Jitamitra Desai

Associate Professor
Decision Sciences and Information Systems
Indian Institute of Management @ Bangalore
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Current Position

Associate Professor, Decision Sciences and Information Systems, Indian Institute of Management @ Bangalore

Academic Qualifications

Doctor of Philosophy (PhD), Industrial & Systems Engineering, June 2005
Virginia Polytechnic Institute and State University
Advisor: Dr. Hanif D. Sherali

Master of Science (MS), Industrial & Systems Engineering, May 2002
Virginia Polytechnic Institute and State University
Advisor: Dr. Hanif D. Sherali

Bachelor of Technology (BTech), Civil Engineering, May 2000
Indian Institute of Technology-Madras (IIT-M)
Advisor: Dr. G. Srinivasan

Summary of Work Experience

Assistant Professor, Industrial Engineering and Operations Research Cluster, Nanyang Technological University, Singapore, 2010 – 2017.

Visiting Assistant Professor, Department of Industrial and Systems Engineering, Lehigh University, Bethlehem, PA., 2007 – 2010.

Visiting Assistant Professor, Department of Systems and Industrial Engineering, University of Arizona, Tucson, AZ., 2006 – 2007.

Postdoctoral Research Associate, Department of Systems and Industrial Engineering, University of Arizona, Tucson, AZ., 2005 – 2006.

Research Interests

Methodologies: Large-scale (big data) optimization; decision analytics; data science; networks and graphs; convex and nonconvex analysis

Applications: Transportation systems; wireless communications; energy models; risk management; high performance computing

Journal Publications (in Reverse Chronological Order)

[1] Zhang, D.+, Yu, C.+, Desai, J., Lau, H.Y.K., and Srivathsan, S+. (2016), "A time-space network flow approach to dynamic repositioning in bicycle sharing systems", **Transportation Research Part B: Methodological**, available online (http://dx.doi.org/10.1016/j.trb.2016.12.006).

[2] Wang, K*., Desai, J. and He, H. (2016), "A proximal partially parallel splitting method for separable convex programs", **Optimization Methods and Software**, available online (DOI: 10.1080/10556788.2016.1200044).

[3] Desai, J. and Kishore, S. (2016), "A global optimization framework for distributed antenna systems in CDMA cellular networks", **Annals of Operations Research**, available online (DOI: 10.1007/s10479-016-2306-1).

[4] He, H., Desai, J. and Wang, K*. (2016), "A primal-dual prediction-correction algorithm for saddle point optimization", **Journal of Global Optimization**, available online (DOI: 10.1007/s10898-016-0437-1).

[5] Zhang, D+., Yu, C+., Desai, J. and Lau, H.Y.K. (2016), A math-heuristic algorithm for integrated air service recovery, **Transportation Research Part B: Methodological** 84: 211-236.

[6] Kumar, R+ and Desai, J. (2016), "Solution of monotone semidefinite linear complementarity problem by the modified potential reduction interior point method", **Optimization Letters** 10(7): 1417-1448.

[7] Desai, J. and Wang, K. (2015), "Lagrangian Optimization for LP: Theory and Algorithms", In: **Wiley Encyclopedia of Operations Research and Management Science 2nd edition** (editor: James J. Cochran), available online. (http://dx.doi.org/10.1002/9780470400531.eorms0447.pub2)

[8] Wang, K*., Desai, J., and He, H. (2014), "A note on the augmented Lagrangian-based parallel splitting method", **Optimization Letters** 9: 1199-1212.

[9] Sherali, H.D., Dalkiran, E. and Desai, J. (2012), "Enhancing RLT-based LP relaxations for solving polynomial programming problems via a new class of v-semidefinite cuts", **Computational Optimization and Applications** 52(2): 483-506.

[10] Desai, J. (2011), "Lagrangian optimization for LP", In: **Wiley Encyclopedia of Operations Research and Management Science** (editor: James J. Cochran) Volume 04: 2691-2702.

[11] Desai, J. and Sen, S. (2010), "A global optimization algorithm for reliable network design", **European Journal of Operational Research** 200(1): 1-8.

[12] Sherali, H.D., Desai, J. and Glickman, T.S. (2008), Optimal allocation of risk-reduction resources in event trees, **Management Science** 54: 1313-1321.

[13] Bozorg, M., Sherali, H.D., Davison, E., and Desai, J. (2006), "Computation of parameter stability margins using polynomial programming techniques", **International Journal of Control** 79(7): 739-751.

[14] Sherali, H.D., Desai, J. and Rakha, H. (2006), "A discrete optimization approach for locating Automatic Vehicle Identification (AVI) readers for the provision of roadway travel times", **Transportation Research-Part B: Methodological** 40: 857-871.

[15] Sherali, H.D. and Desai, J. (2005), "A global optimization RLT-based approach for solving the fuzzy clustering problem", **Journal of Global Optimization** 33(4): 597-615.

[16] Sherali, H.D. and Desai, J. (2005), "On solving polynomial, factorable, and black-box optimization problems via the RLT Methodology", In: **Essays and Surveys in Global Optimization**, Audet, C., Hansen, P., Savard, G. *eds*., Kluwer Academic Publishers, Dordrecht, The Netherlands, 131-164.

[17] Sherali, H.D. and Desai, J. (2005), "A global optimization RLT-based approach for solving the hard clustering problem", **Journal of Global Optimization** 32(2): 281-306.

[18] Sherali, H.D., Desai, J., and Glickman, T.S. (2004), "Allocating emergency response resources to minimize risk under equity considerations", **American Journal of Mathematical and Management Sciences** 24(3/4): 367-410.

Refereed Conference Proceedings (in Reverse Chronological Order)

[1] Merabet, M.,Desai, J. and Molnar, M. (2018), A generalization of the minimum branch vertices spanning tree problem, **Proceedings of the 5th International Symposium on Combinatorial Optimization (ISCO)**, In: *Springer Lecture Notes in Computer Science*, Marrakesh, Morocco.

[2] Prakash, R.* and Desai, J. (2017), "A data-splitting algorithm for flight sequencing and scheduling on two runways", **Proceedings of the Industrial & Systems Engineering Research Conference**, Pittsburgh, USA. (Winner of the IISE Best Paper Award "Operations Research" Track.)

[3] Desai, J., Guan, L.+, and Srivathsan, S.*, (2017), "A hybrid penalty-based dynamic departure pushback control policy", **Proceedings of the Industrial & Systems Engineering Research Conference**, Pittsburgh, USA. (Winner of the IISE Best Paper Award "Modeling and Simulation" Track.)

[4] Lai, W.Y.*, Yu, C.+, Li, L.*, and Desai, J. (2017), "A 0-1 MINLP approach for solving the air cargo loading problem", **Proceedings of the Industrial & Systems Engineering Research Conference**, Pittsburgh, USA.

[5] Cheung, W.L.*, Desai, J., and Prakash, R*. (2017), "An improved macroscopic analytical model for estimating runway capacity", **Proceedings of the**

Industrial & Systems Engineering Research Conference, Pittsburgh, USA.

[6] Zhang, T.*, Desai, J. and Wan, M.P. (2017), "Optimal temperature control in smart buildings via model predictive control and optimization", **Proceedings of the Industrial & Systems Engineering Research Conference**, Pittsburgh, USA.

[7] Desai, J. and Prakash, R*. (2016), "Flight sequencing and scheduling: A data-driven approach", **Proceedings of the Industrial & Systems Engineering Research Conference**, Anaheim, USA.

[8] Desai, J. and Prakash, R*. (2016), "An optimization framework for terminal sequencing and scheduling: The single runway case", **Proceedings of the Complex Systems Design & Management Conference**, In: *Advances in Intelligent Systems and Computing* (Springer), Singapore, 195-207. (https://dx.doi.org/10.1007/978-3-319-29643-2).

[9] Gupte, A., Missoum, S., Desai, J. and Sen, S. (2007), "A multidisciplinary design optimization algorithm with distributed autonomous subsystems", **Proceedings of the 7th World Congress on Structural and Multidisciplinary Optimization**, Seoul, South Korea.

[10] Sherali H., Desai J., Rakha H. and El-Shawarby, I. (2003), "A discrete optimization approach for locating AVI readers for the provision of roadway travel times", **Proceedings of the Transportation Research Board 82nd Annual Meeting**, Washington DC, CD-ROM [Paper # 03-2596]

* Student (Undergrad, MS, or PhD); + Postdoctoral Scholar

Proposals and Grants (in Chronological Order)

[1] **(Co-PI)** Intelligent Building Automation and Analytics using Model-Predictive Control: $898,800, *National Research Foundation*, Green Buildings Innovation Cluster Grant, Singapore, July 2016 – June 2018.

[2] **(PI)** An Integrated Surface Traffic Planning Approach for Combined Arrival-Departure Management and Runway Optimization: $1,198,638.00, *ATRMI Type B Research Grant*, Singapore, Nov 2014 - Nov 2018.

[3] **(PI)** Developing a global optimization envelope for stochastic decision analysis: $96,856, Academic Research Fund (AcRF) Tier 1, Singapore, 2013 – 2016.

[4] **(PI)** Convexification-based methods for solving global optimization problems with applications to engineering and design problems: $100,000, *NTU Start-Up Grant*, Singapore, 2011 – 2013.

Students and Postdoctoral Scholars Supervised (in Chronological Order)

(Advisor)

Jianing Liu (PhD., 2011 – 2016): Global optimization of fractional programs with applications to engineering and management problems, NTU, Singapore.

Xiaofei Qi (PhD., 2012 – present): Enhancing convexification techniques for quadratic and polynomial programming problems, NTU, Singapore.

Rupaj Kumar Nayak (Postdoc, 2012 – 2013): Linear complementarity and semidefinite programming algorithms, NTU, Singapore.

Kai Wang (PhD., 2013 – present): Augmented Lagrangian-based splitting methods for separable convex programs, NTU, Singapore.

Rakesh Prakash (PhD., 2014 – present): Optimization models and algorithms for flight sequencing and scheduling, NTU, Singapore.

Wai Lun Cheung (PhD., 2015 – present): A study of arrival-departure flow management and related airport capacity, NTU, Singapore.

Xu Yi (Postdoc, 2015 – 2016): Studying linear symmetric cones and semi-infinite linear programs, NTU, Singapore.

Dong Zhang (Postdoc, 2016 – present): Integrated approach to arrival-departure management and runway optimization, NTU, Singapore.

Chuhang Yu (Postdoc, 2016 – present): Integrated approach to arrival-departure management and runway optimization, NTU, Singapore.

Sandeep Srivathsan (Postdoc, 2016 – present): Integrated approach to arrival-departure management and runway optimization, NTU, Singapore.

(Co-Advisor)

Guan Lian (PhD., 2013 – present): Optimal queueing strategies for managing departure pushback control mechanisms, China Scholarship Council exchange student, Harbin University (China) and NTU, Singapore.

Cheryl Wong (PhD., 2015 – present): A dynamic optimization-based approach to airspace sectorization, School of CE, NTU, Singapore.

(Committee Member)

Akshay Gupte (MS., 2007): A trust-region derivative free approach for optimization of quasi autonomous subsystems, University of Arizona, Tucson, UA.

Mahendra Birhade (PhD., 2015): Train timetabling and resource optimization for rail systems: models and algorithms, Nanyang Business School, Singapore.

Arijit Bagchi (PhD., 2013 – present): Power system adequacy assessment using aggregated probabilistic models of distributed energy resources, School of EEE, NTU, Singapore.

(External Examiner for PhD Dissertations)

Hassan Mirzahossein (PhD., 2011): School of Mechanical and Aerospace Engineering, NTU, Singapore.

Lin Huiling (PhD., 2012): School of Mathematical Sciences, NTU, Singapore.

Hong Zhen (PhD., 2013): School of Mechanical and Aerospace Engineering, NTU, Singapore.

Le Thi Khanh Hien (PhD, 2014): School of Mathematical Sciences, NTU, Singapore.

Zheng Meimei (PhD, 2015): School of Mechanical and Aerospace Engineering, NTU, Singapore.

Teaching Interests

Optimization (Linear-, Nonlinear-, Integer-, Advanced Math-Programming)
Applied operations research
Global optimization/Convex and nonconvex analysis
Graph theory and network flows
Operations / Supply chain management

Invited Presentations at Conferences/Scientific Meetings/Workshops

I usually organize sessions and present at noteworthy optimization and OR conferences, including but not limited to:

"A discrete optimization approach to solve the reader location problem for estimating travel times" (with H.D. Sherali and H. Rakha)

- Transportation Research Board Annual Meeting 2003, Washington DC.
- SIE Department Seminar Series, University of Arizona, Tucson, UA.

"A convexification-based global optimization approach for the allocation of emergency response resources" (with H.D. Sherali)

- SIAM Graduate Student Presentation, Virginia Tech, Blacksburg, VA.
- International Conference on Complementarity, Duality, and Global Optimization 2005, Blacksburg, VA.
- INFORMS Annual Conference 2005, San Francisco, CA.
- IIE Annual Conference 2006, Orlando, FL.

"An MDO Optimization Algorithm for distributed autonomous subsystems" (with A. Gupte, S. Sen, and S. Missoum)

- AIAA Multidisciplinary Design Optimization Conference 2006, Norfolk, VA.

"A global optimization algorithm for reliable networks" (with S. Sen)

- INFORMS Annual Conference 2006, Pittsburgh, PA.
- IIE Annual Research Conference 2007, Nashville, TN.

"Models and algorithms for decision tree analysis" (with S. Sen)

- INFORMS Annual Conference 2007, Seattle, WA.
- Optimization Society Conference 2008, Atlanta, GA.
- ISMP 2012, Berlin, Germany.

"Computing the independence number via a fractional programming approach" (with B. Balasundaram)

- INFORMS Annual Conference 2008, Washington DC.
- Singapore University of Technology and Design (SUTD) seminar series, 2013
- ISE Department and Operations Research Society of Singapore joint talk, National University of Singapore (NUS), 2015

"Minimum Triangle Inequalities and Algorithms for 0-1 quadratic programs" (with X. Qi and R.K. Nayak)

- IFORS Triennial Conference 2014, Barcelona, Spain.
- INFORMS Annual Conference 2014, San Francisco, CA.
- INFORMS Annual Conference 2015, Philadelphia, PA.

"Higher rank-ordered semidefinite cuts for quadratic and polynomial programs" (with X. Qi)

- INFORMS Annual Conference 2012, Phoenix, AZ.
- INFORMS Annual Conference 2013, Minneapolis, MN.

"Optimization framework for terminal sequencing and scheduling: The single runway case" (with R. Prakash)

- ATMRI – ENRI Joint Workshop, NTU, Singapore.
- Complexity Institute Seminar Series, NTU, Singapore.
- Complex Systems Design and Management Conference, 2016, Singapore.
- INFORMS Annual Conference 2016, Nashville, TN.

"Flight sequencing and scheduling: A data-driven approach" (with R. Prakash)

- IIE Annual Conference 2016, Anaheim, USA.

Service as a Referee/Reviewer

I write referee reports for approximately 3-4 research papers per year, usually for the following journals: *Operations Research, Decision Sciences, Math Programming*, *SIAM Journal on Optimization, Discrete Mathematics, Journal of Global Optimization, European Journal of Operational Research, Optimization Methods and Software, IIE Transactions, Computers and Operations Research, Computers and Industrial Engineering*.

Professional Qualifications/Memberships

Institute for Operations Research and Management Sciences (INFORMS): Member
Society for Industrial and Applied Mathematics (SIAM): Member
Mathematical Optimization Society (MOS): Member
Institute for Industrial Engineers (IIE): Member

Annual Workload

A typical annual workload distribution for me so far has been: Research (40%), Teaching (40%), Service (10%), and Miscellaneous (10%)

Honors and Awards

Winner of the **IISE 2017 Annual Conference Best Paper Award** (Modeling and Simulation Track) for the work presented on 'hybrid departure pushback control policies'

Winner of the **IISE 2017 Annual Conference Best Paper Award** (Operations Research Track) for the work presented on 'data-driven algorithms for flight sequencing and scheduling'

Winner of the **Nanyang Education Award** (2014), a university-wide teaching recognition for the best teaching/advising record, given by the President of NTU (cash award: $5000 and plaque)

Awarded the **1st place prize** (cash award: $1000) in the *INFORMS subdivision NIJ-OR Challenge Competition*.

Recipient of **Engineers' Week Award** (2007), on behalf of *Institute of Industrial Engineers* (IIE) – awards ceremony coverage by USA Today (circulation of 3 million).

Awarded the best **SIAM Graduate Student Seminar Prize** (cash award: $100) by the *SIAM VT Student Chapter*, May, 2005.

Appeared in the *Work Perfect* series of IIE magazine (March, 2007).

Cited by *OR/MS Tomorrow* for the best student project done as part of coursework (http://ormstomorrow.informs.org/archive/fall03/features.htm#studentprojects).