Curriculum Vitae

a. Candidate Information

a.1. Personal

a.1.1 Name
- Mian LI

a.1.2 Education
- **Ph.D.** (Best Dissertation Award) Major: Design and Reliability Systems
Sept 2007, Department of Mechanical Engineering, University of Maryland, College Park, MD, USA
Robust Optimization and Sensitivity Analysis with Multi-Objective Genetic Algorithms: Single- and Multi-disciplinary Applications, Advisor: Dr. S. Azarm, Professor

- **M.S.** Major: Control Theory and Control Engineering
July 2001, Department of Automation, Tsinghua University, Beijing, China

- **B.E.** Major: Automation

  July 1999, Department of Automation, Tsinghua University, Beijing, China

a.1.3 Positions at UM-SJTU JI (titles and dates)
- Associate Professor, March 2012 – Present
- Assistant Professor, Sept 2009 – February 2012

a.1.4 Positions at other institutions or organizations (titles and dates)
- Associate Professor (Adjunct), ME School of SJTU, July 2010 – Present
- Research Associate, January 2009 – August 2009

a.2 Honors and Awards

- 35th ASME Design Automation Conference Best Paper Award, San Diego, CA, USA 2009

  Presented by ASME Design Engineering Division, Design Automation Committee

- Best Ph.D. Dissertation Award, Mechanical Engineering, University of Maryland, 2007

  One receiver each year, $1000 cash award

- Member of the Honor Society of Phi Kappa Phi, University of Maryland, Chapter 22, 2007

  Nation's oldest and largest all-discipline honor society, by invitation only, top 10% of graduate students

b. Teaching

b.1 New courses introduced at UM-SJTU JI
- Course number /title
  - Vm452: Design for Manufacturability
    The objectives of Vm452 are to: review major steps in the product development process and the significance of early phases of design; introduce fundamental principles of design and discuss applications of these principles; introduce concepts for design of systems for ease of assembly, manufacture, and other

issues; discuss interrelations among part geometry, tolerances, materials and manufacturing processes; and introduce principles of parametric study, design optimization, and robust design

o Vm555: Engineering Optimization
The course objectives of Vm555 are to: Review and discuss basic optimality theorems and conditions; Introduce theoretical methods for single-objective continuous optimization problems; Present an overview of computational methods for single- and multi-objective engineering optimization problems, mainly with continuous design variables; and Introduce practical optimization software, such as Matlab optimization toolbox and Excel.

o Vm660: Engineering Decision Making
Making decisions under conditions of risk and uncertainty is a fundamental part of every engineer and manager's job, whether the situation involves product design, investment choice, regulatory compliance, human health and safety, or public policy. This course will provide students with both qualitative and quantitative tools for structuring problems, describing uncertainty, assessing risks, and reaching decisions, using a variety of case studies. Multiple methods will be introduced, emphasizing the natural connections between probabilities, utility, decision-making, sensitivity analysis and preference.

b.2 Courses taught at UM-SJTU JI
(Please list course taught in reverse chronological order with the most recent semester first. Do not list student evaluations here since the casebook committee will summarize them)

Course #	Course title	Teaching Role[1]	Term
Vm555	Engineering Optimization	Instructor	Fall 2012
Vm450	Design and Manufacturing III (Capstone)	Instructor	Summer 2012
Vm250	Design and Manufacturing I	Instructor	Summer 2012
Vm660	Engineering Decision Making	Instructor	Fall 2011
Vm450	Design and Manufacturing III (Capstone)	Co-instructor	Fall 2011
Vm250	Design and Manufacturing I	Instructor	Summer 2011
Vm555	Engineering Optimization	Instructor	Fall 2010
Vm450	Design and Manufacturing III (Capstone)	Co-instructor	Summer 2010
Vm250	Design and Manufacturing I	Instructor	Summer 2010
Vm452	Design for Manufacturability	Instructor	Fall 2009

b.3 Ph.D. Committees chaired/co-chaired

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[1] Instructor, Co-instructor, Recitation/discussion leader, etc.

- Name of student, year or anticipated year of graduation, thesis title, chair or co-chair, student current position. Please include all current and formerly supervised students. Suggested format:
  1. Jing WANG, August 2015, "Reliability Improvement for Complex Engineering Systems". Chair. (Current position: PhD student at UM-SJTU JI)
  2. Jianhua ZHOU, August 2015, "Robust Optimization with Interval Uncertainty". Chair. (Current position: PhD student at UM-SJTU JI)
  3. Yanjun ZHANG, August 2017, "Sensitivity Analysis with Interval Uncertainty". Chair. (Current position: PhD student at UM-SJTU JI)
  4. Bin WANG, August 2013, "Design Optimization of Electrical Vehicles". Co-chair. (Current position: PhD student at ME school)

b.4 M.S. students advised/co-advised
- Name of student, year or anticipated year of graduation, thesis title, student current position, chair or co-chair. Use same format as b.3.

  1. Jiaqi XI, April 2014, "Kalman Filter Based Control Methods for System with Uncertainty". Chair. (Current position: MS student at UM-SJTU JI)
  2. Shuo CHENG, April 2014, "Reliability Design for Engineering Systems". Chair. (Current position: MS student at UM-SJTU JI)
  3. Wenhao ZHOU, April 2015, "Multi-agent Based Design and Control for Multi-source Energy Systems". Chair. (Current position: MS student at UM-SJTU JI)
  4. Sen XIANG, April 2015, "Design and Optimization for Control Strategy of Electric Vehicles". Chair. (Current position: MS student at UM-SJTU JI)
  5. Minfan, FU, April 2013, "Large Power Wireless charging Systems". Co-chair. (Current position: MS student at UM-SJTU JI)

b.5 Undergraduate major projects directed
- Include project title, number of students involved and year.
  1. Instructor of *SJTU Student Formula Car Racing Team*, starting from Nov. 2011, 45 undergraduate students.
  2. Instructor of "Gold Award" Capstone team: *Design and Implementation of a Modular Electric Vehicle Configuration*, Summer 2012, 5 senior students.
  3. Instructor and sponsor of "Gold Award" Capstone team: *Close-wheel Powertrain*, Fall 2011, 5 senior students.
  4. Instructor of JI team for *2012 National Instrument Graduation Project Competition*, 3rd price, 4 senior students.
  5. Instructor of 2012 Students Innovation Contest (National level) project, *Portable water-extracting device based on bionic technology and solar energy*, "Excellent" rank, 5 senior students.
  6. Instructor of 18th PRP project *Design and optimization of PID control system for a High Speed Blow-down Wind Tunnel*, Fall 2010- Summer 2011, 4 undergraduate students.
  7. Instructor of 17th PRP project Multi-agent simulation in system design, Summer 2010, 3 undergraduate students.

b.6 Short courses and workshops taught

- Indicate course, location or institution, date, enrollment, nature of participation.

b.7   Outreach directly related to teaching

b.8   Other
     (e.g., Scholarly work in education.)

c.   Research

c.1   Research programs underway
Include a brief description of each research area and information regarding involvement of graduate and undergraduate students, research staff, and other faculty, both inside and outside the UM. Include outreach if that is part of research projects.

- Design optimization for complex engineering systems under uncertainty (Students: Jiahua Zhou, Shuo Cheng)
  Develop novel efficient single-/multi-objective optimization methods for design optimization of multi-disciplinary engineering systems under interval uncertainty
- Energy flow analysis and optimization of electric vehicles and multi-source energy systems (Students: Sen Xiang, Wenhao Zhou, Bin Wang (from ME school))
  Use different efficient simulations and tools to analyze the mechanism of the energy flow in multi-source energy systems (e.g., electrical vehicles, smart grids); focus on systems' dynamic performance under different usage conditions and/or scenarios; develop and optimize energy control strategies considering both system performance and cost.
- Reliability analysis and improvement for complex engineering systems (Students: Jing Wang, Shuo Cheng)
  Use different decision making tools (e.g., FMEA, fault tree, AHP, etc.) to analyze system reliability; improve system reliability with the minimum cost; redundancy allocation optimization for reliability and cost.
- Intelligent control strategies and methods (Jiaqi, Xi, Xiang Liu (from ME school))
  Develop and implement intelligent control methods and controllers considering the uncertainty in measurements and experiments; focus on systems with dynamic behaviors, like blown-down wind tunnels, e-drive motors, etc.

c.2   Past grants and contracts
Include sponsor, project title, dates, amount, names of principal investigators and/or co-principal investigators, candidate's share and number of GSRAs supported by grant or contract. **Grants and contracts must be sequentially numbered by start date, in reverse chronological order (newest item first).** Suggested format:

1. *Science and Technology Commission of Shanghai Municipality*, "Reliability analysis for complex information intelligent systems", RMB 150K, 6/2010 – 12/2011. PI: Mian LI.
2. *Science and Technology Commission of Shanghai Municipality,* "Development of Horizontal Opposite Piston Boxer Engine", RMB 5000K, 09/2008 – 12/2011. PI: Min Xu (ME school), co-PI: Yunyin Zhang (ME), Tie Li (ME), Mian Li.
3. *General Motors Company and General Motors China Inc.,* "Investigation and research the technological options for developing low cost electric vehicle", RMB 280K, 11/2010 – 10/2011. PI: Mian Li.
4. *Science and Technology Commission of Shanghai Municipality,* "BaiYuLan Fund for ASME IDETC 2010 conference", RMB 20K, 9/2010 – 9/2011. PI: Mian LI.

c.3   Current grants and contracts
Include sponsor, project title, dates, amount, names of principal investigators and/or co-principal investigators, candidate's share and number of GSRAs supported by grant or contract. Follow c.2 for format of listing

1. *Hang Tian Xin Chang Zheng Electric Vehicle Technology Ltd. (航天新长征电动汽车技术有限公司)*, "Powertrain System and Control Policy Optimization for Hybrid City Buses", RMB 150K, 06/2012 – 12/2012. PI: Mian LI.
2. Ministry of Education, Startup funding, RMB 40K, 06/2012. PI: Mian LI.
3. *BOSCH (China)*, "Powertrain topology research and comparison", RMB 3000K, 04/2011 – 04/2014. PI: Min Xu (ME), co-PIs: Mian LI, Lin Feng (EE).
4. *SGMW(上汽通用五菱)*, "Advanced Manufacturing Technologies on Engine Development (2 微米工程)", RMB 3800K, 03/2010– 03/2014. PI: Min Xu (ME school), co-PIs: Sun Jin (ME), Tie Li (ME), Mian Li.

c.4   New research directions **(one page maximum)**
Provide a narrative description of any new research planned, including proposed research in pending grants listed in c.5. Follow c.2 for format of listing.

- Design optimization of electric vehicles with parameterized simulation (Students: Sen Xiang, Jianhua Zhou, Bin Wang (from ME school))
  Model-based optimization and design of electric vehicles is one of the critical and ongoing research issues around world, especially for automobile industries. Accurate simulation models provide an indispensable, efficient and effective way for the evaluation, analysis and development of EVs. Based on the developed MATLAB/Simulink model, certain energy components (e.g. engine, solar panel) in the system and energy control strategies (e.g. energy management scheme) need to be consummated and improved further. To be more specific, to analysis and achieve the optimal energy solutions of electric-drive vehicles, the developed simulation model need to be parameterized for those important components. For example, the engine models can be modified using Willans line method to reflect the characteristics (e.g. performance and fuel consumption) of various displacements. Since the limited battery capacitor and restricted energy economy requirements, the different driving scenarios of EVs should be analyzed and proposed to achieve the most efficient energy usage. Using global optimization algorithms, the reconfiguration of key components and regulation of control strategies will be implemented under pre-determined application scenarios.
- Reliability improvement with minimum cost of engineering systems (Students: Jing Wang, Shuo Cheng)
  Reliability analysis and improvement plays an important role in complex system design such as Electric Vehicles (EV) powertrain system. However, the tradeoff between high reliability and low cost has always been a common issue and also a dilemma especially in early design procedure. Therefore, how to significantly improve the reliability of the entire system while maintaining a minimum cost is a critical issue in improving the quality of a product as well as the profitability of a company, and it is also the part of the content that we would like to deal with in this proposal. The project goals are to identify most critical components in the EV powertrain system using Analytic Hierarchy Process (AHP) and conduct reliability analysis and Failure Modes, Effects and Criticality Analysis (FMECA), investigating the effect of failure propagation in the system, and then improve the overall reliability of EV powertrain system with the minimum cost.

c.5 Pending grants and contracts
List proposals that are pending. Include sponsor, project title, amount, names of principal investigators and/or co-principal investigators, candidate's share and number of GSRAs supported by grant or contract and submission date. Follow c.2 for format of listing

1. *General Motors Company and General Motors China Inc.,* "Energy-Based Design Optimization for Electric Vehicles", RMB225K, 11/2012 – 10/2013.
2. *General Motors Company and General Motors China Inc.,* "Reliability Improvement of EV Powertrain System with Minimum Cost", RMB225K, 11/2012 – 10/2013.

c.6 Publications and scholarly presentations
NOTES:
Publications in each category below must be sequentially numbered in reverse chronological order (newest items first). CVs without numbered publications will not be accepted for review.

Publication format may vary by discipline but should be consistent in casebook.
- Underline the names of current graduate student(s) to whom you've provided significant guidance listed among the authors;
- Double underline the names of former graduate student(s) to whom you've provided significant guidance listed among the authors;
- Undergraduate students should be single underlined and noted by an asterisk * after their name.

The preferred format in the Provost's office is for journal names to be spelled out (i.e. not abbreviated). If this is not possible, then the abbreviations must be included, along with the full journal names, in the qualitative ranking list of journals in the casebook template.

c 6.1 Full articles in refereed publications
(Full articles in refereed journals, transactions, or archives that have appeared or have been accepted only)

1. Wang, J., and M. Li, 2012, "Optimal Redundancy Allocation for Systems with Failure Interactions using Modified Analytic Hierarchy Process", *Reliability Engineering & System Safety* (under review).
2. Wang, J., M. Li, 2012, "Reliability-based Design for Web-based Information Analysis Systems Using Axiomatic Design and Fault Tree Analysis," *Research in Engineering Design* (under review).
3. Zhou, JH., S. Cheng, M. Li, 2012, "Sequential Quadratic Programming for Robust Optimization with Interval Uncertainty", *Journal of Mechanical Design*, 2012 (forthcoming).
4. Zhao, JX., M. Xu, M. Li, B. Wang, SZ. Liu, 2012, "Design and Optimization of an Atkinson Cycle Engine with the Artificial Neural Network Method," *Applied Energy* (forthcoming).
5. Li, M., 2011, "An Improved Kriging Assistant Multi-Objective Genetic Algorithm," *Journal of Mechanical Design*, Vol.133, No. 7, 071008/1 – 071008/10.
6. Li, M., S. Gabriel, Y. Shim, and S. Azarm, 2011, "Robust Optimization Using Worst Case Analysis for Convex and Non-Convex Quadratic Programs," *Networks and Spatial Economics*, 11, pp.159–191.
7. Hu, W., M. Li, S. Azarm, S. Al Hashimi, A. Almansoori, and N. Al Qasas, 2011, "On Improving Multi-Objective Robust Optimization under Interval Uncertainty

Using Worst Possible Point Constraint Cuts," *Journal of Mechanical Design*, Vol.133, No. 6, 061002/1 - 061002/9.

8. Hamel, J., M. Li, S. Azarm, 2010, "Design Improvement by Sensitivity Analysis (DISA) Under Interval Uncertainty Using Multi-Objective Optimization," *Journal of Mechanical Design*, Vol. 132, No.8, 081010/1- 081010/10.

9. Li, M., J. Hamel and S. Azarm, 2010, "Multi-Disciplinary Multi-Output Global Sensitivity Analysis with Reducible Interval Uncertainty," *Structural and Multidisciplinary Optimization*, Vol. 40, No.1-6, pp.77-86.

10. Li, M., S. Azarm, N. Williams, S. Al Hashimi, A. Almansoori, and N. Al Qasas, 2009, "Integrated Multi-Objective Robust Optimization and Sensitivity Analysis with Irreducible and Reducible Interval Uncertainty," *Engineering Optimization*, Vol.41, No.10, 889-908.

11. Li, M., N. Williams and S. Azarm, 2009, "Interval Uncertainty Reduction and Sensitivity Analysis with Multi-Objective Design Optimization," *Journal of Mechanical Design*, Vol. 131, No.3, 031007/1 – 031007/11.

12. Li, G., M. Li, S. Azarm, N. Al Qasas, T. Al Ameri, and S. Al Hashimi, 2009, "Improving Multi-Objective Genetic Algorithms with Adaptive Design of Experiments and Online Metamodeling," *Structural and Multidisciplinary Optimization*, Vol. 37, No. 5, pp. 447-461.

13. Li, M., and S. Azarm, 2008, "Multiobjective collaborative Robust Optimization (McRO) with Interval Uncertainty and Interdisciplinary Uncertainty Propagation," *Journal of Mechanical Design*, Vol. 130, No.8, 081402/1 – 081402/11.

14. Li, M., G. Li and S. Azarm, 2008, "A Kriging Metamodel Assisted Multi-objective Genetic Algorithm for Design Optimization," *Journal of Mechanical Design*, Vol. 130, No.3, 031401/1 – 031401/10.

15. Li, G., M. Li, S. Azarm, J. Rambo, Y. Joshi, 2007, "Optimizing thermal design of data center cabinets with a new multi-objective genetic algorithm," *Distributed and Parallel Databases*, Vol. 21, No. 2-3, pp.167-192.

16. Li, M., S. Azarm, and A. Boyars, 2006, "A New Deterministic Approach Using Sensitivity Region Measures for Multi-objective Robust and Feasibility Robust Design Optimization," *Journal of Mechanical Design,* Vol. 128, No.4, pp. 874-883.

c 6.2.   Shorter communications, letters or notes or briefs in refereed publications

c 6.3   Refereed conference or symposium proceedings papers

1. Wang, B., M. Li, M. Xu, Energy-Based Modeling and Optimization for Energy Economy of Electric Vehicles. FISITA2012, November 27-30, Beijing, China (accepted).

2. Zhou, JH., S. Cheng, M. Li, Sequential Quadratic Programming for Robust Optimization with Interval Uncertainty. *IDETC/CIE 2012, ASME 2012 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Aug.12-15, Chicago, Illinois, USA.

3. Liu, X., **M. Li**, C. Ma, M. Xu, Kriging Assisted On-line Torque Calculation for Brushless DC Motors Used in Electric Vehicles. *21th IEEE International Symposium on Industrial Electronics*, ISIE 2012, May 28-31, Hangzhou, China.

4. Liu, X., C. Ma, **M. Li**, M. Xu, A Kriging Assisted Direct Torque Control of Brushless DC Motor for Electric Vehicles. *7th International Conference on Natural Computation*, ICNC 2011, v3, pp. 1705-1710,2011.

5. **Li, M.**, 2010, "An Improved Kriging Assistant Multi-Objective Genetic Algorithm," *IDETC/CIE 2010, ASME 2010 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, August 15-18, 2010, Montreal, Quebec, Canada.

6. **Li**, **M.**, N. Williams and S. Azarm, 2009, "Interval Uncertainty Reduction and Sensitivity Analysis with Multi-Objective Design Optimization," *IDETC/CIE 2009, ASME 2009 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, August 30 - September 2, San Diego, California, USA.

7. Hamel, J., **M. Li,** and S. Azarm, 2009, "A Sensitivity Analysis Based Approach to Ensure Design Feasibility under Interval Uncertainty," *IDETC/CIE 2009, ASME 2009 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, August 30 - September 2, San Diego, California, USA.

8. Hu, W., **M. Li**, S. Azarm, S. Al Hashimi, A. Almansoori, and N. Al Qasas, 2009, "On Improving Multi-Objective Robust Optimization under Interval Uncertainty Using Worst Possible Point Constraint Cuts," *IDETC/CIE 2009, ASME 2009 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, August 30 - September 2, San Diego, California, USA.

9. **Li**, **M.**, J. Hamel, and S. Azarm, "Multi-Disciplinary Multi-Objective Sensitivity Analysis (MIMOSA) with Interval Parameter Uncertainty," *12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Victoria, British Columbia, Canada, September 10-12, 2008.

10. **Li**, **M.**, and S. Azarm, "Multiobjective collaborative Robust Optimization (McRO) with Interval Uncertainty and Interdisciplinary Uncertainty Propagation," *Proceedings of IDETC/CIE 2007, ASME 2007 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, DETC2007-34818, Las Vegas, Nevada, September 4-7, 2007.

11. **Li**, **M.**, G. Li and S. Azarm, "A Kriging Metamodel Assisted Multi-objective Genetic Algorithm for Design Optimization," *Proceedings of IDETC/CIE 2006, ASME 2006 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, DETC2006-99316, Philadelphia, Pennsylvania, September 10-13, 2006.

12. **Li**, **M.**, S. Azarm, and A. Boyars, "A New Deterministic Approach Using Sensitivity Region Measures for Multi-objective Robust and Feasibility Robust Design Optimization," *Proceedings of IDETC/CIE 2005, ASME 2005 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, DETC2005-85095, Long Beach, California, September 24-28, 2005.

13. **Li**, **M.**, S. Azarm, and V. Aute, "A Multi-Objective Genetic Algorithm for Robust Design Optimization," *Genetic and Evolutionary Computation Conference (GECCO) '05*, Washington, DC, June 25-29, 2005.

Journal paper in Chinese:
14. 钟明明，许敏，李冕，王森，林观生, 2012,
    "发动机制造精度与性能关系研究[J]." 机械设计与研究 (accepted)
15. 邱宇，许敏，李冕, 2012,
    "基于多体动力学的发动机主轴承润滑特性Kriging建模研究,"
    机械设计与研究 (accepted)

16. 李明，许敏，赵金星，徐宏昌，李冕，2011，"基于GT-Power仿真的2.0L汽油机动力性能分析与优化，"汽车技术，3, pp.5-11.

c 6.4　Refereed conference summaries or abstracts
1. Cheng, S., JH. Zhou, M. Li, 2012, "Differential Evolution and SQP for Optimization with Interval Uncertainty," INFORMS Beijing 2012, June 24-27, Beijing, China.
2. **Li, M.,** J. Hamel, S. Azarm, C. Tseng, Y. T. Lee, 2009, "A Matlab Based Software Tool for Multi-Objective Robust Optimization and Sensitivity Analysis: A Case Study for Undersea Propulsion System Design," *8th World Congress on Structural and Multidisciplinary Optimization*, Lisbon, Portugal, June 1-5.
3. Azarm, S., and **M. Li**, 2005, "Multi-objective Robust Design Optimization: Parameter vs. Performance Sensitivity," *6th World Congress on Structural and Multidisciplinary Optimization*, Rio de Janeiro, Brazil, May 30-June 3.

c 6.5　Abstracts in non-refereed conference proceedings
c 6.6　Books
c 6.7　Chapters in books
c 6.8　Book reviews
c 6.9　Government, university, or industrial reports (non-refereed)
c 6.10　Publications in popular press/magazines
c 6.11　Other submitted publications
c 6.12　Invited presentations
(Invited keynote presentations at conference or symposium, or seminar series at peer institutions)
1. Li, M. Jing Wang, 2011，"复杂系统稳定性分析与研究，"融合和创新—网络文化信息共享技术论坛，Shanghai China，2011.10.20.
2. **Li, M.,** 2011, "Analysis and Optimization of Energy System in Renewable Energy Vehicles," China Academy of Launch Vehicle Technology, Beijing, July 1.

c.7　Technology Transfer and Entrepreneurship
c 7.1　US and international patents awarded (title, number, date issued)
c 7.2　Provisional patents and patents pending (title, date submitted)
c 7.3　Invention disclosures submitted (title, date submitted)

1. Li, M., N. Williams, and S. Azarm, 2008, "Multi-Objective Sensitivity Analysis," Invention Disclosure No. IS-2008-067, Office of Technology Commercialization, University of Maryland, College Park.
2. Li, M., and S. Azarm, 2008, "Multi-Objective Collaborative Robust Optimization," Invention Disclosure No. IS-2008-068, Office of Technology Commercialization, University of Maryland, College Park.
3. Li, M., and S. Azarm, 2008, "Multi-Objective Robust Optimization Software," Invention Disclosure No. IS-2008-069, Office of Technology Commercialization, University of Maryland, College Park.

4. Li, M., S. Azarm and G. Li, 2008, "Kriging Metamodel Assisted Multi-Objective Optimization Software," Invention Disclosure No. IS-2008-070, Office of Technology Commercialization, University of Maryland, College Park.
5. Li, M., S. Azarm and J. Hamel, 2008, "Multidisciplinary Multi-Objective Sensitivity Analysis," Invention Disclosure No. IS-2008-071, Office of Technology Commercialization, University of Maryland, College Park.

    c 7.4   Licensing and technology transfer

    c 7.5   Startups and entrepreneurial activities

    c 7.6   Other major technology transfer activities
            (provide whatever information you find appropriate)

    c 7.7   Industry interactions (consulting arrangements, board memberships, etc.)

c.8   Outreach Directly Related to Research

c.9   Other

d. Service

d.1   Major committee assignments in the Department, College, and/or University
(Name of committee, dates, member or chair status)
1. UM-SJTU JI graduate committee, 10/2009 – present, member.
2. UM-SJTU JI Faculty Search Committee (temporary)

d.2   Administrative duties at UM-SJTU JI

d.3   Service to government or professional organizations, and service on review board/study panels
(Name of committee, chair or member, editorships etc.; dates)

1. Interviewer
   a. SJTU Independent Undergraduate student recruitment, April 2011, April 2012. The interview will take entire three days every year. I also attended the undergrad student recruitment trip in 2012.
   b. UM-SJTU JI graduate student recruitment, 2009, 2010, 2011 and 2012
   Since I was pointed as the member of the graduate committee, I have attended the recruitment and interview for JI graduate students every year since 2009. This event actually takes multiple months every year, starting from around the middle of May to the end of October.
2. Member
   a. 35th Design Automation Conference (within ASME IDETC2009) Committee, 2009.
   b. 36th Design Automation Conference (within ASME IDETC2010) Committee, 2010.
   c. 38th Design Automation Conference (within ASME IDETC2012) Committee, 2012.
   d. American Society of Mechanical Engineers, 2006 – present
   e. IEEE Industrial Electronics Society, Energy Storage Devices and Systems (ESDS) Technical Committee, 2012- present
3. Paper reviewer
   a. Genetic Programming and Evolvable Machines
   b. ASME Trans., Journal of Mechanical Design

   c. ASME Trans., Journal of Computing and Information Science in Engineering
   d. Engineering Optimization
   e. Structural and Multidisciplinary Optimization
   f. Mechanics Based Design of Structures and Machines
   g. Energy
   h. 2009~2012, ASME Design Automation Conference
   i. 2009 IEEE Wireless Communications and Networking Conference (WCNC 2009)
  4. International Liaison
   a. 2010~2013 ASME Design Automation Conference
  5. Session co-chair of 2010 ASME Design Automation Conference
   a. Multidisciplinary Design Optimization Session
  6. Session chair/co-chair of 2012 ASME Design Automation Conference
   a. Multidisciplinary Design Optimization
   b. Simulation-based Design under Uncertainty
   c. Sustainable Design

d.4 Contribution to diversity and climate

d.5 Outreach that is not part of research or teaching, or entrepreneurship

 1. Organizer and contact person of JI English ME Core Course Development Project, 985 3rd period, RMB 400K.

d.6 Mentoring activities involving junior faculty or post-doctoral scholars

d.7 Other

e. Summary of contributions to teaching, research, service and major impact

Recommend one (1) page each on teaching, research and service, for a total of 3~4 pages. May use 2 pages to emphasize contributions in one particular area only, e.g., teaching. Total length cannot exceed 4 pages.

The research summary may also include contributions to tech transfer and entrepreneurship as well as broader impact-focused activities if applicable.

The service summary may include contributions to diversity and climate, if applicable.

Teaching:

Teaching is one of the most important tasks for my work in JI, not just because I am a junior faculty member here, but also because JI is a brand new school whose curricula have not been well established (especially for graduate courses). Since there was no much to follow at the beginning of my career here, what kind of content should be covered in the lecture and lab projects, how to conduct them, what students can learn from those materials, and how they will learn them are the critical questions that I need to answer carefully. In addition to standard requirements for teaching, one of important criteria in my teaching is to tell the differentiation, which lies in the following perspectives.

First, from my teaching profile, one can notice that I have offered courses for four different levels of students, from sophomore (Vm250), senior (Vm450/452), to first year graduate (Vm555) and second year graduate students (Vm660). This difference requires me to focus on different perspectives during my teaching. For example, in Vm250 *Design and Manufacturing I*, lots of attentions have been given to fundamental topics in design and manufacturing. The course provides sophomore students with experiences in basic tools and knowledge in this area, as well as initial hands-on experience on manufacturing. In this regard, during the lecture and lab work, I focus on helping students build their foundations in design and manufacturing. In addition to the lectures, there are two course projects to consolidate the knowledge that students learn from the class. To help achieve the teaching goals, I have to be patient and let students make more fun from the course/lab to inspire their interests for the content. For example, one of the course projects is to design and manufacture a prototype of down-sized catapults, and I always organize a catapult tournament game along with the project every year in the class. Trying to win the game and Vm250 Cup, students paid much more attention for their prototypes and made a lot of fun from the game. On the contrary, for seniors in Capstone (Vm450) and Vm452, I always pay attention to keeping questions open, providing students enough space to work out the solutions with their own ideas, and encouraging them to achieve the final solutions within the very limited time. As a result, two of senior groups that I supervised and sponsored have won the gold award during the last year. For graduate courses like Vm555, the teaching style is different with more focused on theatrical content as well as the capability of defining, formulating and solving the problems using the technique discussed in the class. There will be more discussions among students, more readings from the literature for 6XX level courses, like Vm660, which is more research oriented.

Secondly, preparation and course development for different courses are different too. During the last three years, I have been deeply involved within the core course development of Vm250/350/450, which is the most important while most heavy-loaded series courses for students in ME major. Even though we obtained lots of help from the UM side about the course content, there are still many issues that need to be tailored to fit the situation here in JI. This is especially important and critical for courses having course projects. For example, facilities, resources and even students here are different from the UM. When we design the projects here, the projects have to be justified for their feasibility while still need to be able to fulfill the course goals and objectives. Actually, the situation was very critical for Vm450 at the beginning when there were not many experienced faculty members and enough facilities. Having been the instructor /co-instructor of Vm250/450 for three years, I tried my best for their development and I believe they have been developed well. Developing grad courses is another story though. In that case, we have even fewer to follow. I studies different courses from different universities in the US for their content during the development of two new graduate courses in JI (Vm5555 and Vm660). Since I am doing my research in those areas, I also include many state-of-the-art topics into the class, as long as the course projects closely related to the research topics of involved grad students.

The third difference lies in students. So far I am supervising three PhD and four MS students, and I also am working with many undergraduate students for projects out of the class, including SJTU Formula SAE racing car team (30+ undergraduate students). For research projects with graduate students, encouraging them to work independently is very important in my opinion, while more detailed instructions are necessary when working with undergraduate students.

Research:

I will summarize my contribution in research into five perspectives in this casebook: publications, funding situation, the nature of my work, collaboration, and finally new research directions.

Up to now, I have published totally 14 international journal papers and another two journal papers are under review. Among those 14 journal papers, 8 of them are published in the past three years after I became a faculty member of JI and most of them on the top journals in my research area. Including those two under review, the rate of journal publication is about three per year for me for the last three years, which is reasonable, I believe, considering the nature of my research area and the start-up situation of my career. In addition, I also published 13 peer-reviewed full papers in international conference proceedings. Considering my major and research directions, I consider my publication record is reasonable, even though generally speaking the impact factors of those journals are not very high (e.g., more than 1 or less) due to the nature of this research domain and topics. However, they are very important journals in this research domain, such as *Journal of Mechanical Design*, *Structural and Multidisciplinary Optimization* and so on. Starting from the second half of the last year, my own graduate students have been working on the publications with me together, especially my PhD students. I also published three papers on Chinese local journals with my colleagues. Even though the quality of those Chinese journal papers may not be comparable, they are kind of helpful for us to be known to Chinese research community.

Regarding to the funding, I also believe I am in a reasonable good shape even though there are still lots of space for improvement. My research work has been supported by government agencies, such as Science and Technology Commission of Shanghai Municipality and MOE of China, for several funded projects. In addition, I also obtained funding support from several multi-national industry companies like GM and BOSH, as well as some local Chinese companies. This record shows that my research work is not only recognized by the government agencies, but also interesting to industry companies. Although I could not say that my funding situation is excellent, it is enough for me to support my research assistants and related activities. An improvement that I need to achieve is to successfully submit my proposals to and get funded by national agencies like NSFC, which is still my target for the next several years.

To clearly indicate my status in research, it is necessary to identify the nature and characteristics of my research topics. Since my PhD program, I have been working on the research in design optimization of complex engineering system under uncertainty. Research work in several different directions has been conducted in this direction, such as simulation-based design under uncertainty, robust optimization methods, multi-disciplinary design optimization, sensitivity analysis, as well as approximation modeling. Those research topics have been recognized in the US research society for studies in aerospace, naval, and mechanical engineering with typical applications like unmanned undersea vehicles, aircrafts and transportation systems and so on. In the US, people in this area focus more on theoretical work such as algorithm development. However, in China, the society still pays much more attention to the applications themselves, rather than algorithm or theoretical structure development. The tasks for the researchers in China and US actually are not exactly the same. In this regard, it is suggested that I should use a good application as the platform in my proposals and projects. Thus here in JI I currently choose renewable energy related systems (e.g., electrical vehicles, smart grid, wind tunnels, etc.) as typical applications of the algorithms and methods developed. Several funded research projects belong to this category. On the other hand, it looks like that my research seems not very fundamental in terms of its outcome, in the sense that it will not generate fundamental technologies, new material, or sophisticated devices. Thus recognition by local research society seems not straightforward. After I came back, one dilemma for me is how to fit my research here and make it recognized by the local society here while still can keep my research originality and characteristics as in the US and being recognized there. How to maintain this balance is the most challenging issue for me. To keep this balance, necessary adjustments have been made. For example, increasing the percentage of application oriented work in the projects, more collaboration with other colleagues, and working on new research directions helped a lot in my opinion.

After I started my career in JI, collaborating with other colleagues within JI becomes an important perspective in my research. Starting from 2009, I have been working with Prof. Chengbin Ma and Prof. Xin'en Zhu on electrical vehicles (EV) and wireless changing systems. Prof. Ma and I have been working together for several projects such as those on EV-related topics funded by GM and BOSCH. I also have been working with Prof. Qiang Zhang for the control system and strategy development for the blow-down wind tunnel in his research lab for more than one year. A journal paper will be submitted within this month as the outcome of this collaboration. Prof. Xudong Wang has also worked with me for an optimization problem for a communication network and a joint journal paper is under preparation. In the collaboration mentioned above, I make my contribution in system modeling, system optimization, control algorithm and strategy development, as well as data analysis. In addition, Prof. Bauchau also submitted proposals listing me being a co-PI. Due to the nature of my research topics, there are many opportunities for me to work with our JI colleagues. It is a win-win situation for us since I could find good applications from their work and could make my contribution for system optimization and other related issues for the projects.

Moreover, it may be well-known in the institute that I have been working with colleagues outside of JI. I have been working with Prof. Min Xu from ME school and other faculties in this multi-disciplinary research group very closely for more than one year. This EV-focused research team includes two faculties from ME School, three from JI, and other two faculties from EE School. The outcome from this collaboration does not just include funded projects, but also good journal papers that have been published as well as under preparation.

There is also a big difference between the US system and Chinese system in terms of research group organizations and collaboration styles. Keeping a balance between independency and collaboration in research becomes very critical. On the other hand, given the fact that JI is brand new institute and not many ones outside of JI know that JI faculties are even required to do research, I believe it is important for our faculties to work with others outside, not because we could obtain better funding opportunities, but also because we could show the quality of our research work to those who do not know us. This is especially important for me since for my work to be successful it is kind of required that I have to build my research based on appropriated applications where my algorithms and strategies can make the contribution. Actually, in my opinion, being involved into the local research society here seems not actually very straightforward.

Another way of improving my research work is to explore new research directions, in addition to the research topics covered in my PhD and post-doc periods. In the past three years, there are three new directions that I have been working on, independently or collaborating with other faculty members: 1) *Design optimization of renewable energy systems*; 2) *Reliability improvement*; 3) *Intelligent control mechanism and strategies*. Although those three directions are new for me, they are closely related to my previous work and can be considered as new extensions. The common objective of those three topics is to improve the system performance, in terms of reliability, efficiency, energy economy and so on, even though they apply different tools and methods to different applications. *Design optimization of renewable energy systems* focuses on using specific system modeling techniques to study energy flow mechanism within typical energy systems which have multiple energy resources and energy consumers, and optimize the system configures as well as operating variables, in order to improve the energy efficiencies of those systems. Typical applications include hybrid vehicles, small home and grids. *Reliability improvement* focuses on improving system reliability performance with the minimum cost, which is a very important and critical problem for complex systems like communication networks, transportation systems and so on. *Intelligent control mechanism and strategies* is the one related to use intelligent methods and algorithm to implement advanced control strategy so that the outputs of the system could be controlled accurately and efficiently with the present of uncertainty or under different working conditions. The typical applications so far include e-drive motors, wind tunnels, etc.

Service:

I could classify my contribution in service into two categories as usual, within JI and out of JI.

My major duty within JI is to serve as a member of JI graduate committee since 10/2009 to present, which is exactly the period for JI to establish its new graduate program (JI has its first year grad students came in 09/2010). Within a committee assembled at that time including three faculty members and a staff, I contributed most of my service time to this committee. Under the leadership of the committee chair, most of my effort in the committee has been put into two major issues for the last three years. The first one is the graduate curriculum development. Since we did not exactly follow the US curriculum and we do have two different programs with diverse research areas in JI, many curricula from different top universities in the US had been consulted, such as UM, UC Berkeley, US San Diego, Cornell, etc. The first priority at that time was to first identify the most necessary graduate courses for our new grad students, considering the limitation of faculty, recourses, and facilities. Gradually, a curriculum suitable for JI has been established and is still developing. During this procedure, as one of three committee members, I devoted lots of my efforts. For example, I am the organizer and contact person of JI English ME Core Course Development Project, funded by SJTU for 400K RMB. It is on the top among schools of SJTU in terms of funded amount per project. I led the proposal of this project with the help of our deans and other faculties. The proposal was successfully submitted to and funded by the university. Simultaneously during the same procedure, we clearly defined the scope of our major courses for ME program, which served as a good initial draft of our ME graduate curriculum. The second issue for which I make my contribution in the graduate committee is student recruitment. Graduate student recruitment is a long time event lasting from every May to October, which includes a series of trips, interviews and discussions. Starting from every May, JI will organize our staff and faculty to attend the recruitment trip for more than 10 cities during the weekend to promote the JI to our potential students. I attended the trip to Wuhan, Dalian, Beijing, and Tianjin so far. After that, a three-day summer camp is organized in July or August to host our potential students, including a series of interviews. Pre-admissions are offered to the top from the summer camp. After that, there are additional two rounds of interviews, one in September and another in March. One can tell that student recruitment is a long procedure in every year which demands significant effort for both faculty and staff. This was absolutely true for me for the first two years (2010 and 2011) since we did not have experience of organizing those activities and the only way was to learn from other schools and then tried our best. I did learn a lot from those activities and my management, communication and leadership skills have been improved significantly. For example, to organize the first JI summer camp in 2010, I had worked with our staff for more than one week just for the preparation, detailed from preparing stuff for temporary living on campus to scheduling interview time, and organizing interview panels. Being proud of myself, I organized some and attended every organized interview for graduate students since then. In addition, together with my colleagues, I represented JI to attend SJTU independent undergrad student interviews for two years (each of which took almost three days). I also took one undergrad student recruitment trip in April 2012.

For service out of JI, my activities focus on the service to research communities. I have been the member of ASME since 2006 when I was still a PhD student. Currently I serve as the member of 2 conference/technical committees, one for ASME Design Automation Conference and one for IEEE Industrial Electronics Society. Within those two committees, I organized the conference sessions and paper reviews before the conference every year. For example, in ASME IDETC conference held in Chicago in Aug 2012, I was the session chair/co-chair for three sessions and organized the paper review for around 10 papers for those sessions. Of course I also reviewed a lot of papers from four conferences during the past three years. In addition, I am also a paper reviewer for six internal journals, including *ASME Trans., Journal of Mechanical Design*, *ASME Trans., Journal of Computing and Information Science in Engineering*, *Structural and Multidisciplinary Optimization*, *Energy*, etc. Some of them are top journals in my research domain. I have reviewed more than 20 papers for those journals in the past three years.