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# 1 ACADEMIC APPOINTMENTS

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**University of Michigan, Ann Arbor, MI.**

05/25 –

Katta G. Murty Collegiate Professor

**University of Michigan, Ann Arbor, MI.**

08/24 –

Professor in Department of Industrial and Operations Engineering (IOE)

**Pennsylvania State University, University Park, PA.**

01/17 – 06/24

Gary and Sheila Bello Chaired Professorship in Department of Industrial and Manufacturing Engineering (IME)

**Pennsylvania State University, University Park, PA.**

08/16 – 06/24

Professor in Department of Industrial and Manufacturing Engineering (IME)

**Pennsylvania State University, University Park, PA.**

08/12 – 07/16

Associate Professor in Department of Industrial and Manufacturing Engineering (IME)

**University of Illinois at Urbana-Champaign, Urbana, IL.**

08/12 – 08/12

Tenured<sup>1</sup> Associate Professor in Department of Industrial and Enterprise Systems Engineering (ISE); Affiliated with M.S. in Financial Engineering (MSFE) Program

**University of Illinois at Urbana-Champaign, Urbana, IL.**

08/06 – 08/12

Assistant Professor in Department of Industrial and Enterprise Systems Engineering (ISE); Affiliated with M.S. in Financial Engineering (MSFE) Program

# 2 EDUCATION

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**Stanford University, Stanford, CA**

2006

Ph.D. in Management Science and Engineering (Operations Research)

(Advisor: W. Murray, Readers: P.W. Glynn, M.A. Saunders and G. Infanger)

Dissertation: *Decomposition and Sampling Methods for Stochastic Equilibrium Problems*

**Massachusetts Institute of Technology (MIT), Cambridge, MA**

1998

S.M. in Operations Research

S.M. in Technology and Policy Program (TPP)

Dissertation: *Optimal Control Systems for Diverse Electricity Pricing Structures*

**Indian Institute of Technology (IIT), Bombay**

1993

B. Tech in Aerospace Engineering

# 3 RESEARCH AWARDS

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My research awards include a dissertation prize (A.W. Tucker Prize from the Math. Optimization Society), two best paper awards (COAP Best Paper award (with W. Murray) and the Winter Simulation Conference (WSC) best theoretical paper award (with F. Yousefian\* and A. Nedić)), the Penn. State Engineering Alumni

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<sup>1</sup>Awarded tenure at Illinois; moved to PSU 13 days later.

Society (PSEAS) Outstanding Research Award (2018), the NSF Career Award (NSF-CMMI-Operations Research) (2018), the A.W. Tucker Prize from the Mathematical Programming Society (2006), two teaching awards as well as several awards for his doctoral students (best student paper prize (U. Ravat) at International Conference on Stoch. Programming (COSP) as well as finalists for best paper prizes (A. Kannan (COSP), H. Yin (IEEE CDC)), amongst others.

### 3.1 AWARDS AND ACCOMPLISHMENTS

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- 2020 Led team that finished in **top 10 prize-winning teams in Department of Energy (DOE) ARPA-E Grid Optimization (GO) Challenge**
- 2018 College of Engineering Penn. State Engg. Alumni Society (PSEAS) Outstanding Research Award (1 award yearly)
- 2017 **Gary and Sheila Bello Chaired Professorship**
- 2013 **Best Theoretical Paper in Winter Simulation Conference** (with F. Yousefian and A. Nedić)
- 2012 **NSF Early Career Award** (Operations Research - CMMI)
- 2008 Finalist for the Microsoft New Faculty Fellowship (11 finalists in North America)
- 2008 Best paper prize for **Computational Optimization and Applications (COAP)** (Jointly with Walter Murray for “A Local Relaxation Method for the Siting of Electrical Substations”)
- 2006 The triennial **A.W. Tucker prize** for outstanding Ph.D. dissertation from the **Mathematical Optimization Society (MOS)**
- 2006 National Center for Supercomputing Applications (NCSA) Faculty Fellowship
- 1995 Charles and Constance Stokes fellowship (MIT)

### 3.2 STUDENT AWARDS

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- 2024 Best Student Paper Award in the Winter Simulation Conference, (As advisor to Peixuan Zhang for “Peixuan Zhang, Uday V. Shanbhag: A Smoothed Augmented Lagrangian Framework for Convex Optimization with Nonsmooth Stochastic Constraints.” WSC 2024: 3181-3192)
- 2010 Best Student Paper Award in the 12th Conference on Stochastic Programming, Halifax (As advisor to Uma Ravat for “On the characterization of smooth and nonsmooth stochastic Nash games”)
- 2010 Finalist for best Student Paper Award in the 12th Conference on Stochastic Programming, Halifax (As advisor to Aswin Kannan for “Risk-based Generalized Nash Games in Power Markets: Characterization and Computation of Equilibria”) (Jointly advised with Harrison M. Kim)
- 2010 Finalist for Best Student Paper Award at American Control Conference (As advisor to Huibing Yin for “Synchronization of Oscillators is a Game” (Jointly advised with Prashant G. Mehta))
- 2008 William A. Chittenden Award for outstanding MS graduate in General Engineering (Ankur Kulkarni)
- 2008 Computational Science and Engineering (CSE) fellowship, University of Illinois (Huibing Yin (jointly advised with Prashant G. Mehta))

- 2010 Finalist for Informs Pierskalla Prize (student prize in health applications) (As coauthor on paper with M.J. Robbins for “The Weighted Set Covering Game: A Vaccine Pricing Model For Pediatric Immunization” (Advised by Sheldon H. Jacobson))
- 2010 Winner of the Pritsker doctoral dissertation award from the Institute of Industrial Engineers (IIE) Pierskalla Prize for his dissertation titled “Exploring Pediatric Immunization Markets Using Operations Research and Game Theory,” was advised by Dr. Sheldon H. Jacobson (Coauthor on a chapter with M.J. Robbins for “The Weighted Set Covering Game: A Vaccine Pricing Model For Pediatric Immunization”)
- 2010 Best paper in the session at the American Control Conference, 2010 (Farzad Yousefian for “Convex Nondifferentiable Stochastic Optimization: A Local Randomized Smoothing Technique” (Jointly advised with Angelia Nedich))

### 3.3 TEACHING AWARDS

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- 2011 **Excellence in Undergraduate Advising**, College of Engineering, University of Illinois
- 2011 **Excellence in Teaching Award** (Annual ISE teaching award: Alpha Pi Mu/Gamma Epsilon)
- 2008 **Excellence in Teaching Award** (Annual ISE teaching award: Alpha Pi Mu/Gamma Epsilon)
- 2007, 2008, 2009, 2011 **List of Excellent Teachers**

## 4 PUBLICATIONS

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**Order of authorship:** Barring a few exceptions, my approach has been to organize authorship as follows: student/postdoc followed by faculty members in alphabetical order. Note that \* denotes graduate student or postdoc.

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### 4.1 ACCEPTED JOURNAL PUBLICATIONS

[F64] S. Cui, U. V. Shanbhag, and M. Staudigl, *A regularized variance-reduced modified extragradient method for stochastic hierarchical games*, **Journal of Optimization Theory and Applications**, Volume 206, No. 1, 1–53 (2025).

[F63] P. Zhang\*, U. V. Shanbhag, and E. X. Fang *A smoothed augmented Lagrangian framework for convex optimization with nonsmooth constraints* (Accepted **Journal of Scientific Computing**, Feb. 2025)

[F62] J. Lei\* and U. V. Shanbhag, *Variance-Reduced Accelerated First-order Methods: Central Limit Theorems and Confidence Statements*, **Mathematics of Operations Research (area: Stochastic Models)**, Volume 50, Number 2, 1364 – 1397. (2025).

[F61] S. Huang, J. Lei\*, Y. Hong, U. V. Shanbhag, and J. Chen, *No-regret distributed learning in subnetwork zero-sum games*, (To appear in **IEEE Transactions on Automatic Control**, 2024).

[F60] S. Yang, E. X. Fang, and U. V. Shanbhag, *Data-Driven Compositional Optimization in Misspecified Regimes*, (To appear in **Operations Research**, 2024)

[F59] L. He, U. V. Shanbhag, and E. Song, *Stochastic Approximation for Multi-period Simulation Optimization with Streaming Input Data*, (To appear in **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Vol. 34, No. 2, 1–27, (2023)

- [F58] I. E. Bardakci, A. Jalilzadeh\*, C. Lagoa, U. V. Shanbhag, *Probability Maximization via Minkowski Functionals: Convex Representations and Tractable Resolutions*, **Mathematical Programming**, Vol. 199, No. 1, 595–637, (2023).
- [F57] J. Lei\* and U. V. Shanbhag, Distributed Variable Sample-Size Gradient-response and Best-response Schemes for Stochastic Nash Equilibrium Problems over Graphs, **SIAM Journal of Optimization**, Vol. 32, No. 2, 573–603, (2022)
- [F56] S. Cui\* and U. V. Shanbhag, *Variance-Reduced Splitting Schemes for Monotone Stochastic Generalized Equations*, **IEEE Transactions on Automatic Control**, (2023).
- [F55] S. Cui\* and U. V. Shanbhag, *On the computation of equilibria in monotone and potential stochastic hierarchical games*, **Mathematical Programming**, Vol. 198, No. 2, 1227–1285, (2023).
- [F54] S. Cui\*, U. V. Shanbhag, and F. Yousefian, *Complexity guarantees for an implicit smoothing-enabled method for stochastic MPECs*, **Mathematical Programming**, Vol. 198, No. 2, 1153–1225, (2023).
- [F53] S. Cui\*, U.V. Shanbhag, M. Staudigl, and P.T. Vuong, *Stochastic Relaxed Inertial Forward-Backward-Forward splitting for Monotone Inclusions in Hilbert spaces*, **Computational Optimization and Applications**, Vol. 83, No. 2, 465–524, (2022).
- [F52] A. Jalilzadeh\*, U. V. Shanbhag, J. H. Blanchet, and P. W. Glynn, *Optimal Smoothed Variable Sample-size Accelerated Proximal Methods for Structured Nonsmooth Stochastic Convex Programs*, **Stochastic Systems**, Vol. 12, No. 4, 373–410, (2022)
- [F51] M. G. Yu, G. S. Pavlak, and U. V. Shanbhag, *Uncertainty-aware optimal dispatch of building thermal storage portfolios via smoothed variance-reduced accelerated gradient methods*, **Journal of Energy Storage**, Volume 51, 104405, (2022)
- [F50] A. Jalilzadeh\*, A. Nedić, U. V. Shanbhag, F. Yousefian, *A Variable Sample-size Stochastic Quasi-Newton Method for Smooth and Nonsmooth Stochastic Convex Optimization*, **Mathematics of Operations Research**, Vol. 47, No. 1, 690–719, (2021).
- [F49] S. Aybat, H. Ahmadi\*, and U. V. Shanbhag, On the analysis of inexact augmented Lagrangian schemes for misspecified conic convex programs, **IEEE Transactions on Automatic Control**, Vol. 67, No. 8, 3981–3996, (2022) .
- [F48] S. Cui\* and U.V. Shanbhag, *On the analysis of variance-reduced and randomized projection variants of single projection schemes for monotone stochastic variational inequality problems*, **Set-Valued and Variational Analysis**, Vol. 29, No. 2, Pg. 453–499, (2021).
- [F47] Y. Xie\* and U.V. Shanbhag, *Tractable ADMM schemes for computing KKT points and local minimizers for  $\ell_0$ -minimization problems*, **Computational Optimization and Applications**, Volume 78, Number 1, Pg 43–85, (2021).
- [F46] J. Lei\* and U. V. Shanbhag, *Asynchronous variance-reduced block schemes for composite non-convex stochastic optimization: block-specific steplengths and adapted batch-sizes*, **Optimization Methods and Software**, 1-31, (2020).
- [F45] H. Ahmadi\* and U. V. Shanbhag, *On the resolution of misspecified convex optimization and monotone variational inequality problems*, **Computational Optimization and Applications**, Vol. 77, No. 1, Pg. 125–161, (2020).
- [F44] J. Lei\* and U. V. Shanbhag, *Asynchronous Schemes for Stochastic and Misspecified Potential Games and Nonconvex Optimization*, **Operations Research**, Vol. 68, No. 6, Pg. 1742–1766, (2020).

- [F43] J. Lei\*, U. V. Shanbhag, J. S. Pang, and S. Sen, *On Synchronous, Asynchronous, and Randomized Best-Response schemes for Stochastic Nash games*, **Mathematics of Operations Research**, Vol. 45, No. 1, Pg. 157–190, (2020)
- [F42] F. Yousefian\*, A. Nedić, and U. V. Shanbhag, *On stochastic and deterministic quasi-Newton methods for non-Strongly convex optimization: convergence and rate analysis*, **SIAM Journal on Optimization**, Vol. 30, No. 2, Pg. 1144–1172, (2020)
- [F41] Y. Xie\* and U. V. Shanbhag, *SI-ADMM: A Stochastic Inexact ADMM Framework for Resolving Structured Stochastic Convex Programs*, **IEEE Transactions on Automatic Control**, Vol. 65, No. 6, Pg. 2355–2370, (2019).
- [F40] A. Kannan\* and U. V. Shanbhag, *Optimal stochastic extragradient schemes for pseudomonotone stochastic variational inequality problems and their variants*, **Computational Optimization and Applications**, Vol. 74, No. 3, Pg. 779–820, (2019).
- [F39] C. Lo Prete, N. Guo, and U. V. Shanbhag, *Virtual Bidding and Financial Transmission Rights: An Equilibrium Model for Cross-Product Manipulation in Electricity Markets*, **IEEE Transactions on Power Systems**, Vol. 34, No. 2, Pg. 953–967, (2018).
- [F38] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *On stochastic mirror-prox algorithms for stochastic Cartesian variational inequalities: randomized block coordinate, and optimal averaging schemes*, **Set-Valued and Variational Analysis**, Vol. 26, No. 4, Pg. 789–819, (2018).
- [F37] H. Jiang\*, U. V. Shanbhag, and S. P. Meyn, *Distributed computation of equilibria in misspecified convex stochastic Nash games*, **IEEE Transactions on Automatic Control**, Vol. 63, No. 2, Pg. 360–371, (2018).
- [F36] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *On Smoothing, Regularization and Averaging in Stochastic Approximation Methods for Stochastic Variational Inequalities*, **Mathematical Programming** (Series B.), Vol. 165, No. 1, Pg. 391–431, (2017).
- [F35] U. Ravat\* and U. V. Shanbhag, *On the existence of solutions to stochastic variational inequality and complementarity problems*, **Mathematical Programming** (Series B.), Vol. 165, No. 1, 291–330, (2017).
- [F34] J. S. Pang, S. Sen, and U. V. Shanbhag, *Two-stage non-cooperative games with risk-averse players*, **Mathematical Programming** (Series B.), Vol. 165, No. 1, 235–290, (2017).
- [F33] Y. Xie\* and U. V. Shanbhag, *On Robust Solutions to Uncertain Linear Complementarity Problems and their Variants*, **SIAM Journal on Optimization**, Vol. 26, No. 4, 2120–2159 (2016).
- [F32] J. Koshal\*, A. Nedich and U. V. Shanbhag, *Distributed Algorithms for Aggregative Games on Graphs*, **Operations Research**, Vol. 64, No. 3, 680–704, (2016).
- [F31] H. Jiang\* and U. V. Shanbhag, *On the Solution of Stochastic Optimization and Variational Problems in Imperfect Information Regimes*, **SIAM Journal on Optimization**, Vol. 26, No. 4, 2394–2429, (2016).
- [F30] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *Stochastic approximation schemes for nonsmooth stochastic multi-user optimization and Nash games* **IEEE Transactions on Automatic Control**, Vol. 61, No. 7, 1753–1766 (2016).
- [F29] A. A. Kulkarni\* and U. V. Shanbhag, *An Existence Result for Hierarchical Stackelberg v/s Stackelberg Games*, **IEEE Transactions on Automatic Control**, Vol. 60, No. 12, 3379–3384 (2015).
- [F28] A. A. Kulkarni\* and U. V. Shanbhag, *A Shared-Constraint Approach to Multi-leader Multi-follower Games*, **Set Valued and Variational Analysis**, Vol. 22, No. 4, 691–720 (2014).

- [F27] U. V. Shanbhag, *Stochastic Variational Inequality Problems: Applications, Analysis, and Algorithms*, **Inform's Tutorials**, 71–107, (2013).
- [F26] U. Ravat\*, U. V. Shanbhag, and R. Sowers, *On the inadequacy of VaR-based risk management: VaR, CVaR, and nonlinear interactions*, **Optimization Methods and Software**, Vol. 29, No. 4, 877–897 (2014).
- [F25] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *On the Efficiency of Equilibria in mean-field oscillator games*, **Dynamic Games and Applications**, Vol. 4, No. 2, 177–207 (2014).
- [F24] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *Learning in mean-field games*, **IEEE Transactions on Automatic Control**, Vol. 59, No. 3, 629–644 (2014).
- [F23] M. J. Robbins, S. H. Jacobson, U. V. Shanbhag, and B. Behzad, *The Weighted Set Covering Game: A Vaccine Pricing Model for Pediatric Immunization*, **INFORMS Journal on Computing**, Vol. 26, No. 1, 183–198 (2014).
- [F22] G. Wang\*, U. V. Shanbhag, T. Zheng, E. Litvinov, and S. P. Meyn, *An extreme-point subgradient method for convex hull pricing in energy and reserves market: Part II – Convergence Analysis and Numerical Results*, **IEEE Transactions on Power Systems**, Vol. 28, No. 3, 2121 – 2127 (2013).
- [F21] G. Wang\*, U. V. Shanbhag, T. Zheng, E. Litvinov, and S. P. Meyn, *An extreme-point subgradient method for convex hull pricing in energy and reserves market: Part I – Algorithm Structure*, **IEEE Transactions on Power Systems**, Vol. 28, No. 3, 2111 – 2120 (2013).
- [F20] B. Ugaonkar, G. Kesidis, U. V. Shanbhag, and C. Wang, *Pricing of service in clouds: optimal response and strategic interactions*, **SIGMETRICS Performance Evaluation Review**, Vol. 41, No. 3, 28–30 (2013).
- [F19] D. Schiro\*, J.S. Pang and U.V. Shanbhag, *On the solution of affine generalized Nash games via Lemke's method*, **Mathematical Programming**, Vol. 142, No. 1-2, 1–46 (2013).
- [F18] A. Kannan\* and U.V. Shanbhag, *Distributed computation of equilibria in monotone Nash games via iterative regularization techniques*, **SIAM Journal of Optimization**, Vol. 22, No. 4, 1177–1205, (2012).
- [F17] A. Kannan\*, U.V. Shanbhag, and H.M. Kim, *Addressing Supply-side Risk in Uncertain Power Markets: Stochastic Generalized Nash Models and Scalable Algorithms*, **Optimization Methods and Software**, Vol. 28, No. 5, 1095–1138 (2013).
- [F16] J. Koshal\*, A. Nedich, and U. V. Shanbhag, *Regularized Stochastic Approximation Schemes for Cartesian stochastic variational inequalities*, **IEEE Transactions on Automatic Control**, Vol. 58, No. 3, 594–609 (2013).
- [F15] A. A. Kulkarni\* and U.V. Shanbhag, *Revisiting Generalized Nash Games and Variational Inequalities*, **Journal of Optimization Theory and Applications**, Vol. 154, No. 1, 175–186 (2012).
- [F14] J. Koshal\*, A. Nedich, and U. V. Shanbhag, *Multiuser Optimization: Distributed Algorithms and Error Analysis*, **SIAM Journal of Optimization**, Vol. 21, No. 3, 1046–1081 (2011).
- [F13] A. A. Kulkarni\* and U. V. Shanbhag, *On the variational equilibrium as a refinement of the generalized Nash equilibrium*, **Automatica**, Vol. 48, No. 1, 45–55, (2011).
- [F12] U. Ravat\* and U. V. Shanbhag, *On the characterization of solution sets of smooth and nonsmooth convex stochastic Nash games*, **SIAM Journal of Optimization**, Vol. 21, No. 3, 1168–1199, (2011).
- [F11] A. Kannan\*, U. V. Shanbhag, and H. M. Kim, *Strategic Behavior in Power Markets under Uncertainty*, **Energy Systems**, Vol. 2, No. 2, 115–141, (2011).

- [F10] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *On stochastic gradient and subgradient methods with adaptive steplength sequences*, **Automatica**, Vol. 48, No. 1, 56–67, (2012).
- [F9] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *Synchronization of Oscillators is a Game*, **IEEE Transactions on Automatic Control**, Vol. 57, No. 4, 920–935, (2012).
- [F8] H. Yin\*, U.V. Shanbhag, and P. G. Mehta, *Nash Equilibrium Problems with Scaled Congestion Costs and Shared Constraints*, **IEEE Transactions on Automatic Control**, Vol. 56, No. 7, 1702–1708, (2011).
- [F7] S. Lu, N.B. Schroeder, H.M. Kim, and U.V. Shanbhag *Hybrid Power/Energy Generation Through Multidisciplinary and Multilevel Design Optimization With Complementarity Constraints*, **Transactions of ASME: Journal of Mechanical Design**, Vol. 132, No. 10, 101007 (12 pages), (2010).
- [F6] S. Lakhera\*, U.V. Shanbhag, and M. McInerney, *Approximating Electrical Distribution Networks via Mixed-integer Nonlinear Programming*, **International Journal of Electric Power and Energy Systems**, Vol. 33, No. 2, 245–257 (2010).
- [F5] U.G. Vaidya, P. G. Mehta and U. V. Shanbhag, *Lyapunov measure and control of non-equilibrium dynamics*, **IEEE Transactions on Automatic Control**, Vol. 55, No. 6, 1390–1405 (2010).
- [F4] A.A. Kulkarni\* and U.V. Shanbhag, *Recourse-based Stochastic Nonlinear Programming: Properties and Benders-SQP Algorithms*, **Computational Optimization and Applications**, Vol. 51, no. 1, 77–123, (2012).
- [F3] U.V. Shanbhag, G. Infanger and P.W. Glynn, *A Complementarity Framework for Forward Contracting under Uncertainty*, **Operations Research**, Vol. 59, No. 4, 810–834, (2011).
- [F2] W. Murray and U. V. Shanbhag, *A Local Relaxation Approach for the Siting of Electrical Substations*, **Computational Optimization and Applications**, Vol. 33, No. 1a, 7–49, (2006). (BEST PAPER AWARD FOR PAPERS PUBLISHED IN 2006 IN COMPUTATIONAL OPTIMIZATION AND APPLICATIONS).
- [F1] S.P. Koruthu and U.V. Shanbhag, *A Distributed Parallel Processing Approach to Subsonic Potential Flow Analysis*, **Journal of Aeronautical Society of India**, Vol. 45, No. 2, (1993).

## 4.2 MANUSCRIPTS UNDER REVIEW

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- [R1] L. Marrinan\*, UV Shanbhag, and F Yousefian, *Zeroth-order Gradient and Quasi-Newton Methods for Nonsmooth Nonconvex Stochastic Optimization*, Second review at **SIAM Journal of Optimization**
- [R2] L. Marrinan\*, UV Shanbhag, and F Yousefian, *On the sampling-based computation of Nash Equilibria under uncertainty via the Nikaido-Isoda function*, First revision at **Vietnam Journal of Mathematics** (Special issue in honor of Prof. T. Terlaky)
- [R3] S Cui\*, U. V. Shanbhag, M Staudigl, *A regularized variance-reduced modified extragradient method for stochastic hierarchical games* (Under first revision at **Journal of Optimization Theory and Applications**, Sep. 2024)
- [R4] Y. Qiu\*, U. V. Shanbhag, and F. Yousefian *Zeroth-order methods for nondifferentiable, nonconvex, and hierarchical federated optimization* (Under first revision at **Mathematics of Operations Research**, Sep. 2024)



[R5] J. Lei, U. V. Shanbhag, and J. Chen *A Distributed Iterative Tikhonov Method for Networked Monotone Stochastic and Hierarchical Aggregative Games* (Under first revision at **Set-Valued and Variational Analysis**, Jan. 2025)

### 4.3 PUBLISHED BOOKS AND BOOK CHAPTERS

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[B1] R. Banerjee and U. V. Shanbhag, *Energy cost in India vis-a-vis the world*, Indian Chemical Manufacturers Association (ICMA), Mumbai, 1997.

[B2] W. Murray and U.V. Shanbhag, *A Local Relaxation Method for Nonlinear Facility Location Problems, Multiscale optimization methods and applications*, 173–204, Nonconvex Optim. Appl., 82, Springer, New York, 2006.

[B3] G. Wang, M. Negrete-Pincetic, A. Kowli, E. Shafieepoorfard, S. P. Meyn and U. V. Shanbhag, *Dynamic Competitive Equilibria in Electricity Markets, Control and Optimization Theory for Electric Smart Grids*, (Editors: A. Chakraborty and M. Ilic), Springer, 2011.

[B4] J. Lei\* and U. V. Shanbhag, *Stochastic Nash equilibrium problems: Models, analysis, and algorithms*, IEEE Control Systems Magazine 42 (4), 103-124.

### 4.4 TECHNICAL REPORTS

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[P1] *Analysis of State Policy Interactions with Electricity Markets in the context of uneconomic existing resources: A Critical Assessment of the Literature*, Technical Report (PJM), S. Blumsack, C. Lo Prete, U. V. Shanbhag, M. Webster (2018).

### 4.5 CONFERENCE PUBLICATIONS

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[H61] P. Zhang\* and UV Shanbhag, A smoothed augmented Lagrangian framework for convex optimization with nonsmooth stochastic constraints, Winter Simulation Conference, 2024.

[H60] M. Wang, P. Chakraborty, and UV Shanbhag, Improving dimension dependence in complexity guarantees for zeroth-order methods via exponentially-shifted Gaussian smoothing, Winter Simulation Conference, 2024.

[H59] M Ebrahimi, UV Shanbhag, F Yousefian, Distributed gradient tracking methods with guarantees for computing a solution to stochastic MPECs, 2024 American Control Conference (ACC), 2182-2187.

[H58] Y Qiu, U Shanbhag, F Yousefian, Zeroth-order methods for nondifferentiable, nonconvex, and hierarchical federated optimization, Advances in Neural Information Processing Systems 36

[H57] P. Zhang, U. V. Shanbhag, C. M. Lagoa, and I. E. Bardakci, Global Resolution of Chance-Constrained Optimization Problems: Minkowski Functionals and Monotone Inclusions, To appear in IEEE Conference on Decision and Control (CDC), 2023.

[H56] U. V. Shanbhag and F. Yousefian, Zeroth-order randomized block methods for constrained minimization of expectation-valued Lipschitz continuous functions, Proceedings of the Indian Control Conference, 2021.

[H55] S. Cui\*, B. Franci, S. Grammatico, U. V. Shanbhag, M. Staudigl, A relaxed-inertial forward-backward-forward algorithm for Stochastic Generalized Nash equilibrium seeking, Proceedings of the CDC, (2021).

- [H54] J. Lei\*, U. V. Shanbhag, and J. Chen, Distributed Computation of Nash Equilibria for Monotone Aggregative Games via Iterative Regularization, Proceedings of the CDC, Pg. 2285–2290, (2020).
- [H53] A. Jalilzadeh\* and U. V. Shanbhag, A Proximal-Point Algorithm with Variable Sample-Sizes (PPAWSS) for Monotone Stochastic Variational Inequality Problems, Pg. 3551–3562, Proceedings of the Winter Simulation Conference, (2019).
- [H52] E. Song and U. V. Shanbhag, Stochastic Approximation for simulation Optimization under Input Uncertainty with Streaming Data, Proceedings of the Winter Simulation Conference, Pg. 3597–3608, (2019).
- [H51] A. Jalilzadeh\* and U. V. Shanbhag, Smoothed First-order Algorithms for Expectation-valued Constrained Problems. CISS, (2019).
- [H50] J. Lei\* and U. V. Shanbhag, Linearly Convergent Variable Sample-Size Schemes for Stochastic Nash Games: Best-Response Schemes and Distributed Gradient-Response Schemes, Pg. 1396–1401, (2018)
- [H49] A. Jalilzadeh\*, A. Nedić, U. V. Shanbhag, and F. Yousefian, *A Variable Sample-size Stochastic Quasi-Newton Method for Smooth and Nonsmooth Stochastic Convex Optimization*, IEEE Conference on Decision and Control (CDC), Pg. 4097–4102, 2018
- [H48] J. Lei\* and U. V. Shanbhag, *Linearly Convergent Variable Sample-Size Schemes for Stochastic Nash Games: Best-Response Schemes and Distributed Gradient-Response Schemes*, IEEE Conference on Decision and Control (CDC), Pg. 3547–3552, 2018
- [H47] I. E. Bardakci, C. Lagoa, and U. V. Shanbhag, *Probability Maximization with Random Linear Inequalities: Alternative Formulations and Stochastic Approximation Schemes*, Proceedings of the ACC, Pg. 1396–1401 (2018)
- [H46] G. Kesidis, U. V. Shanbhag, N. Nasiriani, B. Ugaonkar, *Competition and Peak-Demand Pricing in Clouds Under Tenants’ Demand Response*. MASCOTS (2017), 244–254
- [H45] J. Lei\* and U. V. Shanbhag, *A randomized inexact proximal best-response scheme for potential stochastic Nash games*, Proceedings of the IEEE CDC (2017), 1646–1651
- [H44] F. Yousefian\*, A. Nedic, U. V. Shanbhag, *A smoothing stochastic quasi-Newton method for non-Lipschitzian stochastic optimization problems*, Proceedings of the WSC (2017), 2291–2302
- [H43] U. V. Shanbhag, J. S. Pang, S. Sen, *Inexact best-response schemes for stochastic Nash games: Linear convergence and Iteration complexity analysis*, Proceedings of the IEEE CDC (2016), 3591–3596
- [H42] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *Stochastic quasi-Newton methods for non-strongly convex problems: Convergence and rate analysis*, Proceedings of the IEEE CDC (2016), 4496–4503
- [H41] S. Cui\* and U. V. Shanbhag, *On the analysis of reflected gradient and splitting methods for monotone stochastic variational inequality problems*. Proceedings of the IEEE CDC (2016), 4510–4515
- [H40] A. Jalilzadeh\* and U. V. Shanbhag, *eg-VSSA: An extragradient variable sample-size stochastic approximation scheme: Error analysis and complexity trade-offs*. Proceedings of the Winter Simulation Conference (2016), 690–701
- [H39] Y. Xie\* and U. V. Shanbhag, *SI-ADMM: A stochastic inexact ADMM framework for resolving structured stochastic convex programs*. Proceedings of the Winter Simulation Conference (2016), 714–725
- [H38] A. Kannan\*, A. Nedich, and U. V. Shanbhag, *Distributed Stochastic Optimization under Imperfect Information*, Proceedings of the IEEE Conference on Decision and Control, (2015).

- [H37] H. Jiang\* and U. V. Shanbhag, *Data-driven Schemes for Resolving Misspecified MDPs: Asymptotics and Error Analysis*, Proceedings of the Winter Simulation Conference, (2015).
- [H36] U. V. Shanbhag and Jose M. Blanchet, *Budget-constrained Stochastic Optimization*, Proceedings of the Winter Simulation Conference, (2015).
- [H35] Y. Xie\* and U. V. Shanbhag, *On robust solutions to uncertain monotone linear complementarity problems and their variants*, Proceedings of the IEEE Conference on Decision and Control, (2014), 2834–2839.
- [H34] H. Ahmadi\* and U. V. Shanbhag, *Data-driven first-order methods for misspecified convex optimization problems: Global convergence and Rate estimates*, Proceedings of the IEEE Conference on Decision and Control, (2014), pp. 4228–4233.
- [H33] F. Yousefian\*, A. Nedić, and U. V. Shanbhag, *Optimal robust smoothing extragradient algorithms for stochastic variational inequality problems*, Proceedings of the IEEE Conference on Decision and Control, (2014), pp. 5831–5836.
- [H32] A. Kannan\* and U. V. Shanbhag, *The pseudomonotone stochastic variational inequality problem: Analytical statements and stochastic extragradient schemes*, Proceedings of the American Control Conference, (2014), pp. 2930–2935.
- [H31] F. Yousefian\*, A. Nedić, and U. V. Shanbhag, *A distributed adaptive steplength stochastic approximation method for monotone stochastic Nash Games*, Proceedings of the American Control Conference, (2014), pp. 4765–4470.
- [H30] A. A. Kulkarni\* and U. V. Shanbhag, *On the Consistency of Leaders’ Conjectures in Hierarchical Games*, Proceedings of the IEEE Conference on Decision and Control (CDC), (2013), pp. 1180–1185.
- [H29] H. Jiang\* and U. V. Shanbhag, *On the solution of stochastic optimization problems in imperfect information regimes*, Proceedings of the Winter Simulation Conference, (2013), pp. 821–832.
- [H28] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *A regularized smoothing stochastic approximation (RSSA) algorithm for stochastic variational inequality problems*, Proceedings of the Winter Simulation Conference, (2013), pp. 933–944.
- [H27] B. Ugaonkar, G. Kesidis, U. V. Shanbhag, and C. Wang. *Pricing of Service in Clouds: Optimal Response and Strategic Interactions*, Workshop on Mathematical performance Modeling and Analysis (MAMA 2013), co-located with ACM SIGMETRICS, Pittsburgh PA, June 2013.
- [H26] J. Koshal\*, A. Nedich and U. V. Shanbhag, *A Gossip Algorithm for Aggregative Games on Graphs*, IEEE Conference on Decision and Control (CDC) (2012), pp. 4840–4845.
- [H25] G. Wang\*, U. V. Shanbhag and S. P. Meyn, *On Nash equilibria in duopolistic power markets with make-whole uplift*, IEEE Conference on Decision and Control (CDC) (2012), pp. 472–477.
- [H24] H. Jiang\* and U. V. Shanbhag, *On the convergence of joint schemes for Online Computation and Supervised Learning*, IEEE Conference on Decision and Control (CDC) (2012), pp. 4464–4467.
- [H23] G. Wang\*, Negrete-Pincetic, M., Kowli, A., Shafieepoorfard, E., Meyn, S., and Shanbhag, U. V. *Real-time prices in an entropic grid*, Innovative Smart Grid Technologies (ISGT), IEEE Power Engineering Symposium (PES), (2012) pp. 1–8.
- [H22] F. Yousefian\*, A. Nedich and U.V. Shanbhag, *A Regularized Stochastic Approximation Scheme for Monotone Stochastic Variational Inequalities*, Proceedings of the Winter Simulation Conference (2011).

- [H21] M. Roytman\*, U.V. Shanbhag, J. B. Cardell and C.L. Anderson, *Packaging energy and reserves bids through risk penalties for enhanced reliability in co-optimized markets*, Proceedings of the Hawaii International Conference on System Sciences (HICSS), (2012) (Invited), pp. 1915–1922.
- [H20] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *Bifurcation Analysis of a Heterogeneous Mean-Field Oscillator Game*, IEEE Conference on Decision and Control (CDC) (2011).
- [H19] H. Jiang\*, U.V. Shanbhag and S. P. Meyn, *Learning equilibria in constrained Nash-Cournot games with misspecified demand functions*, IEEE Conference on Decision and Control (CDC) (2011), pp. 1018–1023.
- [H18] J. Koshal\*, A. Nedich and U.V. Shanbhag, *Single timescale Stochastic Approximation for Stochastic Nash Games in Cognitive Radio Systems*, (Invited) (To appear in the Proceedings of the 17th International Conference on Digital Signal Processing, 2011).
- [H17] G. Wang\*, U. V. Shanbhag, T. Zheng, E. Litvinov, and S. P. Meyn, *A Pivot-Based Global Optimization Technique for Convex Hull Pricing*, IEEE Power Engineering symposium (2011).
- [H16] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *On the Efficiency of Equilibria in Mean-Field Oscillator Games*, To appear in the Proceedings of the American Control Conference (ACC), (2011), pp. 5354–5359.
- [H15] A. Kannan\* and U. V. Shanbhag, *Single Timescale Distributed Iterative Regularization Algorithms for Monotone Nash games*, Proceedings of the IEEE Conference on Decision and Control (CDC), (2010), pp. 1963–1968.
- [H14] J. Koshal\*, A. Nedich, and U. V. Shanbhag, *Single Timescale Regularized Stochastic Approximation Schemes for Monotone Nash games under Uncertainty*, Proceedings of the IEEE Conference on Decision and Control (CDC), (2010), pp. 231–236.
- [H13] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *Learning in Mean-Field Oscillator Games*, Proceedings of the IEEE Conference on Decision and Control (CDC), (2010), pp. 3125–3132.
- [H12] S. Lu\*, U.V. Shanbhag, and H.M. Kim, *Multidisciplinary and Multilevel Design Optimization Problems with Equilibrium Constraints*, Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference (2008).
- [H11] H. Yin\*, P. G. Mehta, S. P. Meyn and U. V. Shanbhag, *Synchronization of Oscillators is a Game*, Proceedings of American Control Conference (ACC), Baltimore, 2010, pp. 1783–1790.
- [H10] H. Yin\*, C.L. Cox, P.G. Mehta, and U.V. Shanbhag, *Bifurcation Analysis of a Thalamic Relay Neuron Model*, Proceedings of the American Control Conference (ACC), St. Louis, 2009, pp. 337–342.
- [H9] F. Yousefian\*, A. Nedich, and U. V. Shanbhag, *Convex Nondifferentiable Stochastic Optimization: A Local Randomized Smoothing Technique*, Proceedings of the American Control Conference (ACC), Baltimore, 2010, pp. 4875–4880.
- [H8] U. Ravat\* and U. V. Shanbhag, *On the characterization of solution sets of smooth and nonsmooth stochastic Nash games*, Proceedings of the American Control Conference (ACC), Baltimore, 2010, 5632–5637.
- [H7] J. Koshal\*, A. Nedich, and U. V. Shanbhag, *Distributed Multiuser Optimization: Algorithms and Error Analysis*, Proceedings of the IEEE Conference on Decision and Control (CDC), 2009, 4372–4377.
- [H6] Kulkarni, A. A.\* and U. V. Shanbhag, *New Insights on Generalized Nash Games with Shared Constraints: Constrained and Variational Equilibria*, Proceedings of the IEEE Conference on Decision and Control (CDC), 2009, 151–156.

- [H5] H. Yin\*, U. V. Shanbhag, and P. G. Mehta, *Nash Equilibrium Problems with Congestion Costs and Shared Constraints*, Proceedings of the IEEE Conference on Decision and Control (CDC), 2009, 4649–4654.
- [H4] U.G. Vaidya, P. G. Mehta and U.V. Shanbhag, *Nonlinear Stabilization via Control Lyapunov Measure*, Proceedings of IEEE Conference on Decision and Control, 2007, 1722-1727.
- [H3] A.A. Kulkarni\*, A. Rossi, J. Alameda, and U.V. Shanbhag, *A Grid-Computing Framework for Quadratic Programming under Uncertainty*, Proceedings of the TeraGrid, 2007.
- [H2] U.V. Shanbhag, G. Infanger, and P.W. Glynn, *On the Solution of Stochastic Equilibrium Problems in Electric Power Networks*, Invited Paper: Forty-Second Annual Allerton Conference on Communication, Control and Computing, September 2004.
- [H1] U.V. Shanbhag, L. K. Norford, S. E. Englander, and M. C. Caramanis, *Price Responsive Facility Control Optimization Software for a Changing Retail Market*, Proceedings of the Pricing Energy in a Competitive Market Conference, EPRI, Washington, D.C., June 1998.

## 5 INVITED COLLOQUIA AND PLENARY TALKS

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The research has been communicated through colloquia at **business schools** (including Chicago Booth, Columbia Business School (twice), CMU Tepper, Krannert (Purdue), UCLA Anderson), **engineering schools** (including Johns Hopkins, Maryland, Minnesota, Northwestern (twice), Penn State, Purdue, Stanford, Texas A&M, UIUC), and **mathematics/applied mathematics** programs (including Cornell, Rice, UMBC, UCSD, RIT). In addition, I have been honored to give the plenary at 2 international conferences (including the triennial International Conference on Continuous Optimization (ICCOPT)) as well as semi-plenaries and plenaries at smaller workshops.<sup>2</sup>

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- [L1] (Lecture) Department of Electrical and Computer Engineering, **University of Illinois at Urbana-Champaign** (UIUC), 2003
- [L2] (Lecture) **Anderson School of Management, UCLA**, CA, 2005
- [L3] (Lecture) **Center for Computational and Applied Mathematics (CAAM), Rice University**, TX, 2005
- [L4] (Lecture) **Department of Mechanical and Industrial Engineering (MIE), UIUC**, IL, 2005
- [L5] (Lecture) **Applied Math-MIE Seminar, Department of Mechanical and Industrial Engineering (MIE), UIUC**, IL, 2005
- [L7] (Lecture) **Institute of Mathematics and its Applications (IMA), Hot Topics Workshop on “Mixed-Integer Nonlinear Programming: Algorithmic Advances and Applications”**, Minneapolis, MN, 2008
- [L8] (Lecture) **Department of Geography and Environmental Engineering (DOGEE), Johns Hopkins University**, MD, 2009
- [L9] (Lecture) Department of Civil and Environmental Engineering, **University of Maryland at College Park**, MD, 2009
- [L10] (Lecture) Department of Industrial and Systems Engineering, **Lehigh University**, PA, 2010

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<sup>2</sup>I do not mention invited talks at large conferences as part of sessions.

- [L11] (Lecture) GERAD seminar, **HEC Montreal**, Canada 2010
- [L12] (Lecture) IEOR-DRO Seminar, **Columbia Business School**, NY, 2010
- [L13] (Lecture) Department of Industrial Engineering and Management Science (IEMS), **Northwestern University**, MA, 2010
- [L14] (Lecture) Center for Information & Systems Engineering (CISE), **Boston University**, MA, 2010
- [L15] (Lecture) **US-Mexico Workshop on Optimization and its Applications**, Oaxaca, Mexico, 2011
- [L16] (Workshop) Workshop of **Mathematics for the Analysis, Simulation and Optimization of Complex Systems**, DOE, San Francisco, CA, 2011
- [L17] (Lecture) **University of Chicago, Booth Graduate School of Business**, Applied Economic Theory Workshop, IL, 2011
- [L18] (**Plenary speaker**) **Conference on Optimization and Practices in Industry (COPI)**, Paris, France, 2011
- [L19] (Lecture) **Center for Applied Mathematics, Cornell University**, NY, 2012
- [L20] (**Invited Tutorial Speaker**) International Conference on Complementarity Problems (ICCP), Singapore, 2012
- [L21] (Lecture) **Columbia University, Columbia Business School, (IEOR-DRO Seminar)**, NY, 2013.
- [L22] (Lecture) **Initiative on Mathematical Sciences and Engineering (IMSE), University of Illinois at Urbana-Champaign**, Urbana, IL, 2013.
- [L23] (Lecture) Industrial and Systems Engineering, **Lehigh University**, PA, 2013.
- [L24] (Lecture) **Carnegie Mellon University, Tepper School of Business**, PA, 2014.
- [L25] (Lecture) **Department of Mathematics, University of Maryland at Baltimore County**, MD, April 2015
- [L26] (Lecture) **Department of Applied Mathematics, Rochester Institute of Technology**, NY, April 2015
- [L27] (Lecture) **Department of Industrial and Systems Engineering, University of Southern California**, CA, 2015.
- [L28] (Invited speaker) **ISIM 2015: At the Interface of Simulation and Optimization**, INFORMS Simulation Workshop, Purdue University, IN, 2015.
- [L29] (Invited speaker) **Workshop on Optimization and Equilibrium (USC-WOE)**, University of Southern California, CA, . 2015.
- [L30] (Lecture) **Department of Civil Engineering, Johns Hopkins University**, MD, 2017.
- [L31] (Lecture) **School of Industrial Engineering, Purdue University**, IN, 2017.
- [L32] (Lecture) **Department of Industrial Engineering, University of Pittsburgh**, PA, 2017.

- [L33] (Lecture) **Department of Industrial Engineering, Oklahoma State University, OK, 2018.**
- [L34] (Invited speaker) **Department of Management Science of Engineering, Stanford University, CA, 2018.**
- [L35] (**Invited Tutorial Speaker**) **International Conference on Stochastic Programming (ICSP), Trondheim, Norway, 2019.**
- [L36] (**Plenary Speaker**) **International Conference on Continuous Optimization (ICCOPT), Berlin, Germany, 2019.**
- [L37] (**Semi-plenary Speaker**) **Workshop on Dynamics, Optimization and Variational Analysis in Applied Games, The Fields Institute (University of Toronto), (2020).**
- [L38] (Lecture) **Department of Computational and Applied Mathematics (CAAM), Rice University, TX, 2021**
- [L39] (Lecture) **Department of Industrial Engineering, University of Houston, TX, 2021**
- [L40] (Lecture) **Department of Industrial and Systems Engineering, University of Minnesota, MN, 2021**
- [L41] (Invited Speaker) **Workshop on Optimization under Uncertainty, Centre de Recherches Mathématiques, Montreal, 2021.**
- [L42] (Invited Speaker) **INFORMS Simulation Society (ISIM) Workshop, Penn. State University, University Park, PA (2021).**
- [L43] (Lecture) **Department of Industrial and Systems Engineering, Texas A&M University, TX, 2022**
- [L44] (Lecture) **Department of Mathematics, University of California, San Diego, SD, 2022**
- [L45] (Lecture) **Quantitative Methods Group, Krannert School of Management, Purdue University, IN, 2022**
- [L46] (Lecture) **Department of Applied Mathematics, George Mason University, VA, 2022**
- [L47] (Invited Speaker) **Foundations of Computational Mathematics, Paris, France 2023**
- [L48] (**Plenary Speaker**) **East Coast Optimization Meeting, Fairfax, VA 2023**
- [L49] (Invited Speaker) **Workshop on Optimization, Equilibrium and Complementarity, HKUST, Hong Kong, 2023**
- [L50] (Lecture) **Industrial Engineering, Southern Methodist University, 2024**
- [L51] (Lecture) **Industrial Engineering, University of Texas at Austin, 2025**
- [L52] (Lecture) **Industrial Engineering, University of Minnesota, 2025**

## 6 POSTDOCTORAL SCHOLARS AND STUDENTS

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I have served as an advisor for 14 doctoral students (8 at Illinois and 6 at PSU) of which are either tenure-track or associate professors (Beijing Institute of Technology, Hong Kong University, IIT Mumbai (Systems and Control), Rutgers University, University of Arizona), research assistant professor (or equivalent) (Humboldt University (Mathematics)) and one is a teaching assistant professor (UCSB (Statistics)). In addition, one of my postdoctoral scholars is an assistant professor at Tongji University. In addition, I am currently supervising three doctoral students.

## 6.1 POSTDOCTORAL SCHOLARS

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[P1] **Farzad Yousefian (UIUC)**, 2014-2015  
*Asst. Prof.* (ISE, Oklahoma St.)

[P2] **Jinlong Lei (Chinese Academy of Sciences)**, 2016-2019  
*Asst. Prof.* (Tongji University, China)

[P3] **Shisheng Cui (Penn. State)**, 2019-2021  
*Asst. Prof.* (Beijing Institute of Technology, China)

## 6.2 DOCTORAL STUDENTS

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[S1] **Ankur A. Kulkarni**,  
 Industrial and Enterprise Systems Engg. (2010, Illinois)  
*Thesis title:* Generalized Nash Games With Shared Constraints: Existence, Efficiency, Refinement and Equilibrium Constraints  
*Asst. Prof. (Sys. and Control)* (IIT, Mumbai)

[S2] **Huibing Yin**, (coadvised with P. G. Mehta (MechSE))  
*Thesis title:* Noncooperative Static and Dynamic Games: Addressing shared constraints and phase transitions  
 Mechanical Science and Engg. (2012, Illinois)  
*Engineer* (Yahoo)

[S3] **Uma Ravat** (academic co-advisor R. Sowers (Math.))  
 Mathematics (2014, Illinois)  
*Thesis title:* On the Analysis of Stochastic Optimization and Variational Inequality Problems  
*Teaching Professor* (Statistics, UCSB)

[S4] **Jayash Koshal** (coadvised with A. Nedić)  
*Thesis title:* Distributed algorithms for networked multi-agent systems: Optimization and Competition  
 Industrial and Enterprise Systems Engg. (2012, Illinois)  
*Analyst* (Amazon)

[S5] **Farzad Yousefian** (coadvised with A. Nedić)  
 Industrial and Enterprise Systems Engg. (2013, Illinois)  
*Thesis title:* Stochastic approximation schemes for stochastic optimization and variational problems: Adaptive steplengths, smoothing, and regularization  
*Postdoctoral Fellow* Penn. State University (U. V. Shanbhag)  
*Asst. Prof.* (ISE, Rutgers University)

[S6] **Dane Schiro** (coadvised with J.-S. Pang)  
 Industrial and Enterprise Systems Engg. (2013, Illinois)  
*Thesis title:* Game-theoretic formulations and solution methods for microeconomic market models  
*Lead Analyst* (Independent System Operator, New England)



- [S7] **Gui Wang** (coadvised with S. P. Meyn)  
Electrical and Computer Engg. (2013, Illinois)  
*Thesis title:* Design and operation of electricity markets: Dynamics, uncertainty, pricing and competition  
*Nodal Power Trader* (Electricite De France (EDF), Texas)
- [S8] **Aswin Kannan**  
IME (2015, PSU)  
*Thesis title:* Distributed algorithms for optimization and variational inequality problems: Addressing competition, uncertainty, and misspecification  
*Researcher* (Humboldt University)
- [S9] **Hao Jiang**,  
Industrial and Enterprise Systems Engg. (Graduated, 2015, Illinois)  
*Thesis title:* On the resolution of misspecification in stochastic optimization, variational inequality, and game-theoretic problems  
*Researcher* (Abbott Laboratories)
- [S10] **Hesam Ahmadi**  
IME (Graduated, 2016, PSU)  
*Thesis title:* On the Analysis of Data-driven and Distributed Algorithms for Convex Optimization Problems  
*Analyst* (Optym)
- [S11] **Yue Xie**  
IME (Graduated, 2018, PSU)  
*Thesis title:* On addressing nonconvexity, stochasticity and complementarity in mathematical optimization  
*Postdoctoral Researcher* University of Wisconsin (S. Wright)  
*Assistant Professor* Hong Kong University (Math.)
- [S12] **Afrooz Jalilzadeh**  
IME (Graduated, 2019, PSU)  
*Thesis title:* Variance-reduced First-Order Methods for Convex Stochastic Optimization and Monotone Stochastic Variational Inequality Problems  
*Assistant Professor* University of Arizona (Industrial Engg.)
- [S13] **Shisheng Cui**  
IME (Graduated 2019, PSU)  
*Thesis title:* Stochastic variational & hierarchical problems: models, algorithms, and applications to transmission expansion problems  
*Postdoctoral Fellow* Penn. State University (U. V. Shanbhag)  
*Asst. Prof.* (Beijing Institute of Technology, China)
- [S14] **Wendian Wan**  
IME (Graduated, 2019, PSU)  
*Thesis title:* Algorithms for operation of power systems: risk, uncertainty, discreteness, and nonconvexity  
*Analyst* Amazon

## 6.3 MASTERS STUDENTS

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- [MS1] **Di Zhang**,  
Illinois (Graduated, 2008)  
*Position:* AIIMMS (Seattle, WA)
- [MS2] **Sanyogita Lakhera**,  
Illinois (Graduated, 2008)

*Position:* Citibank (New York, NY)

[MS3] **Ankur A. Kulkarni**,

Illinois

(Graduated, 2008)

*Position:* Continued in doctoral program

[MS4] **Aswin Kannan**, (coadvised with Prof. H. M. Kim)

Illinois

(Graduated, 2010)

*Position:* Pre-doctoral fellowship at Argonne National Laboratory (ANL) (Moré)

[MS5] **Wendian Wan**,

IME

(Graduated, 2015)

## 7 RESEARCH GRANTS

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I have been supported by 8 NSF awards (including the NSF CAREER Award (2012) and three other awards from the Operations Research program), 4 DOE awards (including two recent ARPA-E Award), an ONR award, an AFOSR award, as well as a recent SLOAN Foundation award.<sup>3</sup> **Currently, I am supported by grants from the DOE, AFOSR, and ONR.**

### 7.1 FEDERAL FUNDING

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[GF20] **(CURRENT)** DOE: Analysis of Real-Time Market Design Enhancements: Intertemporal Challenges for Storage, Flexibility, and Incentives, 2024 – 2027  
U. V. Shanbhag (Co-PI) \$ 68,442

[GF19] **(CURRENT)** NSF: RAISE-CET: Design and operation of community-informed equity-based virtual power plants for achieving impact in Philadelphia, 2024 – 2027  
U. V. Shanbhag (Co-PI) \$ 238,262

[GF18] **(CURRENT)** AFOSR: Mathematical Optimization: *Optimization Problems with Complex Functional Constraints: Addressing Hierarchy and Risk*, (2024–2027)  
U. V. Shanbhag (PI) \$ 461,149

[GF17] **(CURRENT)** DOE: Office of Science: *Randomized Federated Learning Methods for Nonsmooth, Nonconvex, and Hierarchical Optimization*, (2023–2025)  
U. V. Shanbhag (PI) (Collaborative with F. Yousefian (Rutgers)) \$ 185,000

[GF16] **(CURRENT)** ONR: **Mathematical and Resource Optimization:** *Hierarchical programs under uncertainty: Risk, Discreteness, and Distributed Resolution*, (2022–2025)  
U. V. Shanbhag (PI) (Collaborative with F. Yousefian (Rutgers)) \$ 325,000

[GF15] **DOE-ARPA-E Award:** *Scalable Tech. for Stoch. Power Flow Problems* (Challenge 2), (2020–2021).  
U. V. Shanbhag (PI) \$ 100,000

[GF14] **Alfred P. Sloan Foundation:** *Electricity market structure, wind penetration and information aggregation*, (2018–2020)  
(C. Lo Prete (PI), A. Kwasnica (co-PI), and U. V. Shanbhag (co-PI)) \$ 250,000 (100,000)  
**Withdrew from this project after award decision.**

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<sup>3</sup>I withdrew from this project upon award of this grant.

- [GF13] **DOE-ARPA-E Award: Scalable Techniques for Stochastic Power Flow Problems**, (2018–2019).  
(U. V. Shanbhag (PI), N. R. Chaudhuri (co-PI), H. K. Fathy (co-PI), C. Lo Prete (co-PI), and M. D. Webster (co-PI) Minghui Zhu (co-PI)) \$ 250,000 (~ 200,000)
- [GF12] **NSF Award (Electric Power and Adaptive Systems): Efficient and Scalable Methods for Multi-Stage Transmission Expansion under Uncertainty**, (2017–2020).  
(M.D. Webster (PI) and U. V. Shanbhag (co-PI)) \$ 310,000 (120,000)
- [GF11] **NSF Award (Operations Research): Nash Equilibrium Problems under Uncertainty**, (2015–2018)  
(J.-S. Pang (USC, PI), S. Sen (USC, co-PI) and Shanbhag (co-PI)) \$ 420,000 (110,000)
- [GF10] **NSF Award (Electric Power and Adaptive Systems): Commitment, Expansion, and Pricing in Uncertain Power Markets: Discrete Hierarchical Models and Scalable Algorithms**, (2014–2017)  
(Shanbhag (PI) and Hobbs (co-PI)) \$ 360,000 (210,000)
- [GF9] **National Energy Technology Laboratory (NETL) Award**, (2014–2015)  
(Shanbhag (PI)) \$ 36,000
- [GF8] **NSF Award (Operations Research): Resolving Parametric Misspecification: Joint Schemes for Computation and Learning**, (2014–2017)  
(Shanbhag (PI) and Aybat (co-PI)) \$ 300,000 (150,000)
- [GF7] **NSF Early Career Award (Operations Research): Stochastic and Robust Variational Inequality Problems: Analysis, Computation and Applications to Power Markets**, (2012–2017)  
(Shanbhag (PI)) \$ 400,000
- [GF6] **NSF (Building Engineered Complex Systems (BECS)): Rare Systematic Risk in Markets: Modelling, Theory and Computation**, (2011–2014)  
(Sowers (PI) (Math) and Shanbhag (Illinois)) \$ 310,000 (150,000)
- [GF5] **NSF (Operations Research): Dynamic Traffic Equilibrium Problems: Distributed algorithms and Error analysis**, (2009–2011)  
(Nedich and Shanbhag (jointly led, both at Illinois)) \$ 200,000 (100,000)
- [GF4] **DOE (Applied Math. and Scientific Computing Research (ASCR)): Extending the Realm of Optimization for Complex Systems: Uncertainty, Competition and Dynamics**, (2009–2013)  
(Shanbhag (PI), Başar, Meyn, and Mehta (Illinois)) \$ 1,031,997 (245,000)
- [GF3] **NSF (CISE): Addressing Competition, Dynamics and Uncertainty in Optimization Problems: Theory, Algorithms, Applications and Grid-Computing Extensions**, (2007–2010)  
(Shanbhag (PI)) \$ 200,000
- [GF2] **US Army: Decision Support Tools for Approximating Utility Networks in Urban Environments**, (2007–2008)  
(Shanbhag (PI)) \$ 106,635
- [GF1] **NSF-Power Systems Engineering Research Center (PSERC): Impact of Increased DFIG Wind Penetration on Power System Reliability and Consequent Market Adjustments**, (2007–2008)  
(Ajarapu (ISU), Mcalvey (ISU), Shanbhag, and Vittal (PI, ASU)) \$ 190,000

## 7.2 INDUSTRY FUNDING

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- [GI1] **CCRINGSS (Collaborative Center for Research in Natural Gas Supply Systems (GE)) Award A Framework for Analytics in Natural Gas Supply Systems (FANGSS)**, (2015–2016)

Shanbhag (PI), Ventura and Harrison (Co-PIs)

\$ 200,000 (79,000)

### 7.3 INTERNAL FUNDING

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[GU4] PSIEE Award, (Pavlak (PI) and Shanbhag (co-PI))	(2019–2020) \$ 25,000
[GU3] PSIEE Award, (Shanbhag (PI), Fathy and Webster (co-PIs))	(2014–2015) \$ 25,000
[GU2] Illinois Research Board: <i>Stochastic Nash Games and their Generalizations: Characterization of Equilibria and Learning Algorithms</i> , (Shanbhag (PI))	(2011–2012) \$ 22,500
[GU1] National Center for Supercomputing Applications (NCSA): <i>Grid-Computing Algorithms for Large-Scale Stochastic Games</i> , (Shanbhag (PI))	(2006) \$ 28,000

## 8 COURSEWORK

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<b>IE 360</b> <b>Facilities Planning and Design</b> (Junior)	(Illinois) Every Spring
<b>IE 361</b> <b>Production Planning and Control</b> (Junior)	(Illinois) Spring 2011
<b>IE 510</b> <b>Nonlinear programming (NEW)</b> (Doctoral)	(Illinois) Alternate Fall Semesters
<b>IE 598NS</b> (Co-taught with A. Nedić) <b>Continuous-strategy noncooperative games (NEW)</b> (Doctoral)	(Illinois) Alternate Fall Semesters
<b>IE 467</b> <b>Facilities Planning and Design</b>	(PSU) 2013, 2014, 2015 Spring
<b>IE 597</b> <b>Stochastic Optimization (NEW)</b>	(PSU) 2013, 2014, 2015, 2018, 2019, 2020. Spring
<b>IE 425</b> <b>Stochastic Models in Operations Research</b>	(PSU) 2015, 2016, 2019, 2023
<b>IE 468</b> <b>Optimization Modeling and Algorithms</b>	(PSU) 2016, 2019, 2020, 2021
<b>IE 505</b> <b>Linear Programming</b>	(PSU) 2021
<b>IE 597</b> <b>Equilibrium Programs and Hierarchical Optimization</b>	(PSU) 2022

## 9 SERVICE

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Since my arrival in Fall 2012, I have served at the department level (P&T committee, Executive committee, Graduate Policy Committee) as well as the college and campus level (IME Head search committee, ICS search committee, chairing and participation in ad-hoc working groups). I recently chaired both the departmental P&T committee as well as a college-level committee for reviewing the Associate Dean of Equity and Inclusion (ADEI). I am currently serving on the University-level P&T Committee as well as the CoE Dean Search Committee. I have also served the larger academic community at several levels (editorial activities, co-chairing of the INFORMS Nicholson prize with a committee of over 20 faculty members, participation in 5 best paper/dissertation prize committees, vice-chair (Informs Optimization Society (Nonlinear programming), amongst others). I have also been a co-chair for 3 workshops and been on the planning committee for several other conferences.

### 9.1 SERVICE TO DEPARTMENT

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● **Departmental Service at Illinois:** Courses and Curriculum committee (Fall 2009 (**Chair**)), Graduate Program Committee (2006–09), Seminar Committee (2007–09), Search Committee (2010)

- **IME Executive Committee** 2013–2015, 2016–2018, 2023–2024
- **IME P&T Committee** 2013–2015, 2016–2018, 2021–2022
- **IME P&T Committee (Chair)** 2022–2023
- **IME Search Committee** 2012–2015, 2018–2020
- **IME Search Committee** 2019–2020 (Chair)
- **IME Grad. Policy Committee** 2012–2014
- **INFORMS Advisor** 2014–2017
- **OR Group Coordinator** 2017–2021

### 9.2 SERVICE TO COLLEGE AND CAMPUS

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- **University P&T Committee** (2023–2024)
- **Search Committee for COE Dean** (2023–2024)
- **Review committee for Associate Dean of Equity and Inclusion (Chair)** (2022–2023)
- **DEI-centric College search committee (Chair: Dean of Equity and Inclusion: Tonya Peeples)<sup>4</sup>** (2020–2022)

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<sup>4</sup>This search was approved by university leaders and emphasizes equity and inclusion contributions for the faculty to be considered.

- College P&T Committee (2019–2021)
- Co-director of Initiative of Sustainable Electric Power Systems (Funded by PSU Energy Institute) 2014–2019
- Inst. of CyberScience (ICS) Search Committee (Campus) 2013–2014
- IME Head Search Committee (College) 2014–2015
- Resilient Infrastructures Working Group (College) 2015 Spring
- Power Systems Working Group (Chair) (College) 2015 Summer, Fall
- Energy and Mineral Engg. Search Committee (Campus) 2013–2014
- Engg., Energy, and Environmental Institute (E3i) Steering Committee (Campus) 2013–2015

### 9.3 SERVICE TO COMMUNITY (Editorial boards and Best paper/dissertation committees))

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- Chair of Young Researcher best paper prize in International Conference on Continuous Optimization (IC-COPT) 2024.
- Member of Nicholson paper prize committee 2024
- Chair of INFORMS Computing Society (ICS) paper prize committee 2023
- Co-editor (Special issue: ACM TOMACS) 2021 – 2024
- Associate Editor (SIAM Journal of Optimization) 2020 –
- Associate Editor (Optimization Letters) 2020 – 2024
- Associate Editor (Computational Optimization and Applications) 2018 –
- Associate Editor (IEEE Transactions on Automatic Control<sup>5</sup>) 2016 – 2019
- Associate Editor (IIE Transactions) 2014 – 2017
- Associate Editor (Networks and Spatial Economics) 2015 – 2018
- Co-chair of Nicholson Paper Prize committee (Informs) 2013–2014
- Committee member of Nicholson Paper Prize committee (Informs) 2012–2013
- Committee member of A. W. Tucker Prize (Mathematical Optimization Society) 2015
- Committee member of best paper prize in IIE Transactions 2015
- Committee member of best student paper prize in Optimization Society (INFORMS) 2015
- Committee member of best student paper prize in ENRE (Energy, Natural Resources, and Env.) Society (INFORMS) 2010

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<sup>5</sup>Flagship journal on control theory

## 9.4 SERVICE TO COMMUNITY (Conference Organization and support)

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- Cluster co-chair for “Games and Multi-agent systems” in International Conference on Continuous Optimization (ICCOPT) (2024).
- Chair of the Informs Computing Society Best Paper Prize Committee (2023)
- International Conference on Continuous Optimization (ICCOPT), Stream organizer<sup>6</sup> for Variational Inequalities and Complementarity Problems 2022
- INFORMS Simulation Society (ISIM) Workshop (biennial), Co-Chair 2021.
- International Symposium on Mathematical Programming (ISMP), Stream organizer for variational analysis, Variational inequalities, and Games 2022
- SIAM Conference on Optimization (Committee) 2020
- IISE Conference (Cluster chair for Invited Sessions in OR) 2019
- **Conferences organized:** Co-organized the inaugural conference on Optimization and its applications (Optim-A) at Illinois (3 day meeting) (2010)
- **Conferences organized:** Co-organizing the workshop on power systems and markets at PSU (2 day meeting) (2015)
- **Cluster Chair (Variational Inequalities):** International Conference on Continuous Optimization (ICCOPT) 2016
- **Chair responsibilities:** Vice-chair (Nonlinear Programming) in the Informs Optimization society and the cluster chair for Nonlinear programming in Informs 2009, 2010
- **Program committee:** 1st International Conference on High Confidence Networked Systems (HiCoNS), April 2012
- **Advisory committees:** Informs Optimization conference in Gainesville, FL (2010)
- **Advisory committees:** Midwest Informs Conference, Columbus, OH (2011)
- Editorial activities: Allerton conference on Computing, Communication and Control; Conference on High Confidence Networked Systems (HiCoNS);
- **NSF Panel Reviews** (Operations Research (2), Operations Research CAREER panel (1), Electric Power and Adaptive Systems (1))
- **NSF Site Visit** (Climate Change and Decision-making under Uncertainty)
- **Journal Reviews:** *Mathematical Programming, Mathematics of Operations Research, Operations Research, SIAM Journal of Optimization, Management Science, Optimization Methods and Software, Networks and Spatial Economics, Computational Optimization and its Applications, IEEE Transactions on Power Systems, IEEE Transactions on Automatic Control, Indian Journal of Pure and Applied Math., Management Science, International Game Theory Review, Annals of Operations Research, Journal of Global Optimization*
- **Conference Reviews:** *IEEE Conference on Decision and Control (CDC), American Control Conference, Allerton Conference on Communication and Control*
- **Sessions organized:** *Informs annual meetings, SIAM Optimization Meetings, Symposium on Math. Programming, Conference on Duality and Global Optimization, International Conference on Complementarity Problems and Allerton meetings on communications and controls*

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<sup>6</sup>Stream organizers are responsible for getting a collection of sessions organized, each with 3– 4 speakers.