

Pritam Ranjan

Operations Management & Quantitative Techniques
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Current Affiliations

- Jun 2015 – Associate Professor, OM&QT, IIM Indore, MP, India
- Aug 2016 – Adjunct Professor, Math & Stats, Acadia University, NS, Canada
- Nov 2012 – Adjunct Professor, Statistics & Ac. Sci., Simon Fraser Univ., BC, Canada
- July 2012 – Adjunct Professor, Math & Stats, Dalhousie University, NS, Canada

Previous Affiliations

- July 2011 – July 2016 Associate Professor, Math & Stats, Acadia University, NS, Canada
(on leave during June 2015 - July 2016)
- July 2007 - June 2011 Assistant Professor, Math & Stats, Acadia University, NS, Canada
- Sept. 2006 - Dec 2006 Sessional Instructor, Simon Fraser University, B.C., Canada

Education

- Ph.D. in Statistics, Simon Fraser University, Burnaby, BC, Canada (2003 - 2007)
Thesis title - *Factorial and Fractional Factorial Designs with Randomization Restrictions - A Projective Geometric Approach* [advisor: Derek Bingham]
- Master of Statistics (M.Stat), Indian Statistical Institute, Kolkata, India (2001 - 2003)
Specialization: Mathematical Statistical and Probability
- Bachelor of Statistics (B.Stat-Hons.), Indian Statistical Institute, Kolkata, India (1998 - 2001)

RESEARCH ACTIVITIES

Editorial Positions

- Associate Editor: *Journal of Royal Statistical Society - Series C* (Jan 2014 -)
- Editorial review board member (same as AE): *Journal of Quality Technology* (July 2012 -)
- Associate Editor: *Journal of Statistical Software* (July 2013 - 2015)
- Reviewer for NSERC (Canada) discovery grants
- Manuscript refereeing for several top journals

Sponsored Projects

- DST (SERB) EMR/2016/003332 - PI, *From Small Data to Big Data: Complex Computer Modelling and Optimization*, Co-PI: Snehanishu Saha (PESIT South), External advisor: Abhyuday Mandal (UGA) (2016 - 2019)
- NSERC Discovery grant (2013 - 2018), *Computer Experiments and Multi-stage Factorial Designs*, \$75,000 (\$15,000 per year)
- CANSSI Collaborative Research Team grant (2014 - 2019), *Statistical Modeling of the World: Computer and Physical Models in Earth, Ocean, and Atmospheric Sciences*, \$200,000 [co-applicant with Derek Bingham, William Welch and Hugh Chipman]
- Harrison McCain Foundation Awards, Acadia University (2013 - 2014), *Visitorship for Acadia Scholars*, \$8,400
- University research grant, Acadia University (2013 - 2014), *Space-filling Latin Hypercube Designs based on Stars in $PG(p - 1, 2)$* , \$3,500
- Co-Investigator in the collaborative research grant for the project: *Classification Methods for Measuring Segregation* (2010-2011), PI: Crystal Linkletter, Brown University, \$4,000
- MITACS internship grant with Wilson Lu for Alex Traikov, M.Sc. (May - August 2010), *Statistical Modeling for Extracting Solar Radiation Data from Satellite Images*, \$15,000
- University research grant, Acadia University (2009 - 2010), *Surrogate Modeling for Black-Box Functions*, \$2,500
- Teaching and Learning Enhancement Award, Acadia University (2009 - 2010), *Online Homework to Enhance Introductory Mathematics and Statistics Courses Pilot Project* (Principal Investigator with Eva Curry) \$9,500
- MITACS internship grant with Hugh Chipman for Shujie Li, M.Sc. (May - Dec 2008), *User Modelling and Feature Selection for Personalized Local Search*, \$30,000
- University research grant, Acadia University (2008 - 2009), *Developing Adaptive Statistical Methods for the Design and Analysis of Expensive Computer Experiments*, \$2,300
- NSERC Discovery grant (2008 - 2013), *Design and Analysis of Computer Experiments and Multi-stage Factorial Experiments*, \$60,000 (\$12,000 per year)
- Start-up grant, Acadia University (2007 - 2009), \$12,000

Refereed Publications

1. Zhang, R., Lin, C.D., and Ranjan, P. (2016), "Local Gaussian Process Model for Large-Scale Dynamic Computer Experiments", *Journal of Computational and Graphical Statistics* (**submitted**) [arXiv:1611.09488].

2. Ranjan, P., Thomas, M., Teismann, H. and Mukhoti, S., (2016), “Inverse problem for time-series valued computer model via scalarization”, *Open Journal of Statistics*, **6**, 528-544.
3. Mukhoti, S., and Ranjan, P., (2016), “Mean-correction and Higher Order Moments for a Stochastic Volatility Model with Correlated Errors”, *International Journal of Statistics and Probability*, **5(4)**, 102-110.
4. Gramacy, R., Gray, G., Le Digabel, S., Lee, H., Ranjan, P., Wells, G., and Wild, S. (2016), “Modeling an Augmented Lagrangian for Improved Blackbox Constrained Optimization”, *Technometrics*, **58(1)**, 1-11, (*discussion by experts*), 12-29.
5. MacDonald, K.B., Ranjan, P. and Chipman, H. (2015). GPfit: An R Package for Fitting a Gaussian Process Model to Deterministic Simulator Outputs. *Journal of Statistical Software*, **64(12)**, 1-23.
6. Ranjan, P. and Spencer, N. (2014), “Space-filling Latin Hypercube Designs based on Randomization Restrictions in Factorial Experiments”, *Statist. & Prob. Letters*, **94**, 239 - 247.
7. Bingham, D., Ranjan, P., and Welch, W. (2014), “Sequential Design of Computer Experiments for Optimization, Estimating Contours, and Related Objectives”, in *Statistics in Action: A Canadian Outlook*. (J. F. Lawless, eds.) pp 109 – 124, Chapman and Hall/CRC, ISBN: 978-1-4822-3623-1, DOI: 10.1201/b16597-8.
8. Butler, A., Haynes, R., Humphries, T.D., and Ranjan, P. (2014), “Efficient Optimization of the Likelihood Function in Gaussian Process Modeling”, *Computational Statistics and Data Analysis*, **73**, 40–52.
9. Agarwal, R., and Ranjan, P. (2014), “A New Tree-Based Classifier for Satellite Images”, In J. Wang (Ed.), *Encyclopedia of Business Analytics and Optimization* (pp. 30-38). Hershey, PA: Business Science Reference. doi:10.4018/978-1-4666-5202-6.ch003.
10. Agarwal, R., Ranjan, P. and Chipman, H. (2013), “A new Bayesian Ensemble of Trees Approach for Land Cover Classification of Satellite Imagery”, *Canadian Journal of Remote Sensing*, **39**, 507–520.
11. Ranjan, P. (2013), “Comment: EI Criteria for Noisy Computer Simulators” – Discussion of ‘Quantile-Based Optimization of Noisy Computer Experiments with Tunable Precision’ by Picheny et al. (2013), *Technometrics*, **55(1)**, 24–28.
12. Ranjan, P. and Spencer, N. (2013), “A Unified Approach to Factorial Designs with Randomization Restrictions” In *Calcutta Statistical Association Bulletin, Vol. 65 (Special 8th Triennial Symposium Proceedings Volume)*, Nos. 257-260, pp 43–62.

13. Chipman, H., Ranjan, P. and Wang, W. (2012), “Sequential Design for Computer Experiments with a Flexible Bayesian Additive Model”, *Canadian J. Statis.*, **40(4)**, **663–678**.
14. Linkletter, C.D., Ranjan, P., Lin, C.D., Bingham, D.R., Brenneman, W.A., Lockhart, R.A. and Loughin, T.M. (2012), “Compliance Testing for Random Effects Models with Joint Acceptance Criterion”, *Technometrics*, **54(3)**, **243–255**. [Note: This paper was featured in the *Technometrics* invited session at INFORMS, Charlotte, NC, November 2011.]
15. Ranjan, P., Haynes, R. and Karsten, R. (2011), “A Computationally Stable Approach to Gaussian Process Interpolation of Deterministic Computer Simulation Data”, *Technometrics*, **53(4)**, **366–378**.
16. Ranjan, P., Lu, W., Bingham, D., Reese, S., Williams, B. J., Chou, C-C., Doss, F., Grosskopf, M. and Holloway, J. P. (2011), “Follow-up Experiment Designs for Computer Models and Physical Processes”, (Special issue on Design of Experiments) *Journal of Statistical Theory and Practice*, **5(1)**, **119–136**.
17. Franey, M., Ranjan, P. and Chipman, H. (2011), “Branch and Bound Algorithms for Maximizing Expected Improvement Functions for Deterministic Computer Simulators”, *Journal of Statistical Planning and Inference*, **141(1)**, **42 – 55**.
18. Ranjan, P., Bingham, D. and Mukerjee, R. (2010), “Stars and Regular Fractional Factorial Designs with Randomization Restrictions”, *Statistica Sinica*, **20**, **1637 – 1653**.
19. Ranjan, P. (2010), “Comment on Article by Vernon et al.” – Discussion of ‘Galaxy Formation: a Bayesian Uncertainty Analysis’ by Vernon, I., Goldstein M. and Bower, R., *Bayesian Analysis*, **5(4)**, **677 – 682**.
20. Ritcey, D. and Ranjan, P. (2010), “Statistical Models for the Banker’s Offer in Deal or No Deal”, *The Atlantic Electronic Journal of Mathematics*, **4(1)**, **1 – 22**.
21. Stanley, C., O’Driscoll, N. and Ranjan, P. (2010), “Determining the Magnitude of True Analytical Error in Geochemical Analysis”, *Geochemistry: Exploration, Environment, Analysis*, **10(4)**, **355 – 364**.
22. Ranjan, P., Bingham, D. and Dean, A. (2009), “Existence and Construction of Randomization Defining Contrast Subspaces for Regular Factorial Designs”, *The Annals of Statistics*, **37(6A)**, **3580 – 3599**.
23. Mandal, A., Ranjan, P. and Wu, C.J.F. (2009), “ $\mathcal{G}$ -SELC: Optimization by Sequential Elimination of Level Combinations using Genetic Algorithms and Gaussian Processes”, *The Annals of Applied Statistics*, **3(1)**, **398 – 421**.

24. Ranjan, P., Bingham, D. and Michailidis, G. (2008), “Sequential Experiment Design for Contour Estimation from Complex Computer Codes”, *Technometrics*, **50**, 527–541. Errata, *Technometrics*, **53**(1), 109–110.

Unpublished Manuscripts

25. Franey, M., Ranjan, P. and Chipman, H., (2012), “A Short Note on Gaussian Process Modeling for Large Datasets using Graphics Processing Units” (*arXiv:1203.1269 [stat.CO]*).

Open Source Software

26. MacDonald, K.B., Chipman, H. and Ranjan, P. (2012), “GPfit: A Computationally Stable Approach of Fitting a Gaussian Process Model to Deterministic Simulator Outputs”. **R library**. <http://cran.r-project.org/web/packages/GPfit> [Ver 2 released in June 2014]

Invited Conference Presentations

- “Space-filling Latin Hypercube Designs based on Randomization Restrictions in Factorial Experiments”, Joint Research Conference, Seattle, USA (June 2014).
- “A New Multi-stage Sequential Design Approach for Estimating Quantiles of Simulator Outputs”. Statistical Society of Canada, Annual Meeting, Edmonton, AB (May 2013).
- “A Unified Approach to Factorial Designs with Randomization Restrictions”, Eighth International Triennial Calcutta Symposium on Probability and Statistics, Kolkata, India (Dec 2012).
- Featuring our paper “Compliance Testing for Random Effects Models with Joint Acceptance Criteria” in the Technometrics session at INFORMS, Charlotte, NC (November 2011).
- “Interpolation of Deterministic Simulator Outputs using a Gaussian Process Model”. Accelerating Industrial Productivity via Deterministic Computer Experiments and Stochastic Simulation Experiments – at the Isaac Newton Institute in Cambridge, UK (September 2011).
- “Deterministic Computer Models and GP as an Interpolator”. Spring Research Conference, Vancouver, BC (June 2009).
- “Batch-Sequential Designs for Estimating Process Features of Expensive Simulators”. Statistical Society of Canada, Annual Meeting, Ottawa, ON (May 2008).
- “Randomization Restrictions in Factorial Designs and Geometric Structures in $PG(p-1, 2)$ ”. Design and Analysis of Experiments - DAE 2007, Memphis (October 2007).
- “Intensive Computing in Design of Experiments for Computer Models”. Summer Workshop on High Performance Computing in the Mathematical Sciences, Acadia Univ. (July 2007).
- “Inverse Problems for Complex Computer Codes”. Theme for 2007: Workshop III – Application of Statistics to Numerical Models, National Center for Atmospheric Research (May 2007).

- “Sequential Experiment Design for Contour Estimation from Complex Computer Codes”. INFORMS, Annual Meeting, Pittsburgh (October 2006).

I have also presented this as invited talks at

- Statistical Society of Canada, Annual Meeting, London (June 2006).
- Joint Statistical Meetings, Seattle (August 2006)
- Statistical Society of Canada, Annual Meeting, Saskatoon (June 2005).
- Design and Analysis of Experiments Conference, New Mexico (October 2005)
- National Program on Complex Data Structures workshop, Banff (April 2005)

Invited Seminar Presentations at Universities

- “Space-filling LHDs and Star-based Multi-stage Factorial Designs”, University of Georgia, Athens, GA, USA (May 2014).
- “Factorial Experiments with Randomization Restrictions and Space-filling Designs”, Indian Statistical Institute, Kolkata, India (March 2014).
- “Latin Hypercube Designs based on Multistage Factorial Experiments”, Indian Institute of Technology, Patna, India (January 2014).
- “Tikhonov Regularization for Emulating Deterministic Computer Simulators”. Department of Statistics, University of Georgia (Aug 2010).
- “Gaussian Process Model as an Interpolator for a Deterministic Computer Simulator”. Department of Mathematics and Statistics, Boston University (Sept 2009).
- “Sequential Designs for Estimating Pre-specified Process Features”. Department of Mathematics and Statistics, University of Winnipeg (Feb 2008).
- “An Overview on Design and Analysis of Computer Experiments”. Department of Mathematics and Statistics, Dalhousie University (Oct 2007).
- “Introduction to Randomization Restrictions”. Statistics and Actuarial Science Graduate Student Seminar Series, Simon Fraser University (May 2006).
- “Introduction to Support Vector Machine”. Statistics and Actuarial Science Graduate Student Seminar Series, Simon Fraser University (Feb 2005).

Poster Presentations

- “GPfit: An R library for a Computationally Stable Approach to Gaussian Process Interpolation of Deterministic Simulators”. Design and Analysis of Experiments (DAE) Conference, Athens, Georgia (October 2012)

- “Sequential Design for Solving Inverse Problem for Expensive Deterministic Computer Simulators”. Statistical Society of Canada, Annual Meeting, Vancouver (June 2009)

Professional Memberships

- International Indian Statistical Association
- Acadia Center for Mathematical Modeling and Computation
- Statistical Society of Canada
- American Statistical Association

SERVICE ACTIVITIES

Scientific committees

- Member of the International Programme Committee (IPC) for the 5th IIMA International Conference of Advanced Data Analysis, Business Analytics and Intelligence (ICADABAI-2017), Ahmedabad, India, April 08-09, 2017.
- SPES (ASA) rep. to the Spring Research Conference Management Committee (2012 - 2015)
- SSC Local Representative at Acadia (2012-2014)
- Treasurer for Business and Industrial Statistics Section, SSC (2012-2015)
- Member of the New Investigators Committee, SSC (2010 - 2013)
- Member of the Student Research Presentation Awards Committee, SSC (2009, 2010)

Conference Organizations

- Organized a topic contributed session on “Sequential Designs for Computer Experiments” in Joint Statistical meetings (2013), Montreal, QC
- Organized a BISS sponsored invited session on “Sequential Designs for Computer Experiments” in Statistical Society of Canada meetings (2013), Edmonton, AB
- Local organizing committee member, SSC meetings (2011), Acadia University, Wolfville, NS
- Organized an invited session on “Sequential Designs for Computer Experiments” in Statistical Society of Canada meetings (2011), Wolfville, NS
- Organized an invited session on “Computer Experiments for Complex Environmental Processes” in Statistical Society of Canada meetings (2010), Québec City
- Chaired a contributed paper session on “Analysis of Computer Experiments and Variable Selection” in Spring Research Conference (2009), Vancouver

- Organized an invited paper session on “Statistical Issues in Complex Computational Models” (Session IPM62) in 57th ISI meetings (2009), Durban, South Africa
- Chaired a contributed paper session on “Probability” (Session 02G) in Statistical Society of Canada meetings (2005), Saskatchewan

Institute level committees (at IIM Indore)

- Interview panels: IPM, PGP and FPM
- FPM admission committee member (2015-)
- FPM (Industry) programme review committee member (2016)

University Committees (at Acadia)

- Chair of Senate Honours Committee, Acadia (2011-2013)
- Senate Honours Committee, Acadia (2009-2013)
- Honours Coordinator, Department of Math and Stats, Acadia (2011-present)
- Several departmental committees, Department of Math and Stats, Acadia

MENTORING ACTIVITIES

Student Supervision

- FPM (equiv. to Ph.D.) at IIM Indore
 - Suwarna Shukla (2016 -)
- Ph.D. thesis co-supervision (with C. Devon Lin) - Ru Zhang at Queens Univ., Ontario 2014 – .
 - Thesis: Design and Analysis of Spatio-temporal Data in Computer Experiments
- M.Sc. project co-supervision (with A. Mandal) - Natalia Shim at UGA, Athens, 2014 – .
 - Thesis: Adaptive Designs for Calibrating a Population Growth Simulator
- M.Sc. students (thesis required) - at Acadia
 - Mark Thomas (with H. Teismann, Sept 2013 -)
 - * Thesis: Inverse Problem for Computer Simulators with Time Series Response.
 - Andrew Balzer (with R. Karsten, Sept 2013 - June 2015; CANSSI funded project.)
 - * Thesis: Calibration of Tidal Power Model with Multiple Time-series Response.
 - Kanika Anand (with H. Chipman, Jan 2013 - Feb 2015)
 - * Thesis: An Expected Improvement Criterion for the Global Optimization of a Noisy Computer Simulator.

- Alex Traikov (with W. Lu, 2009-2011) [MITACS co-op at Turquoise Technology Solution Inc., Montreal; joined Spielo, Moncton]
 - * Thesis: Improving a Solar Irradiance Model using Statistical Methods.
- Mark Franey (with H. Chipman, 2008-2010) [co-op for CSEC, NSERC-CGS(M); joined the Communications Security Establishment Canada (CSEC)]
 - * Thesis: Accelerating Statistical Computing with Graphics processing units.
- Shujie Li (with H. Chipman, 2007-2009) [MITACS co-op at GenieKnows; joined the Ph.D. program in the dept. of Epidemiology and Biostatistics at McGill University]
 - * Thesis: Query Classification based on a New Query Expansion Approach.
- B. Sc. honours students (thesis required) - at Acadia
 - Matthew van Bommel (with H. Chipman, 2013-2015) [NSERC-USRA (2); best student presentation award at SSC 2014]
 - * Thesis title: Optimal Design for Placement of Tidal Turbines in the Minas Passage
 - Neil Spencer (with F. Mendivil, 2011-2013) [NSERC-USRA (2); CGS(M); best student presentation award at SSC 2014; best *communication award* (for paper presentation) in Science Atlantic conference 2011, 2012; joined the M.Sc. program in Statistics at UBC]
 - * Thesis title: Isomorphism of Spreads and Stars
 - K. Blake MacDonald (with H. Chipman, 2011-2012) [NSERC-USRA; *best presentation award* (for paper presentation) in Statistics at Science Atlantic conference 2011; joined the graduate Actuarial program at University of Waterloo]
 - * Thesis title: GPfit: A New R Package for Fitting Gaussian Process Models to Deterministic Simulators
 - Amber Corkum (with R. Karsten and R. Haynes, 2010-2011) [NSERC-USRA; joined MSc program in Statistics at Acadia University]
 - * Thesis: Particle Swarm Optimization Applied to Tidal Turbine Placement in the Minas Passage
 - Amanda Swan (with R. Karsten and R. Haynes, 2010-2011) [NSERC-USRA; joined MSc program in Mathematics at University of Alberta]
 - * Thesis: Modeling Power Output for Tidal Turbines
 - Corey Hodder (2009-2010) [NSERC-USRA, PGS(M); joined the M.Sc. program in the department of Mathematical Finance at University of Toronto]
 - * Thesis: Parameter Estimation for Deterministic Simulators with Time Series Output
 - David Ritcey (2009-2010) [NSERC-USRA; joined Dalhouse medical school]
 - * Thesis: Regression based Models for the Banker's Offers in Deal or No Deal
 - WeiWei (Vivi) Wang (with H. Chipman, 2009-2010) [Acadia-HSRA; joined Deloitte in Halifax, NS, as an accountant]
 - * Thesis: Modeling Energy Output to Optimize Tidal Turbine Placement

- B. Sc. honours thesis co-supervision (with Ronald Haynes) - Andrew Butler at Memorial University of Newfoundland, 2013.
 - Thesis: Efficient Optimization of the Likelihood Function in Gaussian Process Modelling
- Research assistants - at Acadia
 - Neil Spencer (with F. Mendivil, Summer 2013)
 - Matthew van Bommel (with H. Chipman, Summer 2013) [NSERC-USRA]
 - Blake MacDonald (with H. Chipman, Summer 2012)
 - Neil Spencer (with F. Mendivil, Summer 2011) [NSERC-USRA]
 - Carla Doyle (with John Murimboh and Clifford Stanley, Summer 2009)
 - Mark Franey (with H. Chipman, Summer 2008)
- Thesis committee - at IIM Indore
 - Ankita Chhabra (FPM 2013 - in Strategy Management at IIM Indore), Thesis Advisory Committee member (TAC Chair: Prof. Manish Popli)
- Thesis committee - at Acadia
 - Mitchell O’Flaherty-Sproul (Internal examiner - M.Sc., Mathematics, Summer 2013)
 - Sara-Lynne Jones (Chair, M.Ed., Thesis defense, 2012)
 - Luke Poirier (Thesis committee member - M.Sc., Biology, 2012-2014)
 - Yunsong Cui (Acting external - M.Sc., Statistics, April 2009)
 - Megan Lickley (Internal examiner - B.Sc., Honours thesis, February 2009)
 - Duncan MacDonald (Acting external - M.Sc., Statistics, November 2008)
 - Kathleen Wilder (Internal examiner - B.Sc. Honours thesis, Statistics, May 2008)

TEACHING ACTIVITIES

IIM Indore

- FPM (PhD)
 - Statistics for Management Research (core)
- PGP (graduate)
 - Quantitative Techniques -1 (core)
- IPM (undergraduate)
 - Statistical Methods -1 (core)

Acadia University

- Undergraduate courses
 - Elementary statistics for Math and Stats major (no textbook)
 - Elementary statistics for other life sciences and social sciences (no textbook)
 - Probability (text - “Introduction to mathematical statistics” by Hogg, McKean & Craig)
- Undergraduate courses (cross-listed for graduate students)
 - Regression (text - “Applied linear statistical models” by Kutner, Nachtsheim, Neter, Li)
 - Generalized linear models (text - “Introduction to GLM” by A. J. Dobson)
 - Nonparametric statistics (no textbook)
 - Time series (no textbook)
 - Mathematical statistics (text - “Statistical inference” by Casella and Berger)
- Graduate course
 - Introduction to computer experiments (no textbook)

Simon Fraser University

- Introduction to Mathematical Statistics (text - “Introduction to Mathematical statistics” by Hogg, McKean and Craig) - Undergraduate course