

Peter Yun Zhang

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Education

PhD in Engineering Systems (2013 – present)
Massachusetts Institute of Technology; advisor: David Simchi-Levi

MASc in Mechanical and Industrial Engineering (2011 – 2013)
University of Toronto; advisor: Cristina Amon

BASc in Engineering Science, with Honours (2005 – 2011)
University of Toronto

BMath candidate, University of Waterloo (2004 – 2005)

Honours and Awards

Hatch Graduate Scholarship for Sustainable Energy Research (\$10,000/year), 2011 – 2013

UofT MIE Graduate Fellowships (\$4,950/year), 2011 – 2013

Gordon Cressy Student Leadership Award (UofT), 2013

NSERC Undergraduate Student Research Award, (\$4,500), 2011

UofT ECE Summer Research Assistantship, (\$6,000), 2006

National René Descartes Scholarship (\$18,000), 2004

Bronze medal, 35th International Physics Olympiad, 2004

Ranked 1st across Canada in national mathematics competition for high school seniors (Euclid), 2004

Research Experience

1. Wind farm layout optimization: decomposition models and robust mixed-integer programs (MASc thesis, September 2011 – present)

Current: using **robust optimization** to capture uncertainty in the design, for example, long-term wind resource uncertainty, with **mixed-integer programs**.

Completed: (1) design and implementation (C++) of a **multi-objective genetic algorithm** for energy generation and noise propagation; and (2) a novel **decomposition method** inspired by Benders decomposition that incorporates a state-of-the-art physics model.

2. Offline/online scheduling and simulation for a large-scale data centre with heterogeneous servers (summer research with NSERC Undergraduate Student Research Award, May – August 2011)

Designed and implemented a **discrete-event simulation** program to test the offline and online **scheduling and dispatch** policies for stochastically distributed jobs in a heterogeneous and large-scale data centre.

3. Redefining affluence in China: carbon emission from private transportation (BASc thesis, September 2010 – April 2011)

Discovered a “naturally” occurring experiment: variations in metropolitan policies have led to dramatically different vehicle ownership levels across China.

Constructed a bottom-up, quantitative model to predict China’s future carbon emissions from private transportation.

4. Peer-to-peer streaming protocol design with network coding components (undergraduate summer research, May – August 2006)

Implemented a peer-to-peer software to analyze and optimize the performance of various P2P streaming protocols on a large-scale simulation testbed.

Elicited empirical evidence for the advantages of implementing an **information theoretical** component (network coding) in the P2P network.

Publications

Journal Articles

1. Turner, S. D. O., **Zhang, P. Y.**, Romero, D., Chan, T. C. Y. A new mathematical programming approach to optimizing wind farm layouts (accepted at *Renewable Energies*).
2. **Zhang, P. Y.**, Romero, D., Beck, J. C., Amon, C. Solving Wind farm layout optimization with mixed integer programs and constraint programs (submitted to *EURO Journal on Computational Optimization*).
3. Kwong, P., **Zhang, P. Y.**, Romero, D., Moran, J., Morgenroth, M., and Amon, C. Multi-objective wind farm layout optimization with non-dominated sorting genetic algorithm (NSGA-II) (submitted to *ASME Journal of Mechanical Design*).

Refereed International Conference Articles

1. **Zhang, P. Y.**, Metcalfe, M., Cheng, Y.-L. Redefining affluence in China: carbon emission from private transportation. *The 3rd Climate Change Technology Conference*, Montreal, Quebec, May 27-29, 2013.
2. **Zhang, P. Y.**, Romero, D., Beck, J. C., Amon, C. Solving wind farm layout optimization with mixed-integer programming and constraint programming. *CPAIOR 2013: 10th International Conference on Integration of Artificial Intelligence and Operations Research Techniques in Constraint Programming*, IBM T. J. Watson Research Center, Yorktown Heights, New York, May 18-22, 2013.
3. Kwong, P., **Zhang, P. Y.**, Romero, D., Moran, J., Morgenroth, M., and Amon, C. Wind farm layout optimization considering energy generation and noise propagation. *Proceedings of the ASME International Design Engineering Technical Conferences*, Chicago, Illinois, August 12-15, 2012.

International Conference Presentations

1. Solving wind farm layout optimization with mixed-integer programming and constraint programming.
CPAIOR 2013: 10th International Conference on Integration of Artificial Intelligence and Operations Research Techniques in Constraint Programming (May 18-22, 2013, IBM T. J. Watson Research Center, Yorktown Heights, New York)
2. Robust wind farm layout optimization with mixed-integer programming.
Institute for Operations Research and the Management Sciences Annual Meeting (Oct 14-17, 2012, Phoenix)
3. Wind farm layout optimization considering energy generation and noise propagation.
American Society of Mechanical Engineers International Design Engineering Technical Conferences (Aug 12-15, 2012, Chicago)

Teaching Assistantship

MIE1240 Wind Power (graduate course), Fall 2012

MIE468 Facility Planning (undergrad senior course), Winter 2013

Professional Activities

1. Student member of:

American Society of Mechanical Engineers (ASME)
Canadian Operational Research Society (CORS)
Institute for Operations Research and the Management Sciences (INFORMS)
Institute of Industrial Engineers (IIE)

2. Executive committee member of:

Canadian Operational Research Society Toronto Student Chapter
The Operations Research Challenge (TORCH, an OR competition for high school students)
University of Toronto Operations Research Group (UTORG)

Internship

Analyst, Hubei High-tech Investment Ltd., 2010 (summer)

Prepared due diligence report for various electronics manufacturing companies

Business analyst and software developer, Deckchair Learning Systems, 2009 – 2010

Customer requirement gathering and software design for referee examination (Ontario Hockey League)

Design and implementation of multi-media contents for user action data tracking

Computer Skills

Languages: C/C++, Java; PHP, HTML/CSS

Scientific Computing: MATLAB

Mathematical Modelling: CPLEX, Gurobi, AMPL, YALMIP

Extracurricular Activities

Question Master, The Operations Research Challenge, 2012 – 2013

Consolidating competition questions and preparing training sessions for a total of 100 contestants and 20 teaching assistants

Co-authored a federal grant application (NSERC PromoScience)

Event Coordinator, University of Toronto Operations Research Group, 2012 – 2013

Co-organizing biweekly academic events, mainly research talks given by professors and graduate students from UofT MIE, Rotman, and other universities

Director of Research, SocialSpark, 2012

Developed curriculum in the sustainable energy and healthcare areas for students from UofT, Western, and Ryerson University

Co-founder, Nspire Innovation Network, 2008 – 2010

Seminar and conference delivery and promotion, hosting more than 600 students and young professionals from six different universities and colleges in Ontario

President, Engineering Chinese Club, University of Toronto, 2008 – 2009

Delivered 6 events, such as internship workshop, graduate school application seminar, for over 100 UofT students

Fundraised over \$10,000 for disaster relief in Asia