Song Gao

214C Marston Hall
130 Natural Resources Road
Amherst, MA 01003-0724

Tel: (413) 545-2688
Fax: (413) 545-9569
E-mail: songgao@ecs.umass.edu

Current Position

University of Massachusetts Amherst — Amherst, MA
Department of Civil and Environmental Engineering
Assistant Professor — Sep. 2007 - Present

Education

Massachusetts Institute of Technology — Cambridge, MA
Ph.D. in Transportation, February 2005
Dissertation:"Optimal Adaptive Routing and Traffic Assignment in Stochastic Time-Dependent Networks"
Committee: Professor Moshe Ben-Akiva (chair), Doctor Jon Bottom, Professor Patrick Jaillet, Professor Nigel Wilson

M.S. in Transportation, February 2002
Thesis: "Routing Problems in Stochastic Time-Dependent Networks with Applications in Dynamic Traffic Assignment"
Advisor: Professor Ismail Chabini

Tsinghua University — Beijing, China
B.S. in Civil Engineering, July 1999
Class rank: 1^{st} out of 98.

Professional Experience

Caliper Corporation — Newton, MA
Transportation Engineer — Nov. 2004 - Aug. 2007

- Enhanced and implemented a practical dynamic traffic assignment model that runs efficiently on large-scale regional planning networks
- Developed an interface to run SATURN, a simulation/assignment package widely used in the UK
- Participated in the development of transportation demand forecasting models for various regions
- Developed dynamic shortest path searching functions for TransCAD, a GIS-based transportation planning software
- Implemented trip production and attraction procedures in TransCAD based on the Institute of Transportation Engineers (ITE) default trip rates
- Taught travel demand forecasting training courses to consultants, government employees, university professors and graduate students

Awards and Honors

- Scholarship for the Workshop on Traffic Modeling: Traffic Behavior and Simulation, Jun. 30 - Jul. 2, 2008, Graz, Austria

- INFORMS Transportation Science and Logistics Dissertation Prize Competition, Honorable Mention (Second Place), 2005
- MIT United Parcel Service (UPS) Doctoral Fellowship, 2001-2002
- MIT Presidential Fellowship, 1999-2000
- Mao Yi-sheng Engineering Education Fellowship, 1998 (Awarded annually to six best Civil Engineering college students in China)
- Tsinghua University Scholarship of Excellence, First Prize, 1995, 1998
- Tsinghua University Excellent Student, 1996, 1997
- Tsinghua's Friend - Dong's Oriental Scholarship, 1996, 1997 (Awarded to the best four undergraduate students in the department)
- Tsinghua University Scholarship of Excellent Freshman, Second Prize, 1994

Research Interests

Methodologies

- Optimization in stochastic networks
- Econometric models of (adaptive) travel behavior
- Dynamic traffic assignment models in uncertain networks with traveler information

Applications

- Intelligent transportation systems
- Transportation planning
- Congestion pricing and emission pricing
- Freight transportation

Papers in Refereed Journals

1. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choices in Risky Traffic Networks: A Prospect Theory Approach. *Transportation Research Part C*. Accepted, 2009.
2. Gao, S., E. Frejinger, and M. E. Ben-Akiva. Adaptive Route Choice Models in Stochastic Time-Dependent Networks. *Transportation Research Record 2085*, pp.136-143, 2008.
3. Ben-Akiva, M. E., J. Bottom, S. Gao, H. Koutsopoulos and Y. Wen. Towards Disaggregate Dynamic Travel Forecasting Models. *Tsinghua Science and Technology*, 12(2):115-130, 2007.
4. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks. *Transportation Research Part B*, 40(2):93-122, 2006.
5. Gao, S. and I. Chabini. Best Routing Policy Problem in Stochastic Time-Dependent Networks. *Transportation Research Record 1783*, pp.188-196, 2002.
6. Gao, S. and H. Huang. Real-Time Traveler Information for Optimal Adaptive Routing in Stochastic Time-Dependent Networks. *Transportation Research Part C*. Under review, 2009.
7. Razo, M. and S. Gao. Strategic Thinking and Risk Attitudes in Route Choice: A Stated Preference Approach. Transportation Research Record. Under review, 2010.

Papers in Refereed Proceedings

1. Razo, M. and S. Gao. Strategic Thinking and Risk Attitudes in Route Choice: A Stated Preference Approach. *The 89th Annual Meeting of Transportation Research Board Compendium of Papers DVD*. Paper #10-3915. Washington, DC, Jan. 10-14, 2010. Accepted.

2. Lu, X. and S. Gao. Evaluating the Potential of Traditional Demand Forecasting Software in Assisting Small and Medium-Sized Regions under Unexpected Emergency Situations. *The 89th Annual Meeting of Transportation Research Board Compendium of Papers DVD*. Paper #10-1415. Washington, DC, Jan. 10-14, 2010. Accepted.

3. Gao, S. and H. Huang. Is More Information Better for Routing in an Uncertain Network? *The 88th Annual Meeting of Transportation Research Board Compendium of Papers DVD*. Paper #09-1315, 21 pages, Washington, DC, Jan. 11-15, 2009.

4. Gao, S., E. Frejinger, and M. E. Ben-Akiva. Adaptive Route Choice Models. *The 10th International Conference on Applications of Advanced Technologies in Transportation Proceedings CD*, Paper #644, 19 pages, Athens, Greece, May 28-30, 2008.

5. Gao, S., E. Frejinger, and M. E. Ben-Akiva. Adaptive Route Choice Models in Stochastic Time-Dependent Networks. *The 87th Annual Meeting of Transportation Research Board Compendium of Papers DVD*, Paper #08-1349, 19 pages, Washington, DC, Jan. 12-17, 2008.

6. Gao, S. Online Traveler Information in Stochastic Dynamic Networks. *Proceedings of the IEEE 9th International Conference on Intelligent Transportation Systems*, Toronto, Canada. Sep. 17-20, pp. 204-211 , 2006.

7. Gao, S. Equilibrium Dynamic Traffic Assignment with Adaptive Routing Decisions. *The 85th Annual Meeting of Transportation Research Board Compendium of Papers CD-ROM*, Paper #06-0205, 33 pages, Washington, DC, Jan. 22-26, 2006.

8. Gao, S. and I. Chabini. A Policy-Based Approach to Dynamic Traffic Assignment. *The 82nd Annual Meeting of Transportation Research Board Compendium of Papers CD-ROM*, Paper #03-2299, 14 pages, Washington, DC, Jan. 12-16, 2003.

9. Gao, S. and I. Chabini. Policy-Based Stochastic Dynamic Traffic Assignment Models and Algorithms. *Proceedings of the IEEE 5th International Conference on Intelligent Transportation Systems*, Singapore, Sep. 3-6, pp. 445-453, 2002.

10. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks, Part I: Framework and Taxonomy. *Proceedings of the IEEE 5th International Conference on Intelligent Transportation Systems*, Singapore, Sep. 3-6, pp. 549-554, 2002.

11. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks, Part II: Exact and Approximation Algorithms. *Proceedings of the IEEE 5th International Conference on Intelligent Transportation Systems*, Singapore, Sep. 3-6, pp. 555-559, 2002.

12. Gao, S. and I. Chabini. The Best Routing Policy Problem in Stochastic Time-Dependent Networks. *The 81st Annual Meeting of Transportation Research Board Compendium of Papers CD-ROM*, Paper #02-4069, 39 pages, Washington, DC, Jan.

13-17, 2002.

Working Papers

1. Gao. S. and H. Huang. Trajectory-Adaptive Routing in Dynamic Networks with Dependent Random Link Travel Times. In Preparation.
2. Gao, S. and X. Lu. Optimal Adaptive Departure Time Choice under Real-Time Traveler Information. In Preparation.
3. Gao, S. User Equilibrium in Stochastic, Static Networks with Adaptive Travelers. In Preparation.
4. Ben-Akiva, M., S. Gao, Z. Wei and Y. Wen. A Dynamic Traffic Assignment Model for a Highly Congested Network. In Preparation.

Teaching Interests

- Network optimization and modeling
- Computer algorithms for system analysis
- Discrete choice modeling
- Transportation planning
- Probability and statistics for engineering analysis

Teaching Experience

University of Massachusetts Amherst Amherst, MA
Department of Civil and Environmental Engineering

Instructor
- Systems Analysis and Engineering Economy for Civil Engineers (Spring 2009)
- Transportation Pricing and Investment Analysis (Fall 2008, Fall 2009)
- Transportation Systems Analysis (Spring 2008, Spring 2009)

Massachusetts Institute of Technology Cambridge, MA
Department of Civil and Environmental Engineering

Lecturer
- Modeling and Simulation of Transportation Networks (Summer 2008, Summer 2009)

Teaching Assistant
- Demand Modeling (Spring 2004)
- Transportation Demand and Economics (Fall 2003)
- Computer Algorithms for System Analysis (Spring 2002)
- Transportation Flow Systems (Fall 2000)

Selected Technical Reports

1. Gao, S. Dynamic Traffic Assignment in Practice. Caliper Corporation, 2006.
2. Gao, S. Optimization for Sentient Vehicles. Cambridge-MIT Institute Sentient Vehicle Project Phase I Summary. Massachusetts Institute of Technology, 2002.
3. Gao, S. Calibration of DynaMIT Supply Simulator Using MITSIM. Intelligent Transportation Systems Program. Massachusetts Institute of Technology, 2000.

Research Projects (PI/co-PI)

1. Gao, S. (PI). Stochastic Dependencies of Traffic Networks in Adaptive Routing with Real-Time Information. University of Massachusetts University Transportation Center (UTC). Oct. 2009 - Sep. 2010. $62,445.
2. Gao, S. (PI). Characterizing Traffic under Uncertain Disruptions: An Experimental Approach. Region 1 University Transportation Center. Sep. 2009 - Aug. 2011. $79,163.
3. Gao, S. (PI). Adaptive Route Choices with Real-Time Traveler Information. University of Massachusetts Faculty Research Grant. Jun. 2009 - May. 2010. $14,918.
4. Gao, S. (PI) and D. L. Fisher. Adaptive Route Choice Models with Real-Time Information. Region 1 University Transportation Center. Sep. 2008 - Aug. 2010. $74,378.
5. Gao, S. (PI). Value of Information for Optimal Adaptive Routing in Stochastic Time-Dependent Traffic Networks: Algorithms and Computational Tools. University of Massachusetts University Transportation Center (UTC). Jul. 2008 - Dec. 2009. $64,649.
6. Collura, J., S. Gao (co-PI) and D. Ni. Evacuation Planning. Berkshire Regional Planning Commission, Franklin Regional Council of Governments and the Pioneer Valley Planning Commission. Sep. 2008 - Jun. 2009. $100,000.
7. Ganz, A. and S. Gao (co-PI). DESEMA: Scalable Real Time Web Based Decision Support System for Emergency Management. National Institute of Health. Under review, 2009.
8. Gao, S. (PI). CAREER: Information, Adaptive Behavior, and Equilibrium in Transportation Networks. National Science Foundation. Under review, 2009.
9. Gao, S. (PI) and G. Patil. Commute Rideshare for Sustainable Transportation in Northern Rural Communities: Understanding the Market and Designing Attractive Programs. New England Transportation Consortium. Under review, 2008.

Research Projects (Participant)

1. Consultant. Collaborative Development of Dynamic Traffic Simulation Models for Beijing: Phase II. Beijing Transportation Research Center (China), Apr. 16, 2009 - Apr. 15, 2010.
2. Consultant. Collaborative Development of Dynamic Traffic Simulation Models for Beijing: Phase I. Beijing Transportation Research Center (China), Jan. 1 - Dec. 31, 2008.
3. Research Assistant (Supervisor: I. Chabini). CAREER: High Performance Computing and Network Optimization Methods with Applications to Intelligent Transportation Systems. National Science Foundation, Jun. 2000 - Oct. 2004.
4. Research Assistant (Supervisor: I. Chabini). Variable Message Sign Placement for Regional Traffic Management of New York State Region 8, New York State Department of Transportation, Jan. 2003 - May 2003.
5. Research Assistant (Supervisor: I. Chabini). Sentient Vehicle: Mobility and Envi-

ronment (Phase I). Cambridge (UK) - Massachusetts Institute of Technology (MIT) Institute, Sep. 2001 - Jun. 2002

6. Research Assistant (Supervisor: M. Ben-Akiva). DynaMIT: Real-Time Traffic Estimation and Prediction Systems. Federal Highway Administration, Sep. 1999 - May 2000.

SELECTED PRESENTATIONS

1. Ben-Akiva, M., S. Gao, Z. Wei and Y. Wen. A Dynamic Traffic Assignment Model for Highly Congested Urban Networks. The Annual Meeting of the Institute for Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
2. Gao, S, E. Frejinger and M. Ben-Akiva. Adaptive Route Choice in Risky Traffic Networks: A Prospect Theory Approach. The Annual Meeting of the Institute for Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
3. Gao, S. User Equilibrium in Static Stochastic Networks with Adaptive Travelers. The Annual Meeting of the Institute for Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
4. Razo, M. and S. Gao. Strategic Thinking and Risk Attitudes in Route Choice: An Experimental Approach. The Annual Meeting of the Institute for Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
5. Huang, H. and S. Gao. Trajectory-Adaptive Routing in Dynamic Networks with Dependent Random Link Travel Times. The Annual Meeting of the Institute for Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
6. Gao, S. and H. Huang. Is More Information Better for Routing in an Uncertain Network? The 88th Annual Meeting of the Transportation Research Board, Washington, DC, Jan. 11-15, 2009.
7. Huang, H. and S. Gao. Value of Traveler Information for Adaptive Routing in Stochastic Time-Dependent Networks. The Annual Meeting of the Institute for Operations Research and Management Science, Washington, DC, Oct 12-15, 2008.
8. Lu, X. and S. Gao. Reliable Departure Time and Route Choices in Stochastic Time-Dependent Networks. The Annual Meeting of the Institute for Operations Research and Management Science, Washington, DC, Oct 12-15, 2008.
9. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choice Models. Workshop on Traffic Modeling: Traffic Behavior and Simulation, Graz, Austria, June 30-July 2, 2008.
10. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choice Models. The 10th International Conference on Applications of Advanced Technologies in Transportation, Athens, Greece, May 28-30, 2008.
11. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choice Models. The 13th Annual ITS Massachusetts Meeting and Conference, Boston, MA, Apr. 14, 2008.
12. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choice Models in Stochastic Time-Dependent Networks. The 87th Annual Meeting of the Transportation Research

Board, Washington, DC, Jan. 13-17, 2008.

13. Gao, S., E. Frejinger and M. Ben-Akiva. Adaptive Route Choice Models. The Annual Meeting of the Institute for Operations Research and Management Science, Seattle, WA, Nov. 4-7, 2007.

14. Gao, S. Adaptive Traffic Assignment in Stochastic Dynamic Networks. The Sixth Triennial Symposium on Transportation Analysis, Phuket Island, Thailand, Jun. 10-15, 2007.

15. Gao, S., J. Brandon and A. Rabinowicz. A Practical Equilibrium Dynamic Assignment Model for Planners. The 2007 Transportation Research Board Planning Application Conference. Daytona Beach, Florida. May 6-10, 2007.

16. Gao, S. Online Traveler Information in Stochastic Dynamic Networks. The IEEE 9th International Conference on Intelligent Transportation Systems, Toronto, Canada. Sep. 17-20, 2006.

17. Gao, S. Equilibrium Dynamic Traffic Assignment with Adaptive Routing Choices. The First International Symposium on Dynamic Traffic Assignment, University of Leeds, United Kingdom, Jun. 21-23, 2006.

18. Gao, S. Equilibrium Dynamic Traffic Assignment with Adaptive Routing Decisions. The 85th Annual Meeting of Transportation Research Board, Washington, DC, Jan. 22-26, 2006.

19. Gao, S. Adaptive Routing and Traffic Assignment in Stochastic Time-Dependent Networks. The 84th Annual Meeting of Transportation Research Board, Washington, DC, Jan. 9-13, 2005.

20. Gao, S. and I. Chabini. Policy-Based Stochastic Dynamic Traffic Assignment Models and Algorithms. The Fifth Triennial Symposium on Transportation Analysis, Le Gosier, Guadeloupe, French West Indies, Jun. 13-18, 2004. Extended abstract accepted.

21. Gao, S. and I. Chabini. A Policy-Based Approach to Dynamic Traffic Assignment. The 82nd Annual Meeting of Transportation Research Board, Washington, DC, Jan. 12-16, 2003.

22. Gao, S. and I. Chabini. Policy-Based Stochastic Dynamic Traffic Assignment Models and Algorithms. The IEEE 5th International Conference on Intelligent Transportation Systems, Singapore, Sep. 3-6, 2002.

23. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks, Part I: Framework and Taxonomy. The IEEE 5th International Conference on Intelligent Transportation Systems, Singapore, Sep. 3-6, 2002.

24. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks, Part II: Exact and Approximation Algorithms. The IEEE 5th International Conference on Intelligent Transportation Systems, Singapore, Sep. 3-6, 2002.

25. Gao, S. and I. Chabini. The Best Routing Policy Problem in Stochastic Time-

Dependent Networks. The 81st Annual Meeting of Transportation Research Board, Washington, DC, Jan. 13-17, 2002.

26. Gao, S. and I. Chabini. Optimal Routing Policy Problems in Stochastic Time-Dependent Networks. The Annual Meeting of the Institute for Operations Research and Management Science, Miami Beach, FL, Nov. 4-7, 2001.

Professional Activities

Conference Committees

- Organizing chair of one session under the stream "Travel Behavior". The 18th Triennial Conference of the International Federation of Operational Research Societies (IFORS), Melbourne, Australia, July 10-15, 2011.
- Chair, Session "Innovations in Vehicle Routing Modeling". The Annual Meeting of the Institute of Operations Research and Management Science, San Diego, CA, Oct 11-14, 2009.
- Chair, Session "Uncertainty and Traveler Information in Traffic Networks". The Annual Meeting of the Institute for Operations Research and Management Science, Washington, DC, Oct 12-15, 2008.
- Chairperson, Session "Intelligent Transportation Systems". The Sixth Triennial Symposium on Transportation Analysis, Phuket Island, Thailand, Jun. 10-15, 2007.
- Co-Chair, Special Session "Approaches and Algorithms for Dynamic Travel Information Systems". The IEEE 9th International Conference on Intelligent Transportation Systems, Toronto, Canada, Sep. 17-20, 2006.

Journals Refereed

- Transportation Science
- Transportation Research Part B
- Transportation Research Part C
- European Journal of Operational Research
- Journal of Applied Econometrics
- IEEE Transactions on Intelligent Transportation Systems
- Journal of Computing in Civil Engineering
- IEEE Transactions on Automation Science and Engineering
- International Journal of Production Economics
- China Economic Review
- Simulation Modelling Practice and Theory

Conferences Refereed

- The 18th International Symposium on Transportation and Traffic Theory (ISTTT18)
- The IEEE International Conferences on Intelligent Transportation Systems
- The Annual Meetings of Transportation Research Board (TRB)

Professional Affiliations

- Institute for Operations Research and Management Science (INFORMS)
- Institute of Transportation Engineers (ITE)

Invited Seminars

- Modeling Adaptive Route Choice Behavior. The Intelligent Transportation Systems (ITS) Lab, Massachusetts Institute of Technology, May 26, 2009.
- Adaptive Travel Choices with Real-Time Information in Uncertain Networks. The School of Engineering, Massachusetts Institute of Technology, May 10, 2009.
- Adaptive Travel Choices in Risky Dynamic Networks with Real-Time Information. Pervasive Decisioning Systems Lab, General Motors (GE) Global Research Center, Niskayuna, NY, Jul. 25, 2008.
- Dynamic Traffic Assignment Models for the City of Beijing. Beijing Transportation Research Center, Beijing, China, Dec. 18-20, 2007.
- Optimal Adaptive Routing and Traffic Assignment in Stochastic Time-Dependent Networks. Institute of Transportation Engineering, Tsinghua University, Beijing, China, Dec. 21, 2007.

Community Outreach

- Lecturer, Summer Transportation Institute at the University of Massachusetts Amherst, July 6-31, 2009. Sponsored by the Federal Highway Administration (FHWA).