Samuel Burer

Tippie Rollins Professor
Department of Business Analytics
Henry B. Tippie College of Business
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EXPERIENCE

2012-07 – present **Professor**, Department of Business Analytics, University of Iowa[1]
Tippie Rollins Professor (2021–present)
George Daly Professor (2016–2021)
Henry B. Tippie Research Fellow (2012–2016)
Faculty Director, Full-Time Business Analytics Graduate Program (2018–2020)
Faculty Director, Part-Time Business Analytics Graduate Program (2014–2019)
Faculty, Applied Mathematical and Computational Sciences (2004–present)

2007-07 – 2012-06 **Associate Professor**, Department of Management Sciences, University of Iowa
Martha and Dennis Hesse Faculty Fellow (2004–12)

2009-04 – 2009-05 **Visiting Associate Professor**, Department of CS and Systems, Sapienza Università di Roma

2007-01 – 2007-05 **Visiting Assistant Professor**, Tepper School of Business, Carnegie Mellon University

2001-08 – 2007-06 **Assistant Professor**, Department of Management Sciences, University of Iowa

EDUCATION

Georgia Institute of Technology

- Ph.D., Algorithms, Combinatorics, and Optimization, August 2001
- *New Algorithmic Approaches for Semidefinite Programming with Applications to Combinatorial Optimization*, advised by R.D.C. Monteiro

University of Georgia

- B.S., Mathematics, June 1997
- First Honor Graduate, *Summa Cum Laude*, With Highest Honors

RESEARCH AND TEACHING INTERESTS

- Analytics, operations research, management sciences
- Discrete and continuous optimization
- Convex, copositive, semidefinite, and nonlinear optimization
- Decision making and optimization under uncertainty
- Teaching at all levels (undergraduate, Master's, doctoral, evening, online, executive)

GRANTS

- National Science Foundation Grant for *CAREER: Computation, Theory, and Applications for Nonconvex*

[1] Department name was changed from *Management Sciences* to *Business Analytics* in April 2019.

Quadratic and Conic Optimization, $400,000, 2006–12

- National Science Foundation Grant for *Collaborative Research: Theory and Implementation of Semidefinite Programming and Its Application to Combinatorial Optimization*, $255,818, 2000–05
- New Technology in the Learning Environment Grant, University of Iowa, $1,500, 2004
- Old Gold Fellowships, University of Iowa, $12,000, 2002–03

JOURNAL PUBLICATIONS (listed in reverse chronological order by appearance of manuscript)

[J01] Strengthened SDP Relaxation for an Extended Trust Region Subproblem with an Application to Optimal Power Flow, with A. Eltved, September 2020, revised July 2021, published online in *Mathematical Programming (Series A)*. DOI link.

[J02] Convex Hull Representations for Bounded Products of Variables, with K. Anstreicher and K. Park, *Journal of Global Optimization*, 80(4), 757–778, 2021.

[J03] Quadratic Optimization with Switching Variables: The Convex Hull for $n = 2$, with K. Anstreicher, *Mathematical Programming (Series B)*, 188(2), 421–441, 2021.

[J04] Exact Semidefinite Formulations for a Class of (Random and Non-Random) Nonconvex Quadratic Programs, with Y. Ye, *Mathematical Programming Series A*, 181(1), 1–17, 2020. Erratum published as *Mathematical Programming Series A*, 190(1), 845-848, 2021.

[J05] Three Methods for Robust Grading, with V. Piccialli, *European Journal on Operational Research*, 272, 364–371, 2019.

[J06] A Data-Driven Distributionally Robust Bound on the Expected Optimal Value of Uncertain Mixed 0-1 Linear Programming, with G. Xu, *Computational Management Science*, 15, 111–134, 2018.

[J07] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, with G. Xu, *Computational Optimization and Applications*, 70, 33–59, 2018.

[J08] Quadratic Programs with Hollows, with B. Yang and K. Anstreicher, *Mathematical Programming Series A*, 170, 541–553, 2018.

[J09] Robust Sensitivity Analysis of the Optimal Value of Linear Programming, with G. Xu, *Optimization Methods and Software*, 32(6):1187-1205, 2017.

[J10] Nearly Efficient Tuitions and Subsidies in American Public Higher Education, with G. Fethke, *Economics of Education Review*, 55, 182—197, 2016.

[J11] A Gentle, Geometric Introduction to Copositive Optimization, *Mathematical Programming Series B*, 151(1), 89–116, 2015.

[J12] A Branch-and-Bound Algorithm for Instrumental Variable Quantile Regression, with G. Xu, *Mathematical Programming Computation*, 9, 471–497, 2017.

[J13] How to Convexify the Intersection of a Second Order Cone and a Nonconvex Quadratic, with F. Kılınç-Karzan, *Mathematical Programming Series A*, 162, 393–429, 2017.

[J14] A Two-Variable Analysis of the Two-Trust-Region Subproblem, with B. Yang, *SIAM Journal on Optimization*, 26(1), 661–680, 2016.

[J15] Faster, but Weaker, Relaxations for Quadratically Constrained Quadratic Programs, with S. Kim and M. Kojima, *Computational Optimization and Applications*, 59(1), 27–45, 2014.

[J16] The Trust Region Subproblem with Non-Intersecting Linear Constraints, with B. Yang, *Mathematical Programming Series A*, 149(1–2), 253–264, 2015.

[J17] Non-Convex Mixed-Integer Nonlinear Programming: A Survey, with A. Letchford, *Surveys in Operations Research and Management Science*, 17, 97–106, 2012.

[J18] A First-Order Smoothing Technique for a Class of Large-Scale Linear Programs, with J. Chen, *SIAM Journal on Optimization*, 24(2), 598–620, 2014.

[J19] Robust Rankings for College Football, *Journal of Quantitative Analysis in Sports*, 8(2), 2012.

[J20] Unbounded Convex Sets for Non-Convex Mixed-Integer Quadratic Programming, with A. Letchford, *Mathematical Programming Series A*, 143(1-2), 231-256, 2014.

[J21] Representing Quadratically Constrained Quadratic Programs As Generalized Copositive Programs, with H. Dong, *Operations Research Letters*, 40(3), 203-206, 2012.

[J22] Second-Order Cone Constraints for Extended Trust-Region Subproblems, with K. Anstreicher, *SIAM Journal on Optimization*, 23(1), 432-451, 2013.

[J23] Globally Solving Nonconvex Quadratic Programming Problems via Completely Positive Programming, with J. Chen, *Mathematical Programming Computation*, 4(1), 33-52, 2012.

[J24] Separation and Relaxation for Cones of Quadratic Forms, with H. Dong, *Mathematical Programming Series A*, 137(1), 343-370, 2013.

[J25] Modifying Soyster's Model for the Traveling Salesman Problem with Interval Travel Times, with N. Cho and A.M. Campbell, *Far East Journal of Applied Mathematics*, 86(2), 117–144, 2014.

[J26] Optimizing a Polyhedral-Semidefinite Relaxation of Completely Positive Programs, *Mathematical Programming Computation*, 2(1), 1-19, 2010.

[J27] A Semidefinite Approach to the Hypergraph Minimum Bisection Problem, with C. Choi, *Optimization*, 60(3):413-427, 2011.

[J28] On Non-Convex Quadratic Programming with Box Constraints, with A.N. Letchford, *SIAM Journal on Optimization*, 20(2):1073-1089, 2009.

[J29] The Difference Between 5x5 Doubly Nonnegative and Completely Positive Matrices, with K. Anstreicher and M. Dür, *Linear Algebra and Its Applications*, 431:1539-1552, 2009.

[J30] A p-Cone Sequential Relaxation Procedure for 0-1 Integer Programs, with J. Chen, *Optimization Methods and Software*, 24(4):523-548, 2009.

[J31] Relaxing the Optimality Conditions of Box QP, with J. Chen, *Computational Optimization and Applications*, 48:653-673, 2011.

[J32] Computable Representations for Convex Hulls of Low-Dimensional Quadratic Forms, with K. Anstreicher, *Mathematical Programming Series B*, 124(1-2):33-43, 2010.

[J33] Globally Solving Box-Constrained Nonconvex Quadratic Programs with Semidefinite-Based Finite Branch-and-Bound, with D. Vandenbussche, *Computational Optimization and Applications*, 43(2):181-195, 2009.

[J34] On the Copositive Representation of Binary and Continuous Nonconvex Quadratic Programs, *Mathematical Programming Series A*, 120(2):479-495, 2009.

[J35] On Handling Free Variables in Interior-Point Methods for Conic Linear Optimization, with M.F. Anjos, *SIAM Journal on Optimization*, 18(4):1310-1325, 2007.

[J36] Ensemble Pruning via Semi-definite Programming, with Y. Zhang and W.N. Street, *Journal of Machine Learning Research*, 7:1315-1338, 2006.

[J37] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Relaxations,

with D. Vandenbussche, *Mathematical Programming Series A*, 113(2):259-282, 2008.

[J38] Coordinating the Supply Chain in the Agricultural Seed Industry, with P.C. Jones and T. Lowe, *European Journal of Operational Research*, 185:354-377, 2008.

[J39] Solving Maximum-Entropy Sampling Problems Using Factored Masks, with J. Lee, *Mathematical Programming Series B*, 109:263-281, 2007.

[J40] Newsvendor Games: Convex Optimization of Centralized Inventory Operations, with M. Dror, *TOP*, 20(3):707-728, 2012.

[J41] Computational Enhancements in Low-Rank Semidefinite Programming, with C. Choi, *Optimization Methods and Software*, 21(3):493-512, 2006.

[J42] Solving Lift-and-Project Relaxations of Binary Integer Programs, with D. Vandenbussche, *SIAM Journal on Optimization*, 16(3):726-750, 2006.

[J43] Local Minima and Convergence in Low-Rank Semidefinite Programming, with R.D.C. Monteiro, *Mathematical Programming Series A*, 103:427-444, 2005.

[J44] D.C. Versus Copositive Bounds for Standard QP, with K. Anstreicher, *Journal of Global Optimization*, 33:299-312, 2005.

[J45] Semidefinite Programming in the Space of Partial Positive Semidefinite Matrices, *SIAM Journal on Optimization*, 14:139-172, 2003.

[J46] A Computational Study of a Gradient-Based Log-Barrier Algorithm for a Class of Large-Scale SDPs, with R.D.C. Monteiro and Y. Zhang, *Mathematical Programming Series B*, 95:359-379, 2003.

[J47] A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, with R.D.C. Monteiro, *Mathematical Programming Series B*, 95:329-357, 2003.

[J48] Maximum Stable Set Formulations and Heuristics Based on Continuous Optimization, with R.D.C. Monteiro and Y. Zhang, *Mathematical Programming Series A*, 94:137-166, 2002.

[J49] Rank-Two Relaxation Heuristics for Max-Cut and Other Binary Quadratic Programs, with R.D.C. Monteiro and Y. Zhang, *SIAM Journal on Optimization*, 12:503-521, 2001.

[J50] Interior Point Algorithms for Semidefinite Programming Based on a Nonlinear Formulation, with R.D.C. Monteiro and Y. Zhang, *Computational Optimization and Applications*, 22:49-79, 2002.

[J51] Solving a Class of Semidefinite Programs via Nonlinear Programming, with R.D.C. Monteiro and Y. Zhang, *Mathematical Programming Series A*, 93:97-122, 2002.

[J52] A General Framework for Establishing Polynomial Convergence of Long-Step Methods for Semidefinite Programming, with R.D.C. Monteiro, *Optimization Methods and Software*, 18:1-38, 2003.

[J53] A Projected Gradient Algorithm for Solving the Maxcut SDP Relaxation, with R.D.C. Monteiro, *Optimization Methods and Software*, 15:175-200, 2001.

REFEREED BOOK CHAPTERS (listed in reverse chronological order)

[B01] Copositive Programming, *Handbook of Semidefinite, Cone and Polynomial Optimization: Theory, Algorithms, Software and Applications*, edited by M.F. Anjos and J.B. Lasserre, 201-218, 2011.

[B02] The MILP Road to MIQCP, with A. Saxena, *IMA Volumes in Mathematics and Its Applications*, edited by J. Lee and S. Leyffer, 154:373-406, 2011.

REFEREED CONFERENCE PUBLICATIONS

[C01] Sharing Classifiers Among Ensembles from Related Problem Domains, with Y. Zhang and W.N. Street, *Proceedings of the Fifth IEEE International Conference on Data Mining (ICDM'05)*, 522-529, 2005.

MANUSCRIPTS UNDER REVIEW (listed in reverse chronological order by appearance of manuscript)

[M01] A Strengthened SDP Relaxation for Quadratic Optimization Over the Stiefel Manifold, with K. Park, submitted to *Journal of Optimization Theory and Applications*, August 2022.

[M02] A Semidefinite Relaxation for Sums of Heterogeneous Quadratics on the Stiefel Manifold, with K. Gilman and L. Balzano, submitted to *NeurIPS 2022*, May 2022.

PRESENTATIONS (listed in reverse chronological order)

[P01] TBD, Massachusetts Institute of Technology, Cambridge, MA, November 2022 (invited).

[P02] New Results on the Trust Region Subproblem with Extra Second-Order-Cone Constraints, INFORMS, Indianapolis, IN, October 2022 (invited).

[P03] A Strengthened SDP Relaxation for an Extended Trust Region Subproblem, Mixed Integer Programming Workshop (MIP), New Brunswick, NJ, May 2022 (invited).

[P04] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, New York University, New York, NY, April 2022 (invited).

[P05] Convexification for Non-Convex Mixed-Integer Quadratic Programming, Lehigh University, April 2022 (invited, online).

[P06] Convexification for Non-Convex Mixed-Integer Quadratic Programming, University of Florida, Gainesville, FL, March 2022 (invited).

[P07] Convexification for Non-Convex Mixed-Integer Quadratic Programming, Singapore University of Technology and Design, March 2022 (invited, online).

[P08] Convexification for Non-Convex Mixed-Integer Quadratic Programming, Indian Institute of Management Bangalore, March 2022 (invited, online).

[P09] Convexification for Non-Convex Mixed-Integer Quadratic Programming, Southern Methodist University, February 2022 (invited, online).

[P10] Convexification for Non-Convex Mixed-Integer Quadratic Programming, INFORMS Optimization Society Conference, March 2021 (invited plenary, online).

[P11] Exact SDPs for a Class of (Random and Non-Random) Nonconvex Diagonal QCQPs, Workshop on Optimization Theory and Methods, Peking University, January 2021 (invited, online).

[P12] Quadratic Optimization with Switching Variables: The Convex Hull for $n = 2$, INFORMS, National Harbor, MD, November 2020 (invited).

[P13] Robust Rankings for College Football, George Washington University, Washington D.C., October 2019 (invited).

[P14] Python or R or Both: Tools for Your Data Analytics Workflow, Practice and Experience in Advanced Research Computing, Chicago, IL, July 2019 (refereed tutorial).

[P15] An Introduction to Semidefinite Programming for Combinatorial Optimization, Conference on Integer Pro-

gramming and Combinatorial Optimization (IPCO), University of Michigan, Ann Arbor, MI, May 2019 (invited tutorial).

[P16] Exact Semidefinite Formulations for a Class of (Random and Non-Random) Nonconvex Quadratic Programs, INFORMS, Phoenix, AZ, November 2018 (invited).

[P17] Exact Semidefinite Formulations for a Class of (Random and Non-Random) Nonconvex Quadratic Programs, Università degli Studi di Roma "Tor Vergata," Rome, July 2018 (invited).

[P18] Exact Semidefinite Formulations for a Class of (Random and Non-Random) Nonconvex Quadratic Programs, Twenty-Third International Symposium on Mathematical Programming, Bordeaux, France, July 2018 (invited).

[P19] A Gentle, Geometric Introduction to Copositive Optimization, "Beyond Convexity: Emerging Challenges in Data Science" CMO-BIRS Workshop, Oaxaca, Mexico, October 2017 (invited).

[P20] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, SIAM Conference on Optimization, Vancouver, May 2017 (invited).

[P21] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, University of Texas at Austin, Austin, TX, May 2017 (invited).

[P22] My Experience in the 2016 INFORMS Syngenta Crop Challenge, Workshop on Designing Optimal Genetic Improvement and Agronomic Systems, Iowa State University, Ames, Iowa, November 2016 (invited).

[P23] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, Universität Klagenfurt, Klagenfurt, Austria, November 2016 (invited).

[P24] A Copositive Approach for Two-Stage Adjustable Robust Optimization with Uncertain Right-Hand Sides, Georgia Tech, Atlanta, GA, October 2016 (invited).

[P25] Robust Sensitivity Analysis, University of Minnesota, Minnesota, MN, May 2016 (invited).

[P26] Balancing Weather Risk and Crop Yield for Soybean Variety Selection, INFORMS Conference on Business Analytics and Operations Research, Orlando, FL, April 2016 (invited).

[P27] How to Convexify the Intersection of a Second Order Cone and a Nonconvex Quadratic, INFORMS, Philadelphia, PA, October 2015 (invited).

[P28] A Gentle, Geometric Introduction to Copositive Optimization, Twenty-Second International Symposium on Mathematical Programming, Pittsburgh, July 2015 (invited semi-plenary).

[P29] Robust Sensitivity Analysis for Linear Programming, First Pacific Optimization Conference, Wuxi, China, November 2014 (invited).

[P30] A Gentle, Geometric Introduction to Copositive Optimization, Workshop on Emerging Topics in Conic and Discrete Optimization, Engineering Systems and Design, Singapore University of Technology and Design, Singapore, October 2014 (invited tutorial).

[P31] Robust Rankings for American College Football, Università degli Studi di Roma "Tor Vergata," Rome, May 2014 (invited).

[P32] Interior-Point Methods for Linear Programming, Università degli Studi di Roma "Tor Vergata," Rome, May 2014 (invited).

[P33] Copositive Optimization, Third University of Florida SIAM Gators Conference, Gainesville, FL, March 2014 (invited faculty speaker).

[P34] A Two-Variable Analysis of the Two-Trust-Region Subproblem, Eighteenth Combinatorial Optimization Worksthop, CNRS Centre Paul Langevin, Aussois, France, January 2014 (invited).

[P35] The Trust Region Subproblem with Non-Intersecting Linear Constraints, INFORMS, Minneapolis, MN,

October 2013 (invited).

[P36] Robust Rankings for College Football, INFORMS, Minneapolis, MN, October 2013 (invited).

[P37] Robust Rankings for American College Football, Tilburg University, Tilburg, Netherlands, July 2013 (invited).

[P38] Copositive Optimization, Fourth International Conference on Continuous Optimization (ICCOPT-IV), Lisbon, Portugal, July 2013 (invited semi-plenary).

[P39] Unbounded Convex Sets for Non-Convex Mixed-Integer Quadratic Programming, INFORMS Computing Society Conference, Santa Fe, NM, January 2013 (invited).

[P40] Robust Rankings for College Football, Department of Mathematics, Grinnell College, December 2012 (invited).

[P41] Robust Rankings for American College Football, Mixed Integer Programming Workshop (MIP), Davis, CA, July 2012 (invited).

[P42] Uncertainty and Robustness: Two Optimization Models, Fuqua School of Business, Duke University, March 2012.

[P43] Separation and Relaxation for Completely Positive Matrices, Tenth SIAM Conference on Optimization, Darmstadt, Germany, May 2011 (invited).

[P44] Cuts for Nonconvex Quadratic Programming, Optimization Days, Montreal, May 2011 (invited).

[P45] Cuts for Nonconvex Quadratic Programming, IBM T. J. Watson Research Center, Yorktown Heights, NY, March 2011 (invited).

[P46] Separating Cuts for Quadratic Programs, INFORMS, Austin, TX, November 2010 (invited).

[P47] New Approximations for Copositive Matrices, INFORMS, Austin, TX, November 2010 (invited).

[P48] Nonconvex Quadratic Programming: Models and Algorithms, West Coast Optimization Meeting, University of Washington, Seattle, WA, May 2010 (invited).

[P49] Nonconvex Quadratic Programming with Box Constraints, Operations Research Seminar, Carnegie Mellon University, Pittsburgh, PA, April 2010 (invited).

[P50] Nonconvex Quadratic Programming: Models and Algorithms, Department of Industrial and Systems Engineering, University of Wisconsin-Madison, Madison, WI, September 2009 (invited).

[P51] Optimizing a Polyhedral-Semidefinite Relaxation of Completely Positive Programs, Twentieth International Symposium on Mathematical Programming, Chicago, August 2009 (invited).

[P52] Optimizing a Polyhedral-Semidefinite Relaxation of Completely Positive Programs, Università di Firenze, Florence, May 2009 (invited).

[P53] Short Course on Semidefinite Programming, Sapienza Università di Roma, Rome, May 2009 (invited).

[P54] Optimizing a Polyhedral-Semidefinite Relaxation of Completely Positive Programs, OptimA Workshop, University of Illinois Urbana-Champaign, March 2009 (invited).

[P55] New Results on Non-Convex Quadratic Programming, Chinese University of Hong Kong, November 2008 (invited).

[P56] Convex Hulls of Low-dimensional Quadratic Forms over Polytopes, INFORMS, Washington D.C., October 2008 (invited).

[P57] On the Copositive Representation of Binary and Continuous Nonconvex Quadratic Programs, Ninth SIAM Conference on Optimization, Boston, May 2008 (invited).

[P58] Representing NP-Hard Problems as Convex Programs, Northwestern University, Evanston, November 2007 (invited).

[P59] On the Copositive Representation of Binary and Continuous Nonconvex Quadratic Programs, INFORMS, Seattle, November 2007 (invited).

[P60] Representing NP-Hard Problems as Convex Programs, Second International Conference on Continuous Optimization (ICCOPT-II), McMaster University, Hamilton, Ontario, August 2007 (invited).

[P61] An Introduction to Semidefinite Programming and Its Applications, INFORMS International, Puerto Rico, July 2007 (invited tutorial).

[P62] Representing NP-Hard Problems as Convex Programs, Tepper School of Business, Carnegie Mellon University, Pittsburgh, March 2007 (invited).

[P63] Representing NP-Hard Problems as Convex Programs, Department of Industrial Engineering, University of Pittsburgh, February 2007 (invited).

[P64] Handling Free Variables in Conic Optimization with Application to Moment Relaxations, Nineteenth International Symposium on Mathematical Programming, Rio de Janeiro, August 2006 (invited).

[P65] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Programming, 21st European Conference on Operational Research, Iceland, July 2006 (invited).

[P66] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Programming, Department of Mathematics, University of Washington, February 2006 (invited).

[P67] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Programming, Department of Mathematics, North Carolina State University, February 2006 (invited).

[P68] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Programming, Workshop on Semidefinite Programming and Its Applications, National University of Singapore, Singapore, January 2006 (invited).

[P69] A Finite Branch-and-Bound Algorithm for Nonconvex Quadratic Programming via Semidefinite Programming, INFORMS, San Francisco, November 2005 (invited).

[P70] The Low-Rank Algorithm for Large-Scale Semidefinite Programming, University of Waterloo, Waterloo, October 2005 (invited).

[P71] Solving Lift-and-Project Relaxations of Binary Integer Programs, University of Michigan, Ann Arbor, September 2005 (invited).

[P72] Solving Lift-and-Project Relaxations of Binary Integer Programs, Tepper School of Business, Carnegie Mellon University, Pittsburgh, February 2005 (invited).

[P73] Solving Lift-and-Project Relaxations of Binary Integer Programs, Workshop on Integer Programming and Continuous Optimization, Chemnitz University of Technology, Germany, November 2004 (invited).

[P74] Computational Enhancements in Low-Rank Semidefinite Programming, INFORMS, Denver, October 2004 (invited).

[P75] Computational Enhancements in Low-Rank Semidefinite Programming, First International Conference on Continuous Optimization (ICCOPT-I), Rensselaer Polytechnic Institute, Troy, August 2004 (invited).

[P76] Maximum Stable Set Formulations and Heuristics Based on Continuous Optimization, SIAM Conference on Discrete Mathematics, Nashville, June 2004 (invited).

[P77] Local Minima and Convergence in Low-Rank Semidefinite Programming, Workshop on Large Scale Nonlinear and Semidefinite Programming, University of Waterloo, Waterloo, May 2004 (invited).

[P78] Solving Semidefinite Programs via Nonlinear Programming, University of Maryland, Baltimore County, Baltimore, November 2003 (invited).

[P79] Local Minima and Convergence in Low-Rank Semidefinite Programming, INFORMS, Atlanta, October 2003 (invited).

[P80] Semidefinite Programming in the Space of Partial Positive Semidefinite Matrices, Eighteenth International Symposium on Mathematical Programming, Copenhagen, August 2003 (invited).

[P81] Semidefinite Programming in the Space of Partial Positive Semidefinite Matrices, INFORMS, San Jose, November 2002 (invited).

[P82] Computational Experience with a Gradient-Based Algorithm for Semidefinite Programming, Seventh SIAM Conference on Optimization, Toronto, May 2002 (invited).

[P83] Rank-Two Semidefinite Relaxation Heuristics for Max-Cut and Other Binary Quadratic Programs, Seventh SIAM Conference on Optimization, Toronto, May 2002 (invited).

[P84] A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-rank Factorization, Seventh SIAM Conference on Optimization, Toronto, May 2002 (invited).

[P85] Solving Semidefinite Programs via Nonlinear Programming, Northwestern University, Evanston, April 2002 (invited).

[P86] The Maximum Stable Set Problem: New Approaches via Continuous Optimization, McMaster University, Hamilton, March 2002 (invited).

[P87] Rank-Two Semidefinite Relaxation Heuristics for Max-Cut and Other Binary Quadratic Programs, INFORMS, Miami, November 2001 (invited).

[P88] Computing the Lovasz Theta Number of a Graph, INFORMS, Miami, November 2001 (invited).

[P89] Maximum Stable Set Formulations and Heuristics Based on Continuous Optimization, Novel Approaches to Hard Discrete Optimization, University of Waterloo, Waterloo, April 2001 (contributed).

[P90] Rank-Two Relaxation Heuristics for Maxcut, Seventh U.S.-Mexico Workshop in Numerical Analysis, Mérida, Mexico, January 2001 (contributed).

[P91] A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, INFORMS, San Antonio, November 2000 (invited).

[P92] Solving Semidefinite Programs via Nonlinear Programming, INFORMS, San Antonio, November 2000 (invited).

[P93] A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, DIMACS Seventh Implementation Challenge, Rutgers, November 2000 (invited).

[P94] A Nonlinear Programming Algorithm for Solving Semidefinite Programs via Low-Rank Factorization, Seventeenth International Symposium on Mathematical Programming, Atlanta, August 2000 (invited).

[P95] Solving Semidefinite Programs via Nonlinear Programming: Transformations, Derivatives and Computational Results, Tokyo Institute of Technology, Tokyo, June 2000 (invited).

[P96] A General Framework for Establishing Polynomial Convergence of Long-Step Methods for Semidefinite Programming, INFORMS, Salt Lake City, May 2000 (invited).

[P97] Solving Semidefinite Programs via Nonlinear Programming: Transformations, Derivatives and Computational Results, INFORMS, Salt Lake City, May 2000 (invited).

[P98] Solving Semidefinite Programs via Nonlinear Programming: Transformations, Derivatives and Computational Results, INFORMS, Philadelphia, November 1999 (invited).

[P99] A General Framework for Establishing Polynomial Convergence of Long-Step Methods for Semidefinite Programming, Sixth SIAM Conference on Optimization, Atlanta, May 1999 (invited).

SOFTWARE

- *QuadProgBB version 20120229*, proposed and developed in publication [J23] (available from personal webpage)
- *OptDNN*, proposed and developed in publication [J26] (available from personal webpage)
- *SDPLR 1.03-beta*, proposed and developed in publications [J41], [J43], [J47], and [J53] and (available from personal webpage and over the Web at www-neos.mcs.anl.gov)
- *Max-AO*, proposed in publication [J48] (available on GitHub)
- *CirCut*, proposed in publication [J49] (available from coauthor)

COURSE DESIGN AND DEVELOPMENT

- Online *Data Programming in R* (Iowa MSCI:6060), Summer 2019
- *Business Analytics for Pharmacists* (pilot module for the Iowa Pharmacy Management Track), Spring 2018
- *Data and Decisions for Doctors* (module within the Iowa Healthcare Delivery Science and Management Track), Fall 2017
- *Applied Optimization* (Iowa MSCI:6130), Spring 2017
- *Data Programming in R* (Iowa MSCI:6060), Spring 2015
- *Optimization and Simulation Modeling* (Iowa MSCI:3800), Fall 2013
- *Seminar on Semidefinite Programming* (Carnegie Mellon 47-837), Spring 2007
- *Linear Programming* (Iowa 06K:286/MSCI:6600), Fall 2004

AWARDS AND HONORS

- President and Provost Award for Teaching Excellence, University of Iowa, 2022
- INFORMS UPS George D. Smith Prize (awarded to Department of Business Analytics), 2021
- Top 2% of researchers worldwide according to 2020 Stanford study
- ICS Prize ("annual award for the best English language paper or group of related papers dealing with the Operations Research/Computer Science interface"), Computing Society of INFORMS, with Renato D.C. Monteiro, 2020
- Collegiate Teaching Award, University of Iowa Tippie College of Business, 2020
- Core Faculty Member of the Year, University of Iowa MBA, 2016 & 2017
- Innovations in Teaching Award for *Data Programming in R*, University of Iowa Tippie College of Business, 2017
- Third Place (out of 36 international teams), INFORMS Syngenta Crop Challenge, sponsored by Syngenta and the INFORMS Analytics Society, with B. Shetty and L. Tong, 2016
- Top 5 Most Downloaded, *Surveys in Operations Research and Management Science* journal, 2014
- Strategic Innovation Faculty Member of the Year, University of Iowa MBA, 2013
- Certificate of Excellence in Reviewing, *Operations Research Letters*, 2013
- Meritorious Service Award for Associate Editors, *Operations Research*, 2012
- G.R.E.A.T. Faculty Award (First Year), Des Moines Executive MBA Class of 2012, April 2012
- Dean's Teaching Excellence Recognition, Fall 2005, Fall 2006, Fall 2011
- Dean's Teaching Award in Management Sciences, 2011
- *Computational Optimization and Applications* Best Paper Award, 2009 for the paper [J33]. Award citation has appeared in: COAP 2009 Best Paper Award, *Computational Optimization and Applications*, 47:567-570, 2010
- Top 10 Most Highly Cited, *Optimization Methods and Software* journal, 2000-2008

- Honorable Mention, Young Researcher Competition, International Conference on Continuous Optimization, 2004
- New Hot Paper recognition by ISI Essential Science Indicators for the paper [J51]
- Optimization Prize for Young Researchers, Optimization Section of INFORMS, 2002
- Delta Sigma Pi Outstanding Faculty Award, University of Iowa, 2002
- Presidential Fellowship, Georgia Institute of Technology, 1997–2001
- Strahan Mathematics Award, University of Georgia, 1996
- Phi Beta Kappa member

PROFESSIONAL SERVICE AND EXTERNAL ACTIVITIES

Editorial positions

- Area Editor, *Operations Research*, 2020–present
- Associate Editor, *Mathematical Programming*, 2022–present
- Associate Editor, *SIAM Journal on Optimization*, 2011–present
- Associate Editor, *Management Science*, 2014–20
- Associate Editor, *Operations Research*, 2011–20
- Associate Editor, *Mathematics of Operations Research*, 2011–18
- Co-Editor, *Optima* (newsletter of the Mathematical Optimization Society), 2010–18
- Co-Editor, *Discrete Optimization*, special issue on Conic Discrete Optimization, 2014–16
- Associate Editor, *Operations Research Letters*, 2009–14
- Associate Editor, *Mathematical Programming Computation*, 2008–13
- Associate Editor, *Surveys in Operations Research and Management Science*, 2009–13
- Associate Editor, *Asia-Pacific Journal of Operational Research*, 2007–10

Society positions

- Vice Chair, Activity Group on Optimization (SIAG-OPT), Society of Industrial and Applied Mathematics (SIAM), 2020–22
- Member, Board of Directors, Computing Society, INFORMS, 2014–17
- Council Member, Mathematical Optimization Society, 2012–15
- Vice-Chair for Linear Programming and Complementarity, Optimization Society, INFORMS, 2008–10
- Member, INFORMS (Institute for Operations Research and the Management Sciences)
- Member, SIAM (Society for Industrial and Applied Mathematics)
- Member, MOS (Mathematical Optimization Society)

Conference organization

- Co-Chair for Committee's Choice Cluster, Organizing Committee, INFORMS Annual Meeting, Phoenix, 2023
- Session Organizer, International Symposium on Mathematical Programming (ISMP), Bordeaux, France, 2018
- Member, Program Committee, SIAM Conference on Optimization (SIOPT), Vancouver, 2017
- Session Organizer, International Symposium on Mathematical Programming (ISMP), Pittsburgh, 2015
- Session Organizer, Eleventh SIAM Conference on Optimization, San Diego, 2014
- Member, Program Committee, 17th Conference on Integer and Combinatorial Optimization, Bonn, 2014
- Session Organizer, INFORMS Annual Meeting, Minneapolis, MN, 2013
- Session Organizer, Fourth International Conference on Continuous Optimization (ICCOPT-IV), Lisbon, 2013
- Session Organizer, International Symposium on Mathematical Programming (ISMP), Berlin, 2012

- Session Organizer, Modeling Optimization Conference: Theory and Applications (MOPTA), Bethlehem, PA, 2012
- Cluster Organizer, INFORMS Midwest Regional Meeting, Columbus, Ohio, 2011
- Session Organizer, Tenth SIAM Conference on Optimization, Darmstadt, Germany, 2011
- Session Organizer, INFORMS Annual Meeting, Austin, 2010
- Cluster and Session Organizer, INFORMS Annual Meeting, San Diego, 2009
- Cluster Organizer, INFORMS Annual Meeting, Washington D.C., 2008
- Session Organizer, Ninth SIAM Conference on Optimization, Boston, 2008
- Session Organizer, INFORMS Annual Meeting, Seattle, 2007
- Stream Co-Organizer and Session Chair, Second International Conference on Continuous Optimization (ICCOPT-II), McMaster University, Hamilton, Ontario, 2007
- Session Chair, EURO XXI, Reykjavik, Iceland, 2006
- Session Chair, INFORMS Annual Meeting, San Francisco, 2005
- Session Chair, INFORMS Annual Meeting, Atlanta, 2003

Referee positions, prize committees, and review panels

- Chair, SIAM Activity Group on Optimization Best Paper Prize committee, 2023
- Member, INFORMS Optimization Society Balas Prize committee, 2021
- National Science Foundation review panel, 2007, 2012, 2014, 2020
- Chair, INFORMS Optimization Society Young Researcher Prize committee, 2020
- INFORMS Nicholson Student Paper Prize committee (two-year terms), 2010–12, 2018–20
- Chair, University of Nebraska MS in Business Analytics Program Review, 2017
- Chair, INFORMS Optimization Society Young Researcher Prize committee, 2016
- Member, INFORMS Optimization Society Young Researcher Prize committee, 2015
- Member, Evaluation Team for ICIAM15 (International Congress on Industrial and Applied Mathematics 2015) Travel Awards, 2015
- Member, INFORMS Optimization Society Young Researcher Prize committee, 2013
- Member, ICCOPT 2013 Young Researcher Prize committee, 2013
- Member, INFORMS Junior Faculty Interest Group Paper Prize committee, 2012
- Member, Mixed Integer Programming Workshop Poster Award committee, 2012
- Chair, INFORMS Computing Society Paper Prize committee, 2011
- INFORMS Computing Society Paper Prize committee, 2010
- INFORMS Optimization Society Student Paper Prize committee, 2009
- Referee for *Mathematical Programming, SIAM Journal on Optimization, Optimization Methods and Software, Optimization Letters, INFORMS Journal on Computing, Journal of Global Optimization, Computational Optimization and Applications, Discrete Applied Mathematics, Discrete Optimization, Mathematics of Operations Research, Operations Research, Optimization and Engineering, 4OR, Annals of Operations Research, ANZIAM Journal, Automatica, European Journal of Operational Research, Foundations of Computational Mathematics, INFORMS Transactions on Education, International Transactions on Operational Research, Journal of Computational and Graphical Statistics, RAIRO, SIAM Review, TOP*

Additional training

- *UI Student Judicial Procedures and Sexual Violence Investigation Strategies and Response* offered by the University of Iowa, 2015
- *Statement of Accomplishment with Distinction* for Coursera course *R Programming*, 2015
- *The Intersection of Title IX and Title VII in Higher Education: What Every Faculty Grievance Panel Needs to*

Know offered by the University of Iowa, 2014
- *TILE Classroom Essentials* offered by the University of Iowa, 2013
- *Lean Academy Course* offered by the Lean Aerospace Initiative, 2006

Consulting and external seminars

- Medcara Pharmaceuticals, 2012
- Caterpillar, 2011–12
- Discover Financial Services, 2008

UNIVERSITY SERVICE

- Member, Tippie College of Business Research Committee, 2021–22
- Member, Business Analytics Lecturer Recruiting Committee, 2021–22
- Chair, Business Analytics Faculty Recruiting Committee, 2021–22
- Chair, Promotion-and-Tenure Tippie College Consulting Group, 2020–21
- Organizer, Business Analytics Seminar Series, 2020–21. (Also contributed to the initial Tippie Thought Leaders Seminar Series.)
- Advisory Board Member, FutureBAProf Workshop for the Department of Business Analytics, 2019–20
- Member, Tippie Dean's Search Committee, 2019–21
- Member, Promotion-and-Tenure Tippie College Consulting Group, 2019–20
- Member, Promotion-and-Tenure Departmental Review Committee, Department of Management Sciences, 2013–14, 2018–19
- Member, JMPEC Advisory Board, 2018–19
- Vice-Chair, Elected Faculty Council, Tippie College of Business, 2017–18
- Member, Strategic Plan Review Committee, Tippie College of Business, 2016–17
- Member, Management Sciences Faculty Recruiting Committee, 2001–02, 2005–06, 2007–08, 2016–17
- Member, Elected Faculty Council, Tippie College of Business, 2016–17
- Member, Graduate Education Task Force, Graduate College, 2015–16
- Member, Department Secretary Search Committee, Department of Managemnt Sciences, 2015
- Member, Post-Tenure Review Committee, Department of Management Sciences, 2013–14
- Chair, Analytics Master's Proposal Committee, Department of Management Sciences, 2013–15
- Member, Management Sciences Graduate Committee, 2003–05, 2006–07, 2013–15
- Member, Faculty Judicial Commission, 2013–16
- Member, Internal Funding Initiatives Review, Office of the VP for Research and Economic Development, 2013–15
- Chair, Management Sciences Faculty Recruiting Committee, 2012–13
- Member, AMCS (Applied Mathematical and Computational Sciences) Executive Committee, 2012–18
- Member, Management Sciences Internal Evaluation Sub-Committee, 2008–09, 2012–13, 2015–16
- Member, Core MBA Committee, 2002–03, 2010–11, 2012–13
- Member, Collegiate and Dean Teaching Awards Committee, 2011–12, 2012–13
- Member, AMCS (Applied Mathematical and Computational Sciences) Admission Committee, 2011–12
- Member, University of Iowa Faculty Engagement Corps, 2010
- Secretary, Elected Faculty Council, Tippie College of Business, 2008–10
- Organizer, Management Sciences Seminar Series, 2001–02, 2006–07
- Executive MBA Committee, 2003–05

ADVISING, MENTORING, AND SUPERVISING

Ph.D. Advisor

Guanglin Xu	Management Sciences University of Minnesota (initial) U of North Carolina at Charlotte (current)	2017 Summer
Boshi Yang	Appl Math and Comp Sci Carnegie Mellon University (initial) Clemson University (current)	2015 Summer
Hongbo Dong	Appl Math and Comp Sci (with K. Anstreicher) University of Wisconsin Madison (initial) Facebook (current)	2011 Fall
Jieqiu Chen	Management Sciences Argonne National Laboratory (initial) Microsoft (current)	2010 Summer
Changhui Choi	Management Sciences University of Colorado Denver (initial) Korea Insurance Research Institute (current)	2007 Spring

Sponsored Postdoctoral Fellows

Nayoung Cho	Management Sciences (with A. Campbell)	2009 Spring – 2010 Summer

Ph.D. Committee

Michael Kratochvil	Appl Math and Comp Sci	2022 Summer (expected)
Alex Wang	Carnegie Mellon University	2022 Summer (expected)
Jiaming Liang	Georgia Institute of Technology	2022 Spring (expected)
Sara Reed	Appl Math and Comp Sci	2021 Summer
Runchao Ma	Business Analytics	2021 Summer
Hassan Rafique	Appl Math and Comp Sci	2020 Summer
Enrico Bettiol	Université Paris 13	2019 Fall
Areesh Mittal	University of Texas at Austin	2019 Spring
Xiaolong Kuang	Lehigh University	2017 Spring
Silviya Valeva	Appl Math and Comp Sci	2017 Spring
Zhenzhen Yan	National University of Singapore	2017 Spring
Santanu Bhowmick	Computer Science	2017 Spring
Nathaniel Richmond	Appl Math and Comp Sci	2016 Fall
Vivek Sardeshmukh	Computer Science	2016 Summer
Fahrettin Cakir	Management Sciences	2016 Summer
Huan Jin	Management Sciences	2016 Summer
Alexander Vinel	Industrial Engineering	2015 Spring
Amit Verma	Management Sciences	2014 Summer
Alexander Michalka	Columbia University	2013 Summer
Lian Duan	Management Sciences	2012 Summer
Moh. Khoshneshin	Management Sciences	2012 Summer
Gaurav Kanade	Computer Science	2011 Summer
Nicholas Liefker	Management Sciences	2010 Summer
Jon Van Laarhoven	Mathematics	2010 Spring
Samid Hoda	Carnegie Mellon University	2010 Spring

Policarpio Soberanis	Industrial Engineering	2009 Fall
Benton McCune	Computer Science	2009 Fall
Chih-Lin Chi	Health Informatics	2009 Summer
Dengfeng Zhang	Management Sciences	2008 Fall
Anureet Saxena	Carnegie Mellon University	2008 Spring
Kaan Ataman	Management Sciences	2007 Summer
Rajiv Raman	Computer Science	2007 Spring
Thaddeus Sim	Management Sciences	2007 Spring
Victoria Shimanovich	Computer Science	2006 Summer
Yi Zhang	Management Sciences	2006 Summer

Ph.D Qualifying / Comprehensive / Preliminary Committee

Sarah Powell	Business Analytics	2021 Fall
Yankun Huang	Business Analytics	2021 Summer
Sara Reed	Appl Math and Comp Sci	2019 Spring
Sadjad Anzabi Zadeh	Management Sciences	2018 Fall
Xiexin Liu	Management Sciences	2018 Fall
Maryam Moghaddam	Mangement Sciences	2018 Fall
Hassan Rafique	Appl Math and Comp Sci	2018 Fall
Michael Redmond	Management Sciences	2017 Fall
Runchao Ma	Management Sciences	2016 Fall, 2017 Fall
Yuanyang Liu	Management Sciences	2016 Fall
Cole Stiegler	Appl Math and Comp Sci	2016 Spring
Bhupesh Shetty	Management Sciences	2015 Summer
Santanu Bhowmick	Computer Science	2015 Spring
Vivek Sardeshmukh	Computer Science	2014 Fall
Preethi Isaac	Management Sciences	2014 Spring
Guanglin Xu	Management Sciences	2014 Spring
Xi Chen	Management Sciences	2014 Spring
Wenjun Wang	Management Sciences	2014 Spring
Huan Jin	Management Sciences	2014 Spring
Fahrettin Cakir	Management Sciences	2013 Spring
Stacy Voccia	Management Sciences	2013 Spring
Qiong Zhang	Management Sciences	2013 Spring
Shu Zhang	Management Sciences	2013 Spring
Huan Jin	Management Sciences	2012 Fall
Kamal Lamsal	Management Sciences	2012 Spring
Chuanjie Liao	Management Sciences	2012 Spring
Senay Yasar Saglam	Management Sciences	2011 Spring
Amit Verma	Management Sciences	2010 Fall, 2012 Spring
Lian Duan	Management Sciences	2010 Spring
Hongbo Dong	Appl Math and Comp Sci	2009 Fall
Gaurav Kanade	Computer Science	2008 Fall
Darin Mohr	Appl Math and Comp Sci	2008 Summer
Seyon Yoon	Appl Math and Comp Sci	2007 Fall
Nicholas Liefker	Management Sciences	2007 Fall
Justin Goodson	Management Scienes	2007 Fall
Jieqiu Chen	Management Sciences	2007 Fall

Chih-Lin Chi	Health Informatics	2007 Spring
Benton McCune	Computer Science	2006 Fall
Hui Chen	Management Sciences	2006 Spring
Dengfeng Zhang	Management Sciences	2005 Fall
Thaddeus Sim	Management Sciences	2005 Fall
Benton McCune	Computer Science	2005 Spring
Rajiv Raman	Computer Science	2004 Fall

Graduate or Undergraduate Project Advisor

Sara Reed	Appl Math and Comp Sci	2020 Spring
Ling Tong	Management Sciences	2016 Spring
Bhupesh Shetty	Management Sciences	2016 Spring
Jeff Landgren	Appl Math and Comp Sci	2015 Fall
Deepakkumar Rohida	MBA	2010–11
Kevin Kotek	Management Sciences	2010 Summer
Daniela Navarro	Management Sciences	2006 Summer

Directed Readings

Natalie Clark	Appl Math and Comp Sci	2013 Fall
Anonya Bagchi	MBA	2013 Spring
Danielle Walker	MBA	2013 Spring
Pankaj Kumar	MBA	2013 Spring
Scott Marsh	MBA	2012 Spring
Isaac Hess	MBA	2012 Spring

Graduate Mentor (Ethnic Inclusion Effort for Iowa Engineering)

James Ratliff	Industrial Engineering	2011–13

Sponsored Short-Term Visitors

Anders Eltved	Technical University of Denmark, Denmark	2019–20 September–January
Nicolo Gusmeroli	University of Klagenfuhrt, Austria	2019 April–May
Peter J.C. Dickinson	University of Groningen, Netherlands	2012 March
Mirjam Dür	University of Groningen, Netherlands	2007 June