

2012 Spring Research Conference:
Enabling the Interface Between
Statistics & Engineering

June 13-15, 2012

Harvard University
Northwest Building
52 Oxford Street
Cambridge, MA 02138

List of Sessions

Wednesday, June 13

09:00-10:00	Keynote Address I	
10:30-12:00	Invited Session 1 Invited Session 2 Invited Session 3 Invited Session 4	<i>Computer Experiments I Innovation Industrial Statistics in Europe Active Learning and Sequential Design</i>
13:30-15:00	Invited Session 5 Invited Session 6 Invited Session 7 Invited Session 8	<i>Technometrics Session Classical Experimental Design Statistical Process Control Change-Point Detection</i>
15:30-17:00	Invited Session 9 Invited Session 10 Contributed Session 1	<i>Special Session on Experimental Design Reliability Machine Learning</i>
17:15-18:45	Poster Session	

Thursday, June 14

09:00-10:00	Keynote Address II	
10:30-12:00	Invited Session 11 Invited Session 12 Contributed Session 2	<i>Panel Discussion: Grant Opportunities for Industrial Statisticians New Challenges and Directions in Industrial Statistics Computer Experiments</i>
13:30-15:00	Invited Session 13 Invited Session 14 Invited Session 15 Contributed Session 3	<i>Machine Learning Computer Experiments II Journal of Quality Technology Session Design and Analysis of Experiments: Some Cutting-Edge Applications</i>
15:30-17:00	Invited Session 16	<i>Panel Discussion: Future of Industrial Statistics</i>

Friday, June 15

08:30-10:00	Invited Session 17 Invited Session 18 Invited Session 19	<i>New Directions in Optimal Experimental Design</i> <i>Statistics for Engineering Design</i> <i>Military Applications of Statistics</i>
10:30-12:00	Invited Session 20 Contributed Session 4 Contributed Session 5	<i>Modern Statistical Computing</i> <i>Quality and Reliability</i> <i>Advanced Statistical Modeling</i>

Conference Program Schedule

Day 1, Wednesday, June 13				
Time	Room B 103	Room B 104	Room B 105	Room B 108
07:30 – 08:30	Continental Breakfast and Registration			
08:30 – 09:00	Welcome and Introductory Remarks			
09:00 – 10:00	Keynote Address I			
10:00 – 10:30	Coffee Break			
10:30 – 12:00	<u>Invited Session 1</u> Computer Experiments I	<u>Invited Session 2</u> Innovation	<u>Invited Session 3</u> Industrial Statistics in Europe	<u>Invited Session 4</u> Active Learning and Sequential Design
12:00 – 13:30	Boxed Lunch			
13:30 – 15:00	<u>Invited Session 5</u> Technometrics Session	<u>Invited Session 6</u> Classical Experimental Design	<u>Invited Session 7</u> Statistical Process Control	<u>Invited Session 8</u> Change-Point Detection
15:00 – 15:30	Coffee Break			
15:30 – 17:00	<u>Invited Session 9</u> Special Session on Experimental Design	<u>Invited Session 10</u> Reliability		<u>Contributed Session 1</u> Machine Learning
17:15 – 18:45	Reception and Poster Session			

Wednesday, June 13, 8:30-9:00

Welcome and Introductory Remarks

Tirthankar Dasgupta, Department of Statistics, Harvard University

Cherry A. Murray, Dean, School of Engineering and Applied Sciences, Harvard University

Wednesday, June 13, 9:00-10:00

Plenary Session I - Chair: RYAN ADAMS, HARVARD UNIVERSITY

Visual Computing in Connectomics
HANSPETER PFISTER, HARVARD UNIVERSITY

Wednesday, June 13, 10:30-12:00

Invited Session 1: Computer Experiments I

Organizer: MAX MORRIS, IOWA STATE UNIVERSITY

Chair: THOMAS SANTNER, OHIO STATE UNIVERSITY

Computationally Efficient Use of Derivatives in Emulation of
Complex Computational Models
Brian J. Williams, Los Alamos National Laboratory

Designs for Computer Experiments with Gradient Information
Fred Hickernell, Illinois Institute of Technology

Cases for the Nugget in Modeling Computer Experiments
Robert B. Gramacy, University of Chicago

Invited Session 2: Innovation

Chair: PRADIPTA SARKAR, PROCTER & GAMBLE

Innovation, Quality Engineering, and Statistics
William H. Woodall, Virginia Tech

The Role of a Statistician in Innovation
Willis A. Jensen, W. L. Gore & Associates

Invited Session 3: Industrial Statistics in Europe

Chair: BRUCE ANKENMAN, NORTHWESTERN UNIVERSITY

Industrial Experiments Using Supersaturated Designs

Dave Woods, University of Southampton, UK

Statistical Process Control for Time Varying Processes – Cases, Issues, Ideas

Bart De Ketelaere, Katholieke Universiteit Leuven, Belgium

Analysis of Categorical Data from a Polypropylene Experiment

Steven Gilmour, University of Southampton, UK

Invited Session 4: Active Learning and Sequential Design

Organizer and Chair: ANDREAS KRAUSE, CALIFORNIA INSTITUTE OF TECHNOLOGY

The Label Complexity of Active Learning

Steve Hanneke, Carnegie Mellon University

Exploiting Saliency in Compressive and Adaptive Sensing

Jarvis Haupt, University of Minnesota

Variational Approximations of Bayesian Inference for Large Scale Automated Decision Making

Matthias W. Seeger, EPFL, Switzerland

Wednesday, June 13, 13:30-15:00

Invited Session 5: Technometrics Session

Organizer and Chair: HUGH CHIPMAN, ACADIA UNIVERSITY

Bayesian Computation Using Design of Experiments-Based Interpolation Technique

V. Roshan Joseph, Georgia Institute of Technology

Discussion

Bradley Jones, SAS Institute Inc. and David Steinberg, Tel Aviv University, Israel*

Discussion

Tirthankar Dasgupta and Xiao-Li Meng, Harvard University

Invited Session 6: Classical Experimental Design

Organizer: CHUNFANG DEVON LIN, QUEENS UNIVERSITY

Chair: ABHYUDAY MANDAL, UNIVERSITY OF GEORGIA

Templates for Design Key Construction

C. S. Cheng, University of California, Berkeley

Covariate-Adaptive Designs for Personalized Medicine

Feifang Hu, University of Virginia

On an Extension for Identifying Locally Optimal Designs for Nonlinear Models

John Stufken, University of Georgia

Invited Session 7: Statistical Process Control

Organizer: PEIHUA QIU, UNIVERSITY OF MINNESOTA

Chair: WILLIAM WOODALL, VIRGINIA TECH

Uncertainty Quantification in Change Detection

Snigdhasu Chatterjee, University of Minnesota

Monitoring the Covariance Matrix with Fewer Observations than Variables

Edgard Maboudou, University of Central Florida

Profile Control Charts Based on Nonparametric L-1 Regression Methods

Ying Wei, Columbia University

Invited Session 8: Change-Point Detection

Organizer and Chair: PAUL FEARNHEAD, LANCASTER UNIVERSITY, UK

PELT: Optimal Detection of Changepoints with a Linear Computational Cost

Rebecca Killick, Lancaster University, UK

Approximate Simulation-Free Bayesian Inference for Multiple Changepoint Models with Dependence within Segments

Nial Friel, University College Dublin

Group Fused Lasso for Multiple Change-Point Detection

Kevin Bleakley, INRIA, France

Wednesday, June 13, 15:30-17:00

Invited Session 9: Special Session on Experimental Design

Chair: TIRTHANKAR DASGUPTA, HARVARD UNIVERSITY

The Recondite Ability of Potential Outcomes in Experimental Design
Donald B. Rubin, Harvard University

Three-Phase Sequential Design for Sensitivity Experiments
C. F. Jeff Wu, Georgia Institute of Technology

Invited Session 10: Reliability

Organizer and Chair: KENNETH J. RYAN, WEST VIRGINIA UNIVERSITY

Reliability and Risk Issues and the Nuclear Deterrent
Aparna Huzurbazar, Los Alamos National Laboratory

Bayesian Multistate Models for Nuclear Power Plant Reliability
David Collins, Los Alamos National Laboratory

Application of Reliability Modeling to Non-Linear Repeated Measure
Degradation Stability Data
Fangyi Luo, Procter & Gamble

Contributed Session 1: Machine Learning

Chair: RYAN ADAMS, HARVARD UNIVERSITY

Undirected Graphical Model Selection Using Tree Decompositions: Tractable
Algorithms and Active Learning
Divyanshu Vats, University of Minnesota

Multi-Relational Learning via Hierarchical Nonparametric Bayesian Collective
Matrix Factorization
Hongxia Yang, IBM Watson Research Center

Probabilistic Hashing Methods for Fitting Massive Logistic Regressions and
SVM with Billions of Variables
Ping Li, Cornell University

Wisely Using a Budget for Crowd Sourcing
Seyda Ertekin, Massachusetts Institute of Technology

Day 2, Thursday, June 14				
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07:30 – 09:00	Continental Breakfast and Registration			
09:00 – 10:00	Keynote Address II			
10:00 – 10:30	Coffee Break			
10:30 – 12:00	<u>Invited Session 11</u> Panel Discussion: Grant Opportunities for Industrial Statisticians	<u>Contributed Session 2</u> Computer Experiments		<u>Invited Session 12</u> New Challenges and Directions for Industrial Statistics
12:00 – 13:30	Boxed Lunch			
13:30 – 15:00	<u>Invited Session 13</u> Machine Learning	<u>Invited Session 14</u> Computer Experiments II	<u>Contributed Session 3</u> Design and Analysis of Experiments: Some Cutting- Edge Applications	<u>Invited Session 15</u> Journal of Quality Technology Session
15:00 – 15:30	Coffee Break			
15:30 – 17:00	<u>Invited Session 16</u> Panel Discussion: Future of Industrial Statistics			
18:45 – 21:00	Banquet Dinner and Talk			

Thursday, June 14, 9:00-10:00

Plenary Session II - Chair: RYAN ADAMS, HARVARD UNIVERSITY

Nonparametric Bayesian Models for Sparsity, Networks, Time Series and Covariances

ZOUBIN GHAHRAMANI, UNIVERSITY OF CAMBRIDGE, UK

Thursday, June 14, 10:30-12:00

Invited Session 11: Panel Discussion – Grant Opportunities for Industrial Statisticians

Chair: PETER Z. G. QIAN, UNIVERSITY OF WISCONSIN - MADISON

Panelists:

Behzad Kamgar-Parsi, Program Officer, Mathematics, Computers and Information Research, Office of Naval Research

Mou-Hsiung (Harry) Chang, Program Manager, Probability & Statistics, Mathematical Sciences Division, U. S. Army Research Office (ARO)

Fariba Fahroo, Program Manager, Computational Mathematics, Mathematics, Information and Life Sciences Directorate, Air Force Office of Scientific Research

Invited Session 12: New Challenges and Directions in Industrial Statistics

Chair: ROBERT EASTERLING, SANDIA NATIONAL LABORATORIES

Predictive Consumer Modeling with Product Variables vs. Technical Measurements

Pradipta Sarkar, Procter & Gamble

Uncertainty Quantification and Optimization Under Uncertainty for a Hypersonic Vehicle

Andrew Booker, The Boeing Corporation

Thermal Zone Mapping in Data Center Management Using Prototype-Based Spatio-Temporal Clustering

Angela Schoergendorfer, IBM Watson Research Center

Contributed Session 2: Computer Experiments

Chair: CHIA-JUNG CHANG, GEORGIA INSTITUTE OF TECHNOLOGY
New Research Directions in Computer Experiments: Clustered Designs
Selden Cray, NewallStreet, Inc.

Designs for Computer Experiments that Minimize the Expected Integrated Mean Square Prediction Error
Erin Leatherman, Ohio State University

Integrating Analytical Models with Finite Element Models: An Application in Micromachining
Shan Ba, Georgia Institute of Technology

Adaptive Designs for Modeling and Optimization of Computer Experiments
Xu Xu, University of Wisconsin-Madison

Thursday, June 14, 13:30-15:00

Invited Session 13: Machine Learning

Organizer and Chair: CYNTHIA RUDIN, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Removing Confounding Factors via Constraint-Based Clustering: An Application to Finding Homogeneous Groups of MS Patients
Carla Brodley, Tufts University

Modeling Time Series Dependence for Scoring Sleep in Mice
Abraham Wyner, University of Pennsylvania

Learning Models of Human Action from Image and Videos on the Web
Stan Sclaroff, Boston University

Growing a List
Cynthia Rudin, Massachusetts Institute of Technology

Invited Session 14: Computer Experiments II

Organizer: DEREK BINGHAM, SIMON FRASER UNIVERSITY

Chair: BRYAN WILLIAMS, LOS ALAMOS NATIONAL LABORATORY

Multiobjective Optimization of Expensive Black-Box Functions via Expected Maximin Improvement
Thomas Santner, Ohio State University

A New Class of Alpha-Stable Processes: Modeling and Bayesian Computation
Rui Tuo, Georgia Institute of Technology

PBART: Parallel Bayesian Additive Regression Trees
Matt Pratola, Los Alamos National Laboratory

Invited Session 15: Journal of Quality Technology Session
Organizer and Chair: BRADLEY JONES, SAS INSTITUTE INC.

Algorithms and Model Spaces for Model-Robust Experiment Design
Byran J. Smucker, Miami University, Oxford, OH

I-optimal Versus D-optimal Split-plot Response Surface Designs
Peter Goos, University of Antwerp, Belgium

Contributed Session 3: Design and Analysis of Experiments: Some Cutting-Edge Applications
Chair: XINWEI DENG, VIRGINIA TECH

Simulation of a Nanoscale Experiment Satisfying a Generalized Langevin Equation
Martin Lysy, Harvard University

Optimal Design of Experiments with Linear Network Effects
Ben Parker, University of Southampton, UK

An Application of Fractional Factorial Designs to Study Drug Combinations
Jessica Jaynes, University of California, Los Angeles

Analysis of Cell Adhesion Experiments Based on Hidden Markov Models
Yijie Wang, Georgia Institute of Technology

Thursday June 14, 15:30-17:00

Invited Session 16: Panel Discussion – Future of Industrial Statistics

Chair: STEPHEN JONES, THE BOEING CORPORATION

Panelists:

C. F. Jeff Wu, Georgia Institute of Technology

Hugh Chipman, Acadia University

Bradley Jones, SAS Institute, Inc.

Steve Scott, Google, Inc.

Day 3, Friday June 15				
Time	Room B 103	Room B 104	Room B 105	Room B 108
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08:30 – 10:00	<u>Invited Session 17</u> New Directions in Optimal Experimental Design	<u>Invited Session 18</u> Statistics for Engineering Design		<u>Invited Session 19</u> Military Applications of Statistics
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10:30 – 12:00	<u>Invited Session 20</u> Modern Statistical Computing	<u>Contributed Session 4</u> Quality and Reliability		<u>Contributed Session 5</u> Advanced Statistical Modeling

Friday, June 15, 8:30-10:00

Invited Session 17: New Directions in Optimal Experimental Design

Organizer and Chair: DAVE WOODS, UNIVERSITY OF SOUTHAMPTON, UK

Optimal and Sequential Design for Bridge Regression
Sarah Carnaby, University of Southampton, UK

Multi-Objective Optimal Experimental Designs for Event-Related fMRI Studies
Abhyuday Mandal, University of Georgia

Optimal Design for Partial Likelihood in Survival Analysis
Jesús López Fidalgo, Universidad de Castilla-La Mancha, Spain

Invited Session 18: Statistics for Engineering Design

Organizer and Chair: DANIEL D. FREY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

An Information-Theoretic Metric of System Complexity with Application to Engineering System Design
Douglas Allaire, Massachusetts Institute of Technology

Support Vector Autoregression in the Structural Health Monitoring Paradigm
Luke Bornn, University of British Columbia, Canada

The “New” Matrix Statistics of Random Matrix Theory and the Julia Programming Language
Alan Edelman, Massachusetts Institute of Technology

Invited Session 19: Military Applications of Statistics

Organizer and Chair: DAVID W. WEBB, U.S. ARMY RESEARCH LABORATORY

Space Filling and Optimal Experimental Designs for Use in Studying Computer Simulation Models with an ISR Application
Rachel Silvestrini, Naval Postgraduate School

Methodological Considerations and Statistical Modeling of U.S. Army Mental Health
M. Shayne Gallaway, Army Institute of Public Health

Development of Non-linear Mixed Effects Models for Assessing Effectiveness of Spending in Iraq

Maj. Nicholas J. Clark, United States Military Academy

Friday, June 15, 10:30-12:00

Invited Session 20: Modern Statistical Computing

Chair: NATESH PILLAI, HARVARD UNIVERSITY

A Bayesian View of Sliced Inverse Regression with Interaction Detection

Jun Liu, Harvard University

Practices and Perils in Multiphysics Simulations

Efthimios Kaxiras, Harvard University

Statistical Computation and Computational Statistics:

An Interweaving Perspective

Xiao-Li Meng, Harvard University

Contributed Session 4: Quality and Reliability

Chair: WILLIS JENSEN, W. L. GORE & ASSOCIATES

EWMA p Charts Under Sampling by Variables — Ideas, Numerics and Properties

Sven Knoth, Helmut Schmidt University, Hamburg

Robust Leak Tests for Transmission Systems Using Nonlinear Mixed-Effect Models

Kamran Paynabar, Georgia Institute of Technology

A Class of Tests for Exponentiality Against NBUE Alternatives

M.Z. Anis, Indian Statistical Institute

Process Monitoring and Feedforward Control for Proactive Quality Improvement

Lihui Shi, University of Washington-Seattle

Contributed Session 5: Advanced Statistical Modeling

Chair: MARTIN LYSY, HARVARD UNIVERSITY

Parabolic SPDEs Driven by a Levy Noise and their Numerical Approximation

Silika Prohl, Princeton University

A Nonparametric Approach for Multiple Change Point Analysis of Multivariate Data

David S. Matteson, Cornell University

Tractable Functional Response Modelling with Processes with Non-Separable Covariance Functions

Matthew A. Plumlee, Georgia Institute of Technology