Farzad Yousefian | CV

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Last revised: Nov. 15, 2023

Education

University of Illinois at Urbana-Champaign
Ph.D., Industrial Engineering   *Aug. 2008–Aug. 2013*
○ Dissertation: *Stochastic Approximation Schemes for Stochastic Optimization and Variational Problems: Adaptive Steplengths, Smoothing, and Regularization*

Sharif University of Technology
M.Sc., Industrial Engineering   *Sep. 2006–July 2008*

Sharif University of Technology
B.Sc., Industrial Engineering   *Sep. 2002–Aug. 2006*

Academic Appointments

Rutgers University – New Brunswick
Assistant Professor, Industrial and Systems Engineering   *Sep. 2022–present*

Oklahoma State University (OSU)
Associate Professor (tenured), Industrial Engineering and Mngmt.   *July 2021–July 2022*
Undergrad. Program Director, Industrial Engineering and Mngmt.   *Jan. 2021–May 2022*
Assistant Professor, School of Industrial Engineering and Mngmt.   *Aug. 2015–June 2021*

Pennsylvania State University
Postdoctoral Researcher, Dept. of IME   *May 2014–July 2015*

University of Illinois at Urbana-Champaign
Postdoctoral Lecturer, Dept. of Industrial and Enterprise Systems Eng.   *Aug. 2013–May 2014*

Honors and Awards

○ The 2022 Mathematical Programming Meritorious Service Award
○ National Science Foundation CAREER Award, 2020-2025
○ The 2020 Industrial Engineering & Management Faculty Award, OSU
○ The 2020 College of Engineering, Architecture, and Technology Excellent Teacher Award, OSU
○ Best Theoretical Paper Award, The 2013 Winter Simulation Conference (WSC)

Research Interests

○ Distributed Optimization in Multi-Agent Networks
○ Stochastic and Large-Scale Optimization

- Hierarchical and Nonconvex Optimization
- Variational Inequalities and Computational Game Theory
- Applications in Transportation Systems and Machine Learning

Publications (graduate student advisee names are marked by *)

Journal Articles (Published/Accepted)..

[1] Afrooz Jalilzadeh, <u>Farzad Yousefian</u>, and Mohammadjavad Ebrahimi*, *Stochastic Approximation for Estimating the Price of Stability in Stochastic Nash Games*, **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, DOI: 10.1145/3632525

[2] Zeinab Alizadeh, Afrooz Jalilzadeh, and <u>Farzad Yousefian</u>, *Randomized Lagrangian Stochastic Approximation for Large-Scale Constrained Stochastic Nash Games*, **Optimization Letters**, accepted, https://arxiv.org/pdf/2304.07688.pdf

[3] Daniel Burbano Lombana and <u>Farzad Yousefian</u>, *A Fish Rheotaxis Mechanism as a Zero-Order Optimization Strategy*, **IEEE Access**, 11 (2023), pp. 102781–102795. DOI: 10.1109/ACCESS.2023.3315240

[4] Harshal D. Kaushik*, Sepideh Samadi*, and <u>Farzad Yousefian</u>, *An Incremental Gradient Method for Optimization Problems with Variational Inequality Constraints*, **IEEE Transactions on Automatic Control**, (2023). DOI: 10.1109/TAC.2023.3251851

[5] Shisheng Cui, Uday V. Shanbhag, and <u>Farzad Yousefian</u>, *Complexity Guarantees for an Implicit Smoothing-Enabled Method for Stochastic MPECs*, **Mathematical Programming**, 198 (2023), pp. 1153–1225. DOI: 10.1007/s10107-022-01893-6

[6] Harshal D. Kaushik* and <u>Farzad Yousefian</u>, *A Method with Convergence Rates for Optimization Problems with Variational Inequality Constraints*, **SIAM Journal on Optimization**, 31 (2021), pp. 2171–2198. DOI: 10.1137/20M1357378

[7] Afrooz Jalilzadeh, Angelia Nedić, Uday V. Shanbhag, and <u>Farzad Yousefian</u>, *A Variable Sample-Size Stochastic Quasi-Newton Method for Smooth and Nonsmooth Stochastic Convex Optimization*, **Mathematics of Operations Research**, 47 (2021), pp. 690–719. DOI: 10.1287/moor.2021.1147

[8] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *On Stochastic and Deterministic Quasi-Newton Methods for Nonstrongly Convex Optimization: Asymptotic Convergence and Rate Analysis*, **SIAM Journal on Optimization**, 30 (2020), pp. 1144–1172. DOI: 10.1137/17M1152474

[9] Nahidsadat Majlesinasab*, <u>Farzad Yousefian</u>, and Arash Pourhabib, *Self-tuned Stochastic Mirror Descent Methods for Smooth and Nonsmooth High-Dimensional Stochastic Optimization*, **IEEE Transactions on Automatic Control**, 64 (2019), pp. 4377–4384. DOI: 10.1109/TAC.2019.2897889

[10] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *On Stochastic Mirror-Prox Algorithms*

for Stochastic Cartesian Variational Inequalities: Randomized Block Coordinate and Optimal Averaging Schemes, **Set-Valued and Variational Analysis**, 26 (2018), pp. 789–819.
DOI: 10.1007/s11228-018-0472-9

[11] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *On Smoothing, Regularization, and Averaging in Stochastic Approximation Methods for Stochastic Variational Inequality Problems*, **Mathematical Programming**, 165 (2017), pp. 391–431. DOI: 10.1007/s10107-017-1175-y

[12] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *Self-Tuned Stochastic Approximation Schemes for Non-Lipschitzian Stochastic Multi-User Optimization and Nash Games*, **IEEE Transactions on Automatic Control**, 61 (2016), pp. 1753–1766. DOI: 10.1109/TAC.2015.2478124

[13] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *On Stochastic Gradient and Subgradient Methods with Adaptive Steplength Sequences*, **Automatica**, 48 (2012), pp. 56–67.
DOI: 10.1016/j.automatica.2011.09.043

Book Chapters

[14] David Newton, <u>Farzad Yousefian</u>, and Raghu Pasupathy, *Stochastic Gradient Descent: Recent Trends*, **INFORMS TutORials in Operations Research: Recent Advances in Optimization and Modeling of Contemporary Problems**, (2018), pp. 193–220. DOI: 10.1287/educ.2018.0191

Under Review Articles

[15] Sepideh Samadi* and <u>Farzad Yousefian</u>, *Improved Guarantees for Optimal Nash Equilibrium Seeking and Bilevel Variational Inequalities*, **SIAM Journal on Optimization** (**under review**), Preprint: https://arxiv.org/abs/2307.12511

[16] Mohammadjavad Ebrahimi*, Uday V. Shanbhag, and <u>Farzad Yousefian</u>, *Distributed Gradient Tracking Methods with Guarantees for Computing a Solution to Stochastic MPECs*, **2024 American Control Conference (ACC), (submitted)**, https://arxiv.org/abs/2310.09356

[17] Sepideh Samadi*, Daniel Burbano Lombana, and <u>Farzad Yousefian</u>, *Achieving Optimal Complexity Guarantees for a Class of Bilevel Convex Optimization Problems*, **2024 American Control Conference (ACC), (submitted)**, https://arxiv.org/abs/2310.12247

Unpublished Articles and Technical Notes

[18] <u>Farzad Yousefian</u>, Jayesh Yevale*, and Harshal D. Kaushik*, *Distributed Randomized Block Stochastic Gradient Tracking Method*. Preprint: https://arxiv.org/abs/2110.06575

[19] Nahidsadat Majlesinasab*, <u>Farzad Yousefian</u>, and Mohammad Javad Feizollahi, *First-Order Methods with Convergence Rates for Multi-Agent Systems on Semidefinite Matrix Spaces*. Preprint: https://arxiv.org/abs/1902.05900

[20] Mostafa Amini* and <u>Farzad Yousefian</u>, *An Iterative Regularized Mirror Descent Method for*

Ill-Posed Nondifferentiable Stochastic Optimization. Preprint: https://arxiv.org/abs/1901.09506

Peer-Reviewed Conference Proceedings

[21] Yuyang Qiu*, Uday V. Shanbhag, and <u>Farzad Yousefian</u>, *Zeroth-Order Methods for Nondifferentiable, Nonconvex, and Hierarchical Federated Optimization*, **The Thirty-seventh Conference on Neural Information Processing Systems (Neurips)**, 2023, accepted https://arxiv.org/abs/2309.13024

[22] Uday V. Shanbhag and <u>Farzad Yousefian</u>, *Zeroth-Order Randomized Block Methods for Constrained Minimization of Expectation-Valued Lipschitz Continuous Functions*, **2021 Seventh Indian Control Conference (ICC)**, 2021, pp. 7–12. DOI: 10.1109/ICC54714.2021.9703135

[23] <u>Farzad Yousefian</u>, *Bilevel Distributed Optimization in Directed Networks*, **2021 American Control Conference (ACC)**, 2021, pp. 2230–2235. DOI: 10.23919/ACC50511.2021.9483429

[24] Harshal D. Kaushik* and <u>Farzad Yousefian</u>, *An Incremental Gradient Method for Large-scale Distributed Nonlinearly Constrained Optimization*, **2021 American Control Conference (ACC)**, 2021, pp. 953–958. DOI: 10.23919/ACC50511.2021.9483035

[25] Nahidsadat Majlesinasab*, <u>Farzad Yousefian</u>, and Mohammad Javad Feizollahi, *A First-Order Method for Monotone Stochastic Variational Inequalities on Semidefinite Matrix Spaces*, **2019 American Control Conference (ACC)**, Philadelphia, PA, 2019, pp. 169–174. DOI: 10.23919/ACC.2019.8814737

[26] Harshal Kaushik* and <u>Farzad Yousefian</u>, *A Randomized Block Coordinate Iterative Regularized Subgradient Method for High-dimensional Ill-posed Convex Optimization*, **2019 American Control Conference (ACC)**, Philadelphia, PA, 2019, pp. 3420–3425. DOI: 10.23919/ACC.2019.8815256

[27] Mostafa Amini* and <u>Farzad Yousefian</u>, *An Iterative Regularized Incremental Projected Subgradient Method for a Class of Bilevel Optimization Problems*, **2019 American Control Conference (ACC)**, Philadelphia, PA, 2019, pp. 4069–4074. DOI: 10.23919/ACC.2019.8814637

[28] David Newton, Raghu Pasupathy, and <u>Farzad Yousefian</u>, *Recent Trends in Stochastic Gradient Descent for Machine Learning and Big Data*, **2018 Winter Simulation Conference (WSC)**, Gothenburg, Sweden, 2018, pp. 366–380. DOI: 10.1109/WSC.2018.8632351

[29] Afrooz Jalilzadeh, Angelia Nedić, Uday V. Shanbhag, and <u>Farzad Yousefian</u>, *A Variable Sample-Size Stochastic Quasi-Newton Method for Smooth and Nonsmooth Stochastic Convex Optimization*, **2018 IEEE Conference on Decision and Control (CDC)**, Miami Beach, FL, 2018, pp. 4097–4102. DOI: 10.1109/CDC.2018.8619209

[30] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *A Smoothing Stochastic Quasi-Newton Method for Non-Lipschitzian Stochastic Optimization Problems*, **2017 Winter Simulation Conference (WSC)**, Las Vegas, NV, 2017, pp. 2291–2302. DOI: 10.1109/WSC.2017.8247960

[31] <u>Farzad Yousefian</u>, Angelia Nedić, and Uday V. Shanbhag, *Stochastic Quasi-Newton Methods for*

Non-strongly Convex Problems: Convergence and Rate Analysis, **2016 IEEE Conference on Decision and Control (CDC)**, Las Vegas, NV, 2016, pp. 4496–4503. DOI: 10.1109/CDC.2016.7798953

[32] Farzad Yousefian, Angelia Nedić, and Uday V. Shanbhag, *Optimal Robust Smoothing Extragradient Algorithms for Stochastic Variational Inequality Problems*, **2014 IEEE Conference on Decision and Control (CDC)**, Los Angeles, CA, 2014, pp. 5831–5836. DOI: 10.1109/CDC.2014.7040302

[33] Farzad Yousefian, Angelia Nedić, and Uday V. Shanbhag, *A Regularized Smoothing Stochastic Approximation (RSSA) Algorithm for Stochastic Variational Inequality Problems*, **2013 Winter Simulation Conference (WSC)**, Washington, DC, 2013, pp. 933–944. DOI: 10.1109/WSC.2013.6721484
○ Awarded the Best Theoretical Paper in the 2013 Winter Simulation Conference

[34] Farzad Yousefian, Angelia Nedić, and Uday V. Shanbhag, *A Distributed Adaptive Steplength Stochastic Approximation Method for Monotone Stochastic Nash Games*, **2013 American Control Conference (ACC)**, Washington, DC, 2013, pp. 4765–4770. DOI: 10.1109/ACC.2013.6580575

[35] Farzad Yousefian, Angelia Nedić, and Uday V. Shanbhag, *A Regularized Adaptive Steplength Stochastic Approximation Scheme for Monotone Stochastic Variational Inequalities*, **2011 Winter Simulation Conference (WSC)**, Phoenix, AZ, 2011, pp. 4110–4121. DOI: 10.1109/WSC.2011.6148100

[36] Farzad Yousefian, Angelia Nedić, and Uday V. Shanbhag, *Convex Nondifferentiable Stochastic Optimization: A Local Randomized Smoothing Technique*, **2010 American Control Conference (ACC)**, Baltimore, MD, 2010, pp. 4875-4880. DOI: 10.1109/ACC.2010.5530908
○ Selected as the Best Paper in Session

Research Grants

As Principal Investigator
○ Department of Energy (Advanced Scientific Computing Research Program, #DE-SC0023303): Role: PI, Budget: **$400,000 ($214,250 PI Yousefian, Rutgers** and $185,750 Co-PI Shanbhag, Penn State), *Randomized Federated Learning for Nonsmooth, Nonconvex, and Hierarchical Optimization*, Effective from 9/1/2022 to 8/31/2024.

○ Office of Naval Research (Computational Methods for Decision Making, Resource Optimization Program, #N00014-22-1-2757): Role: PI, Budget: **$300,000 (PI Yousefian, Rutgers)** and $325,000 (PI Shanbhag, Penn State), *Collaborative Proposal: Hierarchical Programs Under Uncertainty: Risk, Discreteness, and Distributed Resolution*, Effective from 10/1/2022 to 9/30/2025.

○ National Science Foundation (Faculty Early Career Development Program, ECCS, #1944500): Role: Single PI, Budget: **$500,000**, *CAREER: Advancing Mathematical Models and Algorithms for Decentralized Optimization in Complex Multi-agent Networks*, Effective from 3/1/2020 to 2/28/2025.

As Co-Principal Investigator
○ Oklahoma Department of Emergency Management (OEM):
PI: Manjunath Kamath, Co-PIs: Farzad Yousefian, Scott Frazier

- Budget: **$132,484**, *Phase VII: Deployment and Enhancement of the ArcGIS Web Application for Flow Analysis and Risk Assessment of HazMat Transportation in Oklahoma*, Effective from 10/1/2021 to 9/30/2022.

- Budget: **$118,010**, *Phase VI: An Integrated GIS Application for HazMat Flow Analysis and Risk Assessment to Support Local Emergency Planning and Preparedness in Oklahoma*, Effective from 10/1/2020 to 9/30/2021.

- Budget: **$131,341**, *Phase V: Using HazMat Flow Analyzer and Risk Assessment Tools to Support Emergency Resource Planning and HazMat Training Activities in Oklahoma*, Effective from 10/1/2019 to 9/30/2020.

- Budget: **$131,620**, *Phase IV: Development of a GIS Application for Analyzing HazMat Flows in Oklahoma*, Effective from 10/1/2018 to 9/30/2019.

- Budget: **$119,985**, *Phase III: Flow Visualization and Risk Assessment of Hazardous Material Movement in Oklahoma*, Effective from 10/1/2017 to 9/30/2018.

- Budget: **$89,961**, *Phase II: Developing a Modeling Framework for Hazardous Material Movement in Oklahoma*, Effective from 10/1/2016 to 9/30/2017.

Ph.D. Advising

Ph.D. Student Advisees

Rutgers University

Mohammadjavad Ebrahimi   *Fall 2022–present*
- Research topic (tentative): *Distributed stochastic hierarchical optimization over networks*

Sepideh Samadi   *Fall 2022–present*
- Research topic (tentative): *Distributed computation of best Nash equilibrium over networks*

Yuyang Qiu   *Fall 2022–present*
- Research topic (tentative): *Randomized federated scientific machine learning methods*

Oklahoma State University

Harshal D. Kaushik   *Spring 2017–Sep. 2021*
- Dissertation: *On Distributed Optimization Problems with Variational Inequality Constraints: Algorithms, Complexity Analysis, and Applications*
- First position after graduation: postdoc under Dr. Ming Jin at Virginia Tech

Nahidsadat Majlesinasab   *Fall 2015–Summer 2020*
- Dissertation: *Self-tuned, Block-coordinate, and Incremental Mirror Descent Methods with Applications in Machine Learning and Wireless Communications*
- Graduated in Summer 2020; First job position after graduation: Data Scientist at MODE Transportation; Co-advised jointly with Dr. Arash Pourhabib from Fall 2015 to Fall 2016

Mostafa Amini   *Spring 2017–Summer 2019*
- Research: *First-order Methods for Stochastic and Nonsmooth Bilevel Optimization*
- Left the Ph.D. program prior to completing the proposal

Ph.D. Committee Membership (excluding advisees)

Rutgers University

Elnaz Asghari Torkamani *Fall 2022–present*
- Proposal title: Study of Reliability and Efficiency for Autonomous Navigation Algorithms
- Advisor: Dr. Zhimin Xi

Vidita Gawade *Fall 2022–Spring 2023*
- Proposal title: Integration of Physics with Data Science Models for Predicting Porosity and Emission in Metal Additive Manufacturing
- Advisor: Dr. Weihong Guo

Luke Marrinan *Summer 2023–present*
- Proposal title: Schemes For Nonsmooth, Nonconvex Optimization and Equilibrium Problems
- Advisor: Dr. Uday Shanbhag (Penn State)

Oklahoma State University

Taha Khan *Fall 2021–Summer 2022*
- Advisor: Dr. Hamid Nazaripouya

Jianxin Xie *Fall 2021–Summer 2022*
- Advisor: Dr. Bing Yao

Zekai Wang *Fall 2021–Summer 2022*
- Advisor: Dr. Bing Yao

Hossain Shah Mohazzem *Spring 2021–Summer 2022*
- Advisor: Dr. Nishantha Ekneligoda

Zhangyue Shi *Fall 2020–Summer 2022*
- Advisor: Dr. Chenang Liu

Ahmadreza Homayouni *Fall 2020–Summer 2022*
- Advisor: Dr. Tieming Liu

Ronny Pacheco Segura *Graduated in Fall 2020*
- Dissertation: *Development of a Parametric-Decomposition Methodology for Solving Queueing Networks with Simultaneous Resource Possession under Capacity Restrictions*
- Advisor: Dr. Manjunath Kamath

Sadra Babaei *Graduated in Summer 2019*
- Dissertation: *Optimization under Uncertainty Models in Power System Operations*
- Advisor: Dr. Chaoyue Zhao

Akash Gupta *Graduated in Summer 2019*
- Dissertation: *Developing Clinical Decision Support Systems using Temporal and Non-temporal Machine Learning Methods*
- Advisor: Dr. Tieming Liu

Ali Bagheri *Graduated in Summer 2018*
- Dissertation: *Data-Driven Optimization in Power Systems Operations*
- Advisor: Dr. Chaoyue Zhao

Babak Farmanesh *Graduated in Summer 2018*

- Dissertation: *Efficient Techniques for Statistical Modeling of Calibration and Spatio-temporal Systems using Gaussian Processes*
- Advisors: Dr. Baski Balasundaram and Dr. Arash Pourhabib

Saeed Piri   *Graduated in Summer 2017*
- Dissertation: *Developing and Deploying Data Mining Techniques in Healthcare*
- Advisor: Dr. Tieming Liu

Michael Brennan   *Graduated in Fall 2017*
- Dissertation: *Economic Impact Failure Mode and Effects Analysis*
- Advisor: Dr. Camille DeYong

Masters Advising

MS Thesis Student Advisees

Oklahoma State University

Jayesh Yevale   *Summer 2020–Fall 2021*
- Thesis: *Distributed Randomized Block Gradient Tracking Methods: Rate Analysis and Numerical Experiments*
- Remarks: joined UIUC to do a PhD in ISE

Vandan Patel   *Fall 2016–Summer 2017*
- Thesis: *An Iterative ℓ_1 Regularized Limited Memory Stochastic BFGS Algorithm and Numerical Experiments for Big Data Applications*
- Remarks: joined The Home Depot as a Sr. Pricing Analyst

Research Assistant MS Advisees

The following MS students were co-advised in research on HazMat transportation as part of a multi-year grant funded by the Oklahoma Department of Emergency Management:
- *Karan Hingmire (Summer 2021–Fall 2021)*
- *Shantanu Kulkarni (Summer 2021–Fall 2021)*
- *Jackson Baker (Summer 2020–Spring 2021)*
- *Ishita Gupta (Fall 2018–Spring 2019)*
- *Kushal Shah (Fall 2019–Spring 2021)*
- *Goutham Takasi (Spring 2017–Spring 2018)*

MS Thesis Committee Membership (excluding advisees)

Oklahoma State University

Pouya Ahadi   *Defended in Spring 2021*
- Thesis: *Optimizing Expected Cross Value for Genetic Introgression*
- Advisor: Dr. Baski Balasundaram

Harshwardhan Rathod   *Graduated in Fall 2017*
- Thesis: *Assignment of Students to Bus Stops and Routing of School Buses*
- Advisor: Dr. Sunderesh Heragu

Sampreet Mangalvedhe   *Graduated in Fall 2016*
- Thesis: *On a Bi-objective Flow Problem in Networks*
- Advisor: Dr. Baski Balasundaram

Undergraduate Advising

Research Experience for Undergraduates

Rutgers University (Aresty Summer Science Program)

Anuraag Sarkar   *Summer 2023*
- This was a two-month research program.
- Research: *Numerical Validation of Randomized Zeroth-Order Methods for Nonsmooth Federated Learning*.
- Remarks: The student presented the following poster at the "2023 Summer Research Symposium on Thursday, August 3rd":
  `https://drive.google.com/file/d/1CX5jonsM-7VR2j9SVDN2bfzxGvOCWGvd/view?usp=drive_link`

Rutgers University (Aresty Research Assistant Program)

Brian Zhang   *Fall 2023 and Spring 2024*
- Remarks: The flyer for this position is available at:
  `https://drive.google.com/file/d/1qWOcWv74KkXmplUCOh2GQjvJOX3hFYt0/view?usp=drive_link`

Edison Wang   *Fall 2023 and Spring 2024*
- Remarks: The flyer for this position is available at:
  `https://drive.google.com/file/d/1qWOcWv74KkXmplUCOh2GQjvJOX3hFYt0/view?usp=drive_link`

Oklahoma State University

Brenden Dominick   *Summer 2020*
- Research: *Using Machine Learning to Create Predictive Models for Storm Damage in the United States*
- Remarks: This was a two-month research internship program in collaboration with the Louis Stokes Alliances for Minority Participation (LSAMP) program at OSU. The advisee presented the poster in the virtual *26th Annual Research Symposium in October 2020* organized by OK-LSAMP. This poster was presented at the *2021 Research Day at the Capitol* and is available at:
  `https://drive.google.com/file/d/15NTvJ4loba3vkLbmSHD-D_OrzGv6yid3/view`.

Emmanuel Akinwale, Courtney Williams   *Spring 2020*
- Research: *A Predictive Model for the Change of Climate in the State of Oklahoma using Python*
- Remarks: Emmanuel presented the poster in the virtual *26th Annual Research Symposium on Oct. 3, 2020* and the Virtual Technical Meeting of the Oklahoma Academy of Science on Nov. 6, 2020. The poster is available at: `https://drive.google.com/file/d/1R7jJCHAqJ6GruIuaAQfsYIurBLoZ2zf8/view`.

Senior Design Projects

Oklahoma State University

Trent Darby, Bailey Hackler, Gloria Flores Morales, Courtney Williams   *Spring 2021*
- Project: *Workload Balanced Surgeon Scheduling, Department of Surgery, Medical University of South Carolina*

Nathaniel Echols, Victoria Stow, Justin Paxson, Ibrahim Abuehmah   *Spring 2020*
- Project: *Weld Head Refurbishment Process Improvement for CRC-Evans*

Brittany Windsor, Kevin Fabian, Justin Chan, Chisom Anunobi   *Spring 2019*
- Project: *Simulation Model of the 172 Product Line, Textron Aviation*

Ashton Upshaw, Joshua Mabin, Austin L. Ludden, Chisom Anunobi   *Spring 2018*
- Project: *Improving Scheduling for Federal Aviation Administration Academy Air Traffic Control Courses*

James Darling, Brandon Lee, Daniel Woods   *Spring 2017*
- Project: *Optimization of the Class Scheduling Process at the Federal Aviation Administration Academy*

Brianna Harris, Caleb Jette, Yudong Liu   *Fall 2015*

○ Project: *An Investigation into Webco's Shipping Department*

University of Illinois at Urbana-Champaign

Derrick Pemberton, Kyle Thayer, Matthew Zettinger, Jialing Zuo   *Spring 2014*

○ Project: *Beverage Filling/Packaging Changeover Reduction at Anheuser-Busch Inbev*
○ Remarks: [Awarded the Silver Medal in the 2014 James F. Lincoln Engineering Competition]

Siddhant Anand, Angelo Gargano, Sarah Shimizu, Sarah Vo   *Spring 2014*

○ Project: *Precision Machining Cell Setup Time Reduction at Qualiseal Technology*

Teaching

Ph.D. Courses Developed

Rutgers University

16:540:696 - Advanced Topics in Optimization (Stochastic Optimization)   *Spring 2023*

○ Description: Theoretical foundations and recent advances on mathematical models, tools, and algorithms for addressing stochastic and large-scale optimization problems. Topics include the following: Stochastic gradient methods for convex and nonconvex optimization; Stochastic quasi-Newton methods and their limited memory variants; Stochastic zeroth-order methods; Randomized block-coordinate methods; Two-stage stochastic programming; Chance-constrained formulations; Stochastic methods for bilevel optimization; Federated learning methods; Methods for minimax problems; Variance-reduced stochastic gradient methods; Randomized primal-dual methods for large-scale constrained optimization; Distributed and parallel stochastic gradient-tracking methods; Implementations of the methods in Python on synthetic datasets and the MNIST dataset.
○ Remarks: This was a new course that I developed and offered at Rutgers. The flyer is available at: `https://sites.rutgers.edu/farzad-yousefian/courses/`.

Oklahoma State University

IEM 6990: Distributed and Parallel Optimization   *Spring 2021*

○ Description: This course covers the mathematical models and algorithms of distributed optimization in multi-agent networks. The topics include gradient-like methods and their distributed variants, synchronous and asynchronous schemes, gradient tracking methods such as Push-DIGing and Push-Pull, asymptotic and non-asymptotic convergence analysis of distributed optimization methods, ADMM methods, variational inequality problems, Nash equilibrium models in power markets and traffic equilibrium models, and computational methods for Nash games.

IEM 6990: Convex Optimization   *Spring 2018*

○ Description: This was a new course in the curriculum. It covers the fundamental theory and algorithms of convex optimization. The topics include convex sets and functions, existence and uniqueness of optimal solution, optimality conditions, supporting and separating hyperplane theorems, Lagrange duality theory, KKT conditions, sensitivity analysis, subgrdients, projected subgradient method, stochastic (sub)gradient method, dual projected subgradient method, and proximal gradient method.

Graduate Level Courses

Oklahoma State University

IEM 6043: Nonlinear Optimization   *Spring 2020*

o Description: I developed new material for this course with an emphasis on applications in machine learning. The lectures included Python implementations. The topics include first and second derivative characterizations, gradient and Newton methods, Gauss-Newton method, step-size rules, superlinear convergence of Newton-like methods, applications on Newton method in neural networks, conjugate direction methods, standard and limited-memory BFGS methods, randomized block coordinate schemes, Lagrange multiplier theorem, KKT conditions and Fritz John generalizations, constraint qualifications, barrier methods, augmented Lagrangian methods and their inexact implementations.

IEM 5013: Introduction to Optimization   *Fall 2015, 2019, 2020*

o Description: This is a required course for graduate students in Industrial Engineering. It covers basic theory and applications of linear optimization, network optimization, integer programming, and duality.
o Remarks: To help students with implementations of the optimization methods, I developed a tutorial on mathematical modeling in Gurobi-Python. I also provide an additional tutorial on basics of programming for those students who don't have prior background in Python.

IEM 5003: Probability and Statistics for Engineers   *Fall 2018*

o Description: This is a required course for graduate students in Industrial Engineering. It covers topics including probability theory, conditional probabilities, parameter estimation, confidence intervals, hypothesis testing, and regression models.

Undergraduate Level Courses ....

Rutgers University

14:540:453 - Production Control   *Fall 2023*

o Description: Coordination of activities of both manufacturing and service systems. Systems design; input and output; planning and scheduling. Decision-making problems employing mathematical techniques of linear programming. Sequencing jobs on machines and line balancing techniques.
o Remarks: The mathematical modeling for production planning and the demand forecasting will be taught in Python using Gurobi, SciPy, and Statsmodels libraries. The syllabus is available at:
`https://drive.google.com/file/d/1EDTztX_ZgT9_oR9wSVt-LLQdV7POsZYP/view?usp=drive_link`.

01:090:101 - The Byrne Seminars (Intro. to Mathematical Modeling)   *Fall 2023*

o Description: This seminar will provide undergraduate freshman students with an introduction to the use of mathematical modeling in daily life and business decisions. There will be a series of examples where optimization models are employed for problem solving. We will also show how these models can be solved using programming languages such as Python and Microsoft Excel. The lectures will include hands-on in-class experiments where the students will be engaged through small assignments.
o Remarks: This course includes 10 seminars to undergraduate freshman students at Rutgers. The syllabus is available at:
`https://drive.google.com/file/d/1qHkdQIvLtcHATPOYnvmdedlfe9jCRM-k/view?usp=sharing`

Oklahoma State University

IEM 4913: Senior Design Projects   *Fall 2021*

o Description: Student teams work on professional-level engineering projects selected from a wide range of participating organizations. Projects are equivalent to those normally experienced by beginning professionals and require both oral and written reports. Normally taken during student's last semester of undergraduate work.

IEM 4713: Systems Simulation Modeling   *Spring 2016, 2017, 2019*

- Description: This is a required course for junior students in Industrial Engineering. In addition to the lectures where the simulation modeling of discrete-event systems is discussed, the course includes weekly lab sessions where students learn Simio through hands-on assignments and a project.
- Remarks: I redesigned this course by developing a series of handouts and assignments which help students with relating the theory covered in the lectures with the implementations in Simio.

IEM 4613: Production Planning and Control Systems   *Fall 2017, 2018, 2019, 2020, 2021*
- Description: This is a required course for senior students in Industrial Engineering. The topics include hierarchical planning levels of production systems, demand forecasting, and inventory control.
- Remarks: In the past few years, I have redesigned this course by developing a series of interactive handouts which include in-class assignments on the lecture material. To incorporate data science in the course, the lectures on demand forecasting include lessons on time series analysis in Python.

IEM 4013: Operations Research   *Fall 2016, 2017*
- Description: This is a required course for junior students in Industrial Engineering. It is an introductory course in operations research and mathematical optimization with an emphasis on topics in linear, integer, and network optimization.

University of Illinois at Urbana-Champaign

IE 300: Analysis of Data   *Fall 2013, Spring 2014*
- Description: This is the first course in applied statistics and probability for undergraduate students in engineering and the physical or chemical sciences. The main topics include descriptive and analytical methods for dealing with the variability in observed data.

Service

College Service

- Served as the ISE Marshal, School of Engineering Convocation, May 2023, Rutgers
- Served as a judge for 8 ECE Capstone final presentations, Spring 2023, Rutgers
- Academic Council member from Fall 2020 to Summer 2022, OSU
- Oversight Committee member for Engineering Science 2113 (Static) from 2017 to 2019, OSU
- Research Council member in 2019, OSU
- CEAT Scholars interviewer in Fall 2017, OSU

Department Service

- Organizing the ISE UG and MS Research Day, Fall 2023, Rutgers
- Represented ISE at the Admitted Student Open House event, Spring 2023, Rutgers
- Member of Undergraduate Study Committee, Fall 2022 to present, Rutgers
- Member of PhD Qualification Exam Review Committee, Fall 2022 and Spring 2023, Rutgers
- Undergraduate Program Director from Spring 2021 to Spring 2022, OSU
- Assisted IEM Department Head in ABET Preparation from Spring 2021 to Fall 2021, OSU
- Graduate Advisory Committee member from Fall 2016 to summer 2021, OSU
- Senior Design Project mentor from 2015 to 2022, OSU
- Undergraduate Advisory Committee member from Fall 2020 to Spring 2022, OSU
- Faculty Search Committee member in 2015/2016 and 2019/2020, OSU

○ IEM representative on Scholars Day in 2019/2020, OSU

○ IEM Seminar Coordinator in Fall 2017 and Spring 2018, OSU

○ IEM representative on Junior Day in 2016/2017, OSU

○ Graduate Commencement in Fall and Spring 2019, OSU

Workshop/Conference Sessions Organized

○ On Hierarchical and Federated Optimization, 2023 INFORMS Annual Meeting

○ Minisymposium entitled "On Addressing Nonsmoothness, Hierarchy, and Uncertainty in Optimization and Games," 2023 SIAM Conference on Optimization (OP23)

○ Hierarchical problems and variational inequalities, ICCOPT 2022

○ Algorithms for Hierarchical and Distributed Optimization, 2021 INFORMS Annual Meeting

○ Minisymposium entitled "Advances in Constrained and Large-Scale Distributed Optimization over Networks," 2021 SIAM Conference on Optimization (OP21)

○ Organizing Committee member, 2021 INFORMS Simulation Society Workshop (I-SIM)

○ Nonlinear Optimization session, 2018 INFORMS Optimization Society Meeting

○ Stochastic Optimization Methods session, 2016 Conference on Decision and Control (CDC)

○ Computational Methods for Stochastic Optimization session, 2014 INFORMS Annual Meeting

Conference Sessions Chaired/Co-Chaired

○ On Hierarchical and Federated Optimization, 2023 INFORMS Annual Meeting

○ Minisymposium entitled "On Addressing Nonsmoothness, Hierarchy, and Uncertainty in Optimization and Games," 2023 SIAM Conference on Optimization (OP23)

○ Hierarchical problems and variational inequalities, ICCOPT 2022

○ Algorithms for Hierarchical and Distributed Optimization, 2021 INFORMS Annual Meeting

○ Minisymposium entitled "Advances in Constrained and Large-Scale Distributed Optimization over Networks", 2021 SIAM Conference on Optimization (OP21)

○ Optimization Algorithms II session, 2019 American Control Conference (ACC)

○ Algorithms for Large-scale Problems session, 2018 INFORMS Optimization Society Meeting

○ Nonlinear Optimization session, 2018 INFORMS Optimization Society Meeting

○ Gradient-based Simulation Optimization session, 2017 Winter Simulation Conference (WSC)

○ Stochastic Optimization Methods session, 2016 Conference on Decision and Control (CDC)

○ Optimization Algorithms III session, 2014 Conference on Decision and Control (CDC)

○ Computational Methods for Stochastic Optimization session, 2014 INFORMS Annual Meeting

Professional Affiliations

○ Society for Industrial and Applied Mathematics (SIAM)

○ Mathematical Optimization Society (MOS)

○ Institute of Electrical and Electronics Engineers (IEEE)

○ Institute for Operations Research and the Management Sciences (INFORMS)

Invited Proposal Reviewer
○ Panel Reviewer, ONR, 2023
○ Proposal Reviewer, DOE, 2023
○ Proposal Reviewer, DOE, 2022
○ Proposal Review Panelist, NSF, 2021

Journals Reviewed for
○ SIAM Journal on Optimization
○ Operations Research
○ INFORMS Journal on Optimization
○ Optimization Methods and Software
○ J. of Optimization Theory and Applications
○ IEEE Trans. on Signal Processing
○ Math. Comput. Appl.
○ Automatica
○ IEEE Trans. on Control of Network Systems
○ Mathematical Programming
○ IEEE Trans. on Automatic Control
○ IISE Transactions
○ Computational Optimization & Applications
○ Operations Research Letters
○ IEEE Trans. on Control of Network Systems
○ Journal of Global Optimization
○ Networks
○ SIAM Journal on Scientific Computing

Conferences Reviewed for
○ Conference on Decision and Control (CDC)
○ Winter Simulation Conference (WSC)
○ American Control Conference (ACC)
○ European Control Conference

Editorial Service
○ Associate Editor, IISE Transactions, Distributed Learning and Analytics (FDLA), Operations Engineering and Analytics Focused Issue, 2023

Selected Presentations

Tutorial Presentations
Stochastic Gradient Descent: Recent Trends (Co-presented by Raghu Pasupathy)
○ INFORMS Tutorials in Operations Research, November 2018 (Phoenix, AZ)

Invited Presentations
Zeroth-Order Methods for Nondifferentiable, Nonconvex, and Hierarchical Federated Optimization
○ European Conference on Computational Optimization (EUCCO), Heidelberg, Germany, Sep. 2023

On Addressing Hierarchical Optimization in Federated Learning and Nash Games
○ Rutgers Business School, MSIS Seminar Series, Sep. 2023

On Distributed Multi-Agent Optimization for Large-Scale Hierarchical Problems
○ Ohio State University, ISE Seminars, February 2023
○ Rutgers University, ISE Seminars, February 2023
○ INFORMS Annual Meeting, October 2022
○ The SIP Seminar Series at Rutgers, November 2022

- Texas A&M University, ISE Seminars, February 2022 (virtual)
- Naval Postgraduate School, OR Seminars, February 2022 (virtual)
- Rutgers University, ISE Seminars, January 2022 (virtual)

Complexity Guarantees for An implicit Smoothing-Enabled Method for Stochastic MPECs
- The seventh International Conference on Continuous Optimization (ICCOPT), July 2022

Distributed Gradient Tracking Methods for Bilevel Optimization over Networks
- 2021 INFORMS Annual Meeting, October 2021 (virtual)

Distributed and Stochastic Optimization for Hierarchical Problems
- 2021 INFORMS Simulation Society Workshop, June 2021 (virtual)

Bilevel Distributed Optimization in Directed Networks
- Virtual 2020 INFORMS Annual Meeting, November 2020
- CEAT Virtual Seminar Series, Oklahoma State University, October 2020 (Stillwater, OK)

HazMat Transportation Incident Risk Assessment in the State of Oklahoma
- National Association of SARA Title III Webinar, October 2020

Addressing a Class of Bilevel Optimization Problems
- INFORMS Annual Meeting, October 2019 (Seattle, WA)

Optimization over Solutions of Variational Inequality Problems
- Int. Conference on Stochastic Programming (ICSP) XV, August 2019 (Trondheim, Norway)

On Addressing Uncertainty, Ill-posedness, and High-dimensionality in Optimization and Variational Inequality Problems
- Dept. of Statistics, Seminar Series, Oklahoma State University, February 2019 (Stillwater, OK)

Stochastic Quasi-Newton Methods for Ill-posed Stochastic Optimization Problems
- INFORMS Annual Meeting, November 2018 (Phoenix, AZ)

On Addressing Uncertainty and High-dimensionality in Optimization and Variational Inequality Problems: Self-tuned Stepsizes, and Randomized Block Coordinate Schemes
- School of ECEE, Seminar Series, Arizona State University, March 2017 (Tempe, AZ)

A Scalable Decomposition Method for the Two-Stage Stochastic Unit Commitment Problem
- The 22$^{\text{nd}}$ Int. Symposium on Mathematical Programming (ISMP), July 2015 (Pittsburgh, PA)

Other Conference and Workshop Presentations

Guarantees for Optimal Nash Equilibrium Seeking and Optimal Solution Selection Problem
- INFORMS Annual Meeting, October 2023 (Phoenix, AZ)

Distributed Gradient Tracking Methods for Computing the Best Nash Equilibrium
- SIAM Conference on Optimization (OP23), June 2023 (Seattle, WA)

Distributed Optimization for Problems with Variational Inequality Constraints
- SIAM Conference on Optimization (OP21), July 2021 (virtual)

Bilevel Distributed Optimization in Directed Networks

o American Control Conference, May 2021 (virtual)

Stochastic Quasi-Newton Methods for Nonstrongly Convex Optimization
o INFORMS Optimization Society Conference, March 2018 (Denver, CO)

Randomized Block Coordinate Stochastic Mirror Prox Methods for Stochastic Cartesian VIs
o INFORMS Optimization Society Conference, March 2018 (Denver, CO)

A Smoothing Stochastic Quasi-Newton Method for Non-Lipschitzian Stochastic Optimization Problems
o Winter Simulation Conference, December 2017 (Las Vegas, NV)

On Stochastic Mirror Descent Algorithms: Self-tuned Stepsizes, and Optimal Averaging Schemes for L1 Regularized Loss Minimization
o INFORMS Optimization Society Conference, March 2016 (Princeton, NJ)

A Scalable Decomposition Method for the Two-Stage Stochastic Unit Commitment Problem
o INFORMS Annual Meeting, November 2015 (Philadelphia, PA)

Optimal Averaging Schemes for Stochastic Approximation Methods
o INFORMS Annual Meeting, November 2015 (Philadelphia, PA)

Optimal Robust Smoothing Extragradient Algorithms for Stochastic Variational Inequality Problems
o INFORMS Annual Meeting, November 2014 (San Francisco, CA)

A Regularized Smoothing Stochastic Approximation Algorithm for Stochastic Variational Inequalities
o Winter Simulation Conference, December 2013 (Washington, D.C.)
o INFORMS Annual Meeting, October 2013 (Minneapolis, MN)

A Distributed Adaptive Steplength Stochastic Approximation Method for Stochastic Nash Games
o American Control Conference, June 2013 (Washington, D.C.)
o INFORMS Annual Meeting, October 2012 (Phoenix, AZ)
o The 1st Midwest Workshop on Control and Game Theory, Coordinated Science Laboratory, University of Illinois, April 2012 (Urbana, IL)

A Regularized Adaptive Steplength Stochastic Approximation Scheme for Monotone Stochastic Variational Inequalities
o Winter Simulation Conference, December 2011 (Phoenix, AZ)
o INFORMS Annual Meeting, November 2011 (Charlotte, NC)

Convex Nondifferentiable Stochastic Optimization: A Local Randomized Smoothing Technique
o American Control Conference, July 2010 (Baltimore, MD)

K-12 Outreach Activities

As part of the NSF CAREER project, I held two four-week summer workshops for high school math teachers in Stillwater. These are as follows:
o **Summer 2020 Data Science Workshop:** The workshop met three times a week and the teacher developed seven mini-lessons on optimization and forecasting using Python. The mini-lessons were taught by the teacher to junior and senior high school students at the Meridian Technology

Center during the 2020/2021 school year. The electronic copies of lessons are available at:
`https://drive.google.com/file/d/16FCxi3zdR9F19A73uYXbFmjPb_NbQCmr`
- **Summer 2021 RET Workshop:** The workshop met three times a week and the teacher developed six mini-lessons about a research project on forecasting methods using Python. The mini-lessons are currently being taught by the teacher to junior high school students at the Meridian Technology Center. The electronic copies of lessons are available at:
`https://drive.google.com/file/d/1aP63enEGn7HtRmjARcnFCb8IVi4kdKJJ`