022 (under second revision).

R7. S. Tabrizian*, H. Gangammanavar, and H. Üster, An Adaptive Cluster Sampling-based Solution Method for Two-stage Stochastic Linear Programs, 2020.

Working Papers

W1. S. Ariyarathne*, H. Gangammanavar, and J. Wang, Multiagent Optimization for Coordinated Transmission-distribution System, 2023.

W2. K. Baker and H. Gangammanavar, Relationship of Locational Marginal Prices to Network Properties and its Implications, 2023.

Grants (External)

G1. *Integrated Framework for Cooperative 3D Printing: Uncertainty Quantification, Decision Models, and Algorithms*; Role: Co-PI (with Y. Xiang, PI and W. Zhou, Co. PI); National Science Foundation; #2329739; Total award amount: $505,789; January 2024 - December 2026.

G2. *New Abstractions and Randomized Algorithms for Multiscale Stochastic Optimization*; Role: Lead PI; Department of Energy - Office of Science; #DE-SC0023361; Total award amount: $2,040,256; October 2022 - September 2025.

G3. *Stochastic Programming Decomposition Models and Algorithms for Discrete-event Dynamic Systems*; Role: Sole PI; Office of Naval Research #N00014-22-1-2603; $387,826; September 2022-August 2025.

G4. *Statistical Optimality, Algorithms and Resilience in Time-Staged Stochastic Systems*; Role: Co-PI (with S. Sen, PI); Air Force Office of Scientific Research #FA9550-15-1-0267; $450,000; August 2015 - December 2018.

Grants (Internal)	G4. *Data-driven Multistage Decision Policies: Integration of Optimization and Statistical Learning*; Role: PI; SMU Provost's Science and Engineering Postdoctoral Bridge Grant; Award amount: $70,000; January 2024 - January 2025.
	G5. *Data Assimilation for Radiation Therapy Planning via Optimization: Adaptive Deterministic Models*; Role: PI (with S. Çetinkaya); SMU Lyle School Research Seed Funding; $30,500.00; March - December 2020.
	G6. *Multi-temporal Flexibility Services in Transactive Energy Architecture*; Role: Co-PI (with M. Khodayar, PI); SMU Lyle School Research Seed Funding; $23,760.00; March - December 2018.
	G7. *A Data-Driven Support System for Coordinated Operation of Electricity and Natural Gas Infrastructure*; Role: PI (with M. Khodayar); SMU Lyle School Research Seed Funding; $25,080.00; March - December 2017.

Other Research Engagements

- Member, Electrification Council, NSF Engines Development Award: Advancing logistics technologies, May 2023 - April 2025.
- Educational Experience Agreement with Radiation Oncology MAIA Laboratory, University of Texas Southwestern (UTSW Contract ID # 2020—7031), January 2020—January 2021. Collaborative research with S. Çetinkaya and J. Wang (UTSW).

Honors

- Honorable mention at Undergraduate Operations Research Prize (for UG student D. Troxell; joint work with M. Ahn), INFORMS Annual Meeting, Anaheim, Oct. 2021;
- Fellow of the Dedman College Interdisciplinary Institute 2017-18, Southern Methodist University;
- Honorable mention at Minority Issues Forum poster competition (for Z. Azadi*; joint work with S. Eksioglu), INFORMS Annual Meeting, Nashville, Nov. 2016;
- Postdoctoral Fellowship, Clemson University, 2015-16;
- Travel grant recipient, PhD Winter School on Managing Uncertainty in Energy Infrastructure Investment, Oppdal, Norway, 2011;
- Travel grant recipient, llinois Wireless Summer School, University of Illinois at Urbana-Champaign 2009.

Courses Taught

At Southern Methodist University.
- OREM 3360 Operations Research (UG): Spring 2017 (26), 2018 (20), 2019 (24), 2022 (19), 2023 (7); Fall 2021 (25), 2022 (13);
- OREM 5364 Advanced Operations Research (UG): Fall 2022 (10), Fall 2023 (5);
- OREM 8360 Operations Research Models (G): Fall 2016 (26), 2017 (13), 2018 (15), 2020 (4); Spring 2020 (10), 2021 (2);
- OREM 8371 Linear Programming (G): Fall 2018 (6), 2019 (9); Spring 2022 (10);
- OREM 8384 Stochastic Programming (G): Spring 2018 (13), 2020 (6).

At University of Southern California
- ISE 310 Facilities and Logistics (UG): Spring 2015;
- ISE 330 Introduction to Operations Research: Deterministic Models (UG): Spring 2015, 2014; Fall 2014, 2013;
- ISE 499 Special Topics: Integrative Systems Engineering (UG): Spring 2015, 2014;
- ISE 536 Linear Programming and Extensions (G): Fall 2014.

Ph.D. Supervision	• Jackson Forner, Ph.D. Student in Operations Research; 2023 - present; OREM, SMU (co-advised with Prof. Miju Ahn)
	• Niloofar Fadavi, PhD Student in Operations Research; Center for Research Computing Fellow; *Admission to candidacy*: Spring 2023; *Expected graduation*: Spring 2024.
	• Sakitha Ariyarathne, Ph.D. in Operations Research, SMU; *Graduated*: December 2022 *Dissertation title*: Study of Stochastic Market Clearing Problem in Power Systems With High Renewable Integration; *First position*: Data Scientist, BHG Financial.
	• Siavash Tabrizian. Ph.D. in Operations Research University Ph.D. Fellow; *Graduated*: December 2021 (co-advised with Prof. Halit Uster); *Dissertation title*: Sampling-based Algorithms for Two-stage Stochastic Programs and Applications; *First position*: Data Scientist at USX Variant, Atlanta, GA.

Masters Supervision	• Nahal Sakhavand, M.S. in Operations Research *Graduated*: Summer 2018; *First position*: Ph.D. student in ISME, University of Texas at Arlington.

Undergraduate Mentoring	• David Troxell, B.S. in Management Science *Graduated*: Spring 2021; *First position*: M.S. student in Data Science, Stanford University.

Graduate Committee Service

Program	Students
Ph.D. (OREM/EMIS)	Ongoing: Toby Huskinson;
	Completed: Chengyu Ke(2023) Hedieh Ashrafi (2021); Justin B. Brown (2021); Naderehsadat Mansouri (2019); Amin Ziaeifar (2019).
Ph.D. (ECE)	Ongoing: Abdulraheem Alobaidi, Yazeed Alkhrijah, Bin Huang, Yanling Lin, You Lin, Xinyun Lu, Tao Wu;
	Completed: Shengfei Yin (2021); Mahdi Khodayar (2020); Xinan Wang (2020); Ying Zhang (2020).
Praxis (OREM/EMIS)	Emily McIntosh (2022); Mohammed Abdul Qaudeer (2020); Peng Yang (2019).
Ph.D. (UTA IMSE)	Nahal Sakhavand (2021).
Ph.D. (Clemson IE)	Shasha Wang (2020); Site Wang (2018).

Professional Society Service	• Board member, INFORMS Computing Society, 2023-present.
	• *Organization Committee Member*:
	◦ Organizing committee member and co-chair of contributed sessions tracks at INFORMS Annual Meeting 2023;
	◦ Program committee member (Energy Systems Track) at IISE Annual Conference and Expo 2022;

- ○ NSF Operations Engineering Workshop, SMU, March 2019.

- *Conference Session Chair*:

  - ○ INFORMS Annual Meetings 2023(Phoenix), 2022 (Indianopolis), 2021 (Anaheim), 2019 (Seattle), 2018 (Phoenix), 2014 (San Francisco).

- *Referee*: INFORMS Operations Research, Journal on Computing, and Journal on Optimization; SIAM Journal on Optimization; Mathematical Programming; Computational Optimization and Applications; IISE Transactions; Optimization Letters; Energy Systems; Omega: International Journal of Management Science; IEEE Transaction on Power Systems, Transactions on Smart Grid, and Transactions on Sustainable Energy; Electric Power Systems Research; IET Generation, Transmission and Distribution.

- *Panelist*: National Science Foundation, 2023, 2017; Office of Naval Research, 2023, 2022; Department of Energy - Office of Science, 2023.

- *Award Committee Member*: IISE Energy Systems Best Paper Award 2022; George Nicholson Student Paper Competition, INFORMS 2020 and 2021; INFORMS-ENRE Student Paper Competition, INFORMS, 2018.

- *Faculty Advisor*: SMU INFORMS Student Chapter, 2018-2022.

- *Vice-President*: Ohio State University INFORMS Student Chapter, 2011-2012.

Professional Society Membership

- Institute for Operations Research and Management Science (INFORMS): Optimization Society; Computing Society; and Energy, Natural Resources, and Environment Society.

- Society of Industrial and Applied Mathematics (SIAM).

- Mathematical Optimization Society (MOS).

Administrative Service

- Member, OR Program Recruiting and Marketing Committee, 2023-present;

- Member, Lyle Faculty Search Committee, 2023-present;

- Lyle School representative, SMU Faculty Senate; member, Economic Status committee, 2023 - present;

- Member and chair, OREM Graduate Committee, 2022 - present;

- Member, Faculty advisory group, Data Science Institute, 2022 - present;

- EMIS/OREM Department Seminar Organizer, 2020 – 2023;

- EMIS department representative on Lyle Academic Affairs Committee, 2021 – 2022;

- Member and chair, EMIS Course Coordination Committee on OR Methods, 2019 – 2022;

- Member, EMIS Accreditation and Academic Programs, 2020 – 2021;

- Member, EMIS Faculty search committee, 2018-19, 2019-20, 2021-22;

- Instructor, Summer Bit Blast, workshop organized by the Center for Research Computing (SMU), July 2022;

- Judge, Dallas Regional Science and Engineering Fair, 2020 and 2021;

- Judge, Lyle Research Day, 2016, 2017, 2018, and 2019.

Invited Seminars	• Systems and Industrial Engineering Seminar, University of Arizona, Tucson, November, 2023.
	• Decision Sciences Area Seminar, Indian Institute of Management, Bangalore, December 2021.
	• Industrial Engineering, University of Houston, March 2021.
	• Industrial, Manufacturing, and Systems Engineering, University of Texas at Arlington, December 2018.
	• Center for Applicable Mathematics, Tata Institute of Fundamental Research, Bangalore, July 2018.
	• Department of Mechanical Engineering, University of Texas at Dallas, June 2018.
	• Dedman College Interdisciplinary Institute (DCII), Operations Research and Statistics Cluster towards Integrative Analytics, SMU, February 2017.
	• Department of Engineering Management, Information, and Systems, Southern Methodist University, February 2016.
	• Industrial Engineering Technical Innovation Seminar Series, Clemson University, November 2015.
	• Ming Hsieh Department of Electrical Engineering, University of Southern California, October 2014.
	• Daniel J Epstein Department of Industrial and Systems Engineering, University of Southern California, October 2014.

Conference Presentations	• *New Formulations and Pricing Mechanisms for Stochastic Electricity Market Clearing Problem* with S. Ariyarathane,
	○ INFORMS Annual Meeting 2023, Phoenix, AZ, October 2023.
	• *Stochastic dynamic linear programming: A sequential sampling algorithm* with S. Sen,
	○ Invited Semi-Plenary: International Conference on Stochastic Programming, Davis, CA, June 2023.
	○ INFORMS Optimization Society Conference, Greenville, SC, March 2020.
	○ 21st Conference of the International Federation of Operational Research Societies, Quebec City, Canada, July 2017,
	○ SIAM Conference on Optimization, Vancouver, Canada, May 2017.
	• *Stochastic Branch-and-Cut Algorithm from a Sequential Sampling Perspective*
	○ SIAM Conference on Optimization, Seattle, WA, May 2023,
	• *Sequential sampling-based solution algorithms for distributionally robust optimization*,
	○ International Conference on Continuous Optimization, Lehigh, PA, July 2022.
	○ International Conference on Stochastic Programming, Trondheim, July 2019.
	• *A sampling-based branch-and-cut algorithm for two-stage stochastic mixed-integer programming*,
	○ INFORMS Annual Meeting, Anaheim, 2021.
	• *Stochastic decomposition for two-stage stochastic linear programs with random cost coefficients*,
	○ INFORMS Annual Meeting, Phoenix, Nov. 2018.

- *Stochastic programming framework for coordinated operation of power systems with multiple microgrids,*
  - International Symposium on Mathematical Programming, Bordeaux, July 2018.
  - INFORMS Optimization Society Conference, Denver, March 2018.
- *Sequential sampling-based optimization for power systems application*, INFORMS Annual Meeting, Nashville, Nov. 2016.
- *Convergence proofs of SDDP and multistage stochastic decomposition* with S. Sen, International Conference on Stochastic Programming, Buzios, Brazil, June 2016.
- *Multiple timescale stochastic optimization for integrating renewable resources* with S. Sen:
  - INFORMS Annual Meeting, San Francisco, Nov. 2014
  - Workshop on Optimization Under Uncertainty: Energy, Transportation and Natural Resources, University of California-Davis, Nov. 2014
  - Smartgrid Challenges, University of Arizona, Tucson, Mar. 2013.
- *Stochastic optimization of sub-hourly economic dispatch with wind generation*
  - INFORMS Annual Meeting, San Francisco, Nov. 2014
  - INFORMS Annual Meeting, Minneapolis, Oct. 2013.
- *Dynamic coding and rate-control for serving deadline-constrained traffic over fading channels*, with A. Eryilmaz, IEEE International Symposium on Information Theory (ISIT), Austin, Jun. 2010.

Workshops Attended

- "Deep Learning", 25th Annual Teaching Effectiveness Symposium, Center for Teaching Excellence, Southern Methodist University, August 2017.
- New Faculty Colloquium, INFORMS Annual Meeting 2016, Nashville, October 2016.
- "A Conversation between Artificial Intelligence, Operations Research and Control Theory on Stochastic Optimization", NSF Workshop at Rutgers University, 2012.
- "Managing Uncertainty in Energy Infrastructure Investments", Ph.D. Winter School, Oppdal, Norway, 2011 (recipient of workshop travel grant).
- Ph.D. Workshop at 12th International Conference on Stochastic Programming, Halifax, NS, Canada, 2010.
- Illinois Wireless Summer School, University of Illinois, Urbana-Champaign, IL, 2010 (recipient of summer school travel grant).