Yi Ren

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Education

University of Michigan, Ann Arbor, MI 2011
Ph.D. , Mechanical Engineering
Advisor: Panos Y. Papalambros
Committee members: Richard Gonzalez, Noboru Kikuchi, George Michailidis
Dissertation: *Design Preference Elicitation, Identification and Estimation*

University of Michigan, Ann Arbor, MI 2009
Master of Science, Mechanical Engineering
Thesis: *An Interactive Modeling Environment For Automotive Exterior Design*

Tsinghua University, Beijing, China 2007
Bachelor of Engineering, Automotive Engineering

Research Interests

Interactive design, crowdsourcing, machine learning

Research Experiences

University of Michigan, Ann Arbor, MI 2012 - present
Research Fellow, Optimal Design Laboratory
I work with Professors Panos Y. Papalambros on developing interactions for creating innovative design solutions. My current research projects include: (1) developing efficient interactions and learning mechanisms to enhance design crowdsourcing; (2) tailoring statistical learning methods to reveal consumer perceptual tradeoffs between product styling and functions; and (3) optimal design and control of hybrid powertrain architectures.

University of Michigan, Ann Arbor, MI 2008 - 2011
Research Assistant, Optimal Design Laboratory
My research introduced machine learning and evolutionary computation to power crowd-scale interactive design preference elicitation.

Tsinghua University, Beijing, China 2003
Undergraduate Research Assistant, Department of Automotive Engineering
I developed material and geometry models of the honeycomb structure used in crush simulations.

Publications

Journal Articles

[1] **Ren, Y.** and Papalambros, P. Y., "A Design Preference Elicitation Query as an Optimization Process", *ASME Journal of Mechanical Design*, volume 133, issue 11, 2011.

Conference Papers

[2] **Ren, Y.** and Papalambros, P. Y., "Design Preference Elicitation, Derivative-Free Optimization and Support Vector Machine Search", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2010-28475, 2010.

[3] **Ren, Y.** and Papalambros, P. Y., "Design Preference Elicitation: Exploration and Learning", *In Proceedings of the 18th International Conference on Engineering Design*, volume 10, page 149-158, 2011.

[4] **Ren, Y.** and Papalambros, P. Y., "Design Preference Elicitation Using Efficient Global Optimization", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2011-48316, 2011.

[5] **Ren, Y.** and Papalambros, P. Y., "On the Use of Active Learning in Engineering Design", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2012-70624, 2012.

[6] **Ren, Y.** and Papalambros, P. Y., "On Design Preference Elicitation with Crowd Implicit Feedback", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2012-70605, 2012.

[7] **Ren, Y.**, Scott, C. and Papalambros, P. Y., "A Scalable Preference Elicitation Algorithm Using Group Generalized Binary Search", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2013-13059, 2013.

[8] Burnap, A., **Ren, Y.,** Papalambros, P. Y., Gonzalez, R. and Gerth, R., "A Simulation Based Estimation of Crowd Ability and its Influence on Crowdsourced Evaluation of Design Concepts", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2013-13020, 2013.

[9] Bayrak, A. E., **Ren, Y.,** and Papalambros, P. Y., "Optimal Design of Hybrid-Electric Vehicle Architectures Using Auto-Generation of Feasible Driving Modes", *In Proceedings of the ASME International Design Engineering Technical Conferences*, DETC2013-13043, 2013.

[10] **Ren, Y.,** Burnap, A. and Papalambros, P. Y., "Quantification of Perceptual Design Attributes Using a Crowd", *In Proceedings of the 19th International Conference on Engineering Design*, 2013.

Grants and Awards

Co-author of funded NSF grant titled "Creativity through Collaborative Human-Machine Interactions: A Formal Approach to Design Crowd Sourcing." **$642,574 USD** (2013)
Rackham Conference Travel Grant, University of Michigan (2010, 2011)
Outstanding Undergraduate Thesis, Tsinghua University (2007)
National "Challenge Cup" Award, Third Prize, Tsinghua University (2006)
Honeywell Scholarship, Tsinghua University (2004)

Service

Reviewing
ASME Journal of Mechanical Design
Journal of Engineering Design
ASME International Design Engineering Technical Conference

Membership
Member of the American Society of Mechanical Engineers (2009 - present)
Member of IEEE (2012 - present)

Presentations

[1] An Interactive Modeling Environment for Automotive Exterior Design.
15th Automotive Research Center Conference, Ann Arbor, MI, May. 13 2009.

[2] Design Preference Elicitation, Derivative-Free Optimization and Support Vector Machine Search.
ASME International Design Engineering Technical Conferences, Montreal, Canada, Aug. 18 2010.
[3] Design Preference Elicitation.
Design Science Colloquium, University of Michigan, Ann Arbor, MI, Sept. 15, 2010.
[4] Design Preference Elicitation: Exploration and Learning.
ASME International Design Engineering Technical Conferences, Washington DC, Aug. 28, 2011.
[5] HEV Powertrain Architecture Exploration Using Bond Graphs.
18th Automotive Research Center Conference, Ann Arbor, MI, May. 21, 2012.
[6] A Simulation Study of Crowd Abilities on Crowdsourced Evaluation of Design Concepts.
19th Automotive Research Center Conference, Ann Arbor, MI, Apr. 19, 2013.

Teaching Experiences

Design Optimization (ME555), University of Michigan, Ann Arbor 2013
Instructor
The course covered theoretical foundations of nonlinear programming and numerical methods, including both gradient-based and derivative-free algorithms. I also provided tutorials on modeling and optimization with Matlab, AMESim and Optimus.

Design Optimization (ME555), University of Michigan, Ann Arbor 2009, 2011
Teaching Assistant with Prof. Panos Papalambros
I gave lectures on design of experiments and derivative-free optimization, consulted course projects, and helped developing course exams.

Design and Manufacturing (ME350), University of Michigan, Ann Arbor 2010
Teaching Assistant with Michael Umbriac
I guided student teams in the design competition and held discussion sessions and labs (ADAMS).

References

Panos Y. Papalambros
Professor, Mechanical Engineering
University of Michigan, Ann Arbor
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Richard Gonzalez
Professor, Psychology
University of Michigan, Ann Arbor
gonzo@umich.edu (734) 647-6785

Clayton Scott
Associate Professor, EECS
University of Michigan, Ann Arbor
clayscot@umich.edu (734) 615-3656

Fred Feinberg
Professor, Business School
University of Michigan, Ann Arbor
feinf@umich.edu (734) 764-4711