Irina S. Dolinskaya, William A. Patterson Junior Chair in Transportation[1]

Contact Information

Department of Industrial Engineering and Management Sciences
Northwestern University
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Research Interests

Transportation science and logistics with focus on adaptive modeling and solution approaches to integrate dynamic real-time information. Primary applications are in: humanitarian logistics, optimal vessel performance, and electric vehicle routing.

Education

University of Michigan, Ann Arbor, Michigan USA

Ph.D., Industrial and Operations Engineering: Operations Research, 2009

- Dissertation Title: "Optimal Path Finding for Direction, Location and Time Dependent Environments"
- Advisor: Dr. Robert L. Smith
- **INFORMS Transportation Science & Logistics Society Dissertation Prize winner**

M.S., Industrial and Operations Engineering: Operations Research, 2006

University of Florida, Gainesville, Florida USA

B.S. in Industrial Engineering, 2004

- Minor in Business Administration
- Minor in Statistics
- **Summa Cum Laude**

Academic Employment

Northwestern University, Evanston, Illinois USA

Assistant Professor, Industrial Engineering and Management Sciences — **Fall 2009 - present**
Joint appointment with the Transportation Center.

University of Michigan, Ann Arbor, Michigan USA

Visiting Research Scientist, Industrial and Operations Engineering, — **Summer 2010**

Graduate Research Assistant to Dr. Robert L. Smith, — **Fall 2005 - Summer 2009**

University of Florida, Gainesville, Florida USA

Undergraduate Researcher to Dr. Donald W. Hearn, — **Summer 2004**

Publications

Refereed Articles *(appeared in print or accepted for publication)*

Dolinskaya, I.S., Epelman, M.A., Sisikoglu, E. and Smith, R.L. "Parameter-free Sampled Fictitious Play for Solving Deterministic Dynamic Programming Problems," *Journal of Optimization Theory and Applications*, forthcoming.

Sweda, T.M., Dolinskaya, I.S. and Klabjan, D. "Optimal Recharging Policies for Electric Vehicles," *Transportation Science*, forthcoming.

[1] *(Updated August 2015)*

Lortz, T.D., Dolinskaya, I.S., Ghate, A.V. and Smith, R.L. "Solvability in Infinite Horizon Optimization," *Operations Research Letters*, Vol. 43, Issue 5, September 2015, pp. 498-503.

Maya Duque, P.A., Dolinskaya, I.S. and Sorensen, K. "Network Repair Crew Scheduling and Routing for Emergency Relief Distribution Problem," *European Journal of Operational Research*, forthcoming.

Hirsch, M.J., Schroeder, D.E., Maggiar, A. and Dolinskaya, I.S. "Multi-Depot Vessel Routing Problem in a Direction Dependent Wavefield," *Journal of Combinatorial Optimization*, Vol. 28, Issue 1, 2014, pp. 38-57.

Maggiar, A. and Dolinskaya, I. S. "Construction of Fastest Curvature - Constrained Paths in Direction-Dependent Media," *AIAA: Journal of Guidance, Control, and Dynamics*, Vol. 37, No. 3, 2014, pp. 813-827.

Dolinskaya, I. S. and Smith, R. L. "Fastest-Path Planning for Direction-Dependent Speed Functions," *Journal of Optimization Theory and Applications*, Vol. 158, Issue 2, 2013, pp. 480-497.

Dolinskaya, I. S. and Maggiar, A. "Time-Optimal Trajectories with Bounded Curvature in Anisotropic Media," *International Journal of Robotics Research*, Vol. 31, No. 14, December 2012, pp. 1761-1793.

Dolinskaya, I. S. "Optimal Path Finding in Direction, Location and Time Dependent Environments," *Naval Research Logistics*, Vol. 59, No. 5, August 2012, pp. 325-339.

De la Torre, L.E., Dolinskaya, I.S. and Smilowitz, K. "Disaster Relief Routing: Integrating Research and Practice," *Socio-Economic Planning Sciences*, Vol. 46, Issue 1, March 2012, pp. 88-97.

Dolinskaya, I. S., Kotinis, M., Parsons, M. G., and Smith, R. L. "Optimal Short-Range Routing of Vessels in a Seaway." *Journal of Ship Research*, Vol. 53, No. 3, September 2009, pp. 121-129.

Conference Proceedings

Dolinskaya, I.S., Shi, E., Smilowitz, K. and Ross, M. "Decentralized Approaches to Logistics Coordination in Humanitarian Relief," *Proceedings of the 2011 Industrial Engineering Research Conference*, Reno, Nevada. (2011)

Book Chapters

Dolinskaya, I. S. "Dynamic Navigation in Direction-Dependent Environments," *Dynamic Network Modeling in Complex Transportation Systems, Complex Networks and Dynamic Systems* (ed. S. Ukkusuri and K. Ozbay), Vol. 2, 2013, Ch. 10, pp. 245-263. - **invited book chapter**.

Papers Submitted and Under Revision

Yagci Sokat, K., Zhou, R., Dolinskaya, I.S., Smilowitz, K. and Chan, J. "Capturing Real-Time Data in Disaster Response Logistics," *(second round of review).*

Sweda, T.M., Dolinskaya, I.S. and Klabjan, D. "Adaptive Routing and Recharging Policies for Electric Vehicles," *(first round of revisions).*

Maggiar, A., Wachter, A., Dolinskaya, I.S. and Staum, J. "A Derivative-Free Trust-Region Algorithm for the Optimization of Functions Smoothed via Gaussian Convolution Using Adaptive Multiple Importance Sampling," *(under review).*

Dolinskaya, I.S., Shi, Z.E. and Smilowitz, K. "Adaptive Orienteering Problem with Stochastic Travel Times," *(in final stage of preparation for submission).*

Research Projects

Funding Awards

National Science Foundation (2013-2016), "Advancing Dynamic Relief Response: Integration of New Data Streams and Routing Models," with Karen Smilowitz (Co-PI) and Jennifer Chan (Co-PI).

Office of Naval Research (2011-2015), "Autonomous Vehicle Dynamic Navigation System."

Center for the Commercialization of Innovative Transportation Technology, Department of Transportation (2011-2012), "Integration of Real-Time Mapping Technology in Disaster Relief Distribution," with Karen Smilowitz (Co-PI) and Jennifer Chan (Co-PI).

Google Inc. (2011-2012), "Using Advances in Mapping Capabilities and Communications Technology to Improve Humanitarian Relief Routing," with Karen Smilowitz (PI).

Center for the Commercialization of Innovative Transportation Technology, Department of Transportation (2010-2011), "Decision-Making Tools for Distribution Networks in Disaster Relief," with Karen Smilowitz (PI).

Alumnae Board of Northwestern University (2010-2011), "Creating Computer Infrastructure for the Humanitarian Logistics Initiative," with Karen Smilowitz (PI).

Walter P. Murphy Society at Northwestern University (2010-2013), "Humanitarian Logistics Beyond the Classroom," with Karen Smilowitz (PI).

Industry Research Projects

Aidmatrix Foundation, Transportation Capacity Sharing (2010-2011), pro-bono research project.

Fisher & Arnold Inc., Enhanced Search Zones (2011), senior design project.

Invited Talks

Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT), Montreal, Canada (March 2015), "Adaptive Routing and Recharging Policies for Electric Vehicles."

H. Milton Stewart School of Industrial & Systems Engineering, Georgia Institute of Technology (October 2014), "Adaptive Routing and Recharging Policies for Electric Vehicles."

Kellogg School of Management, Northwestern University (October 2014), "Adaptive Routing and Recharging Policies for Electric Vehicles."

Applied Economics, University of Antwerp (May 2012), "Dynamic Vessel Navigation."

Center for Transportation & Logistics, Massachusetts Institute of Technology (November 2011), "Dynamic Multi-Period Humanitarian Relief Routing Problem."

Department of Management Sciences, Tippie College of Business, University of Iowa (October 2011), "Dynamic Multi-Period Humanitarian Relief Routing Problem."

Kellogg School of Management, Northwestern University (April 2010), "Optimal Path Finding in Direction, Location and Time Dependent Environments."

Transportation Center, Northwestern University (March 2010), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel Routing."

Department of Industrial Engineering, University of Houston (March 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot

Routing."

Department of Mechanical and Industrial Engineering, Northeastern University (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial Engineering and Systems Engineering, University of Illinois at Urbana-Champaign (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial and Systems Engineering, University of Florida (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial and Systems Engineering, Rochester Institute of Technology (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Operations Research Department, Naval Postgraduate School (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Defense Resources Management Institute, Naval Postgraduate School (February 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial Engineering and Management Sciences, Northwestern University (January 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial Engineering, University of Arkansas (January 2009), "Optimal Path Finding for Direction, Location and Time Dependent Costs, with Application to Vessel, UAV and Robot Routing."

Department of Industrial and Operations Engineering , University of Michigan, (October 2008), "Optimal Path Planning Problems in Evolving Media."

Conference Presentations

22nd International Symposium on Mathematical Programming (ISMP), Pittsburgh, PA (July 2015), "Adaptive Routing and Recharging Policies for Electric Vehicles," - **invited talk**.

2015 INFORMS Transportation Science and Logistics Society Workshop, Berlin, Germany (July 2015), "Adaptive Routing and Recharging Policies for Electric Vehicles," - **invited talk**.

ODYSSEUS 2015, 6th International Workshop on Freight Transportation and Logistics, Ajaccio, France (June 2015), "Adaptive Orienteering Problem with Stochastic Travel Times," - **invited talk**.

INFORMS Annual Conference, San Francisco, CA (November 2014), "Adaptive Routing and Recharging Policies for Electric Vehicles."

Modeling and Optimization: Theory and Applications, Bethlehem, PA (August 2014), "Network Repair Crew Scheduling and Routing for Emergency Relief Distribution Problem," - **invited talk**.

Conference for the International Federation of Operational Research Societies, Barcelona, Spain

(July 2014), "Adaptive Orienteering Problem with Stochastic Travel Times," - **invited talk**.

3rd INFORMS Transportation Science and Logistics Society Workshop, Chicago, IL (June-July 2014), "Adaptive Orienteering Problem with Stochastic Travel Times."

INFORMS Annual Conference, Minneapolis, MN (October 2013), "Adaptive Orienteering Problem with Stochastic Travel Times," - **invited talk**.

INFORMS Annual Conference, Phoenix, AZ (October 2012), "Real-Time Orienteering Problem with Stochastic Travel Times."

ODYSSEUS 2012, 5th International Workshop on Freight Transportation and Logistics, Mykonos, Greece (May 2012), "Dynamic Vessel Navigation," - **invited talk**.

INFORMS 2011 Midwestern Conference, Columbus, OH (August 2011), "Dynamic Multi-period Humanitarian Relief Routing Problem," - **invited talk**.

Conference for the International Federation of Operational Research Societies, Melbourne, Australia (July 2011), "Dynamic Multi-period Humanitarian Relief Routing Problem," - **invited talk**.

IIE Annual Conference, Reno, NV (May 2011), "Decentralized Approaches to Logistics Coordination in Humanitarian Relief."

INFORMS Annual Conference, San Diego, CA (October 2009), "Fastest-Path Finding in Direction-Dependent Evolving Media," - **invited talk**.

11th INFORMS Computing Society Conference, Charleston, SC (January 2009), "Efficient Dynamic Programming Modeling and Solution of Fastest-Path Finding Problems in an Evolving Environment."

University of Michigan Engineering Graduate Symposium, Ann Arbor, MI (November 2008), "Fastest-Path Planning in Evolving Medium."

18th Fall Workshop on Computational Geometry, Troy, NY (October 2008), "Obstacle-Avoiding Fastest Paths in Anisotropic Media."

INFORMS Annual Conference, Washington, DC (October 2008), "Optimal Path Planning Problems in Evolving Media."

INFORMS Annual Conference, Seattle, WA (November 2007), "Fastest Path Problems for Direction-Dependent Speed Functions with Applications to Vessel Routing."

9th Midwest Optimization Seminar, Ann Arbor, MI (October 2007), "Anisotropic Fastest Path Problems with Applications to Vessel Routing."

Honors and Awards

William A. Patterson Junior Chair in Transportation, 2012 - present

IEMS Undergraduate Professor of the Year (voted by students), 2015

Cole-Higgins Award for Excellence in Advising (McCormick School of Engineering award, students nominated, selected by a committee), 2014

Northwestern Associated Student Government Faculty Honor Roll (undergraduate teaching award,

nominated by students), 2012

IEMS Graduate Teaching Award (outstanding teaching among graduate courses), 2011

INFORMS Transportation Science & Logistics Society Dissertation Prize winner, 2010

Northwestern University Searle Junior Faculty Fellow, 2010 - 2011

University of Michigan College of Engineering Distinguished Achievement Award, 2009

INFORMS Bonder Scholarship for Applied Operations Research in Military Applications, 2008

University of Michigan Marian Sarah Parker Prize (outstanding graduate female student in engineering), 2008

University of Michigan College of Engineering Distinguished Leadership Award, 2008

University of Michigan Outstanding Student Leader Award (honorable mention), 2008

INFORMS Doctoral Colloquium, 2007

University of Michigan Industrial and Operations Engineering Ph.D. Fellowship, 2004 - 2005

Alpha Pi Mu Industrial Engineering Honor Society membership, 2000 - present

Ph.D. Students

Kezban Yagci Sokat, "Advancing Dynamic Relief Response: Integration of New Data Streams and Routing Models," *current student*, co-advised with Benjamin Armbruster and Karen Smilowitz.

Luis de la Torre, "Operational Models in Humanitarian and Non-Profit Logistics," 2015, co-advised with Karen Smilowitz, Logistics Engineer at Expeditors International. Recipient of the Transportation Center Dissertation Year Fellowship and Center for the Commercialization of Innovative Transportation Technology student of the year award (2011).

Alvaro Maggiar, "Optimization of Smoothed Functionals and Applications of Nonlinear Programming to Fastest Path Finding for Vehicles in Anisotropic Media," 2014, Research Scientist at Amazon. Northwestern University: Arthur P. Hurter award for outstanding academic excellence among first year graduate students.

Timothy Sweda, "Selected Topics on Decision Making for Electric Vehicles," 2014, co-advised with Diego Klabjan, Logistics Engineer at Schneider National. Recipient of the Transportation Center Dissertation Year Fellowship and Center for the Commercialization of Innovative Transportation Technology student of the year award (2010).

Teaching Experience

Northwestern University

Primary Instructor

- IEMS 315 Stochastic Models and Simulations, Spring 2010, Spring 2011, Fall 2012, Spring 2014, Winter 2015.
- IEMS 326 Economics and Finance for Engineers, Spring 2015.
- IEMS 460-1 Stochastic Models I, Winter 2010, Winter 2011, Winter 2012
- IEMS 480-1 Production and Logistics I, Spring 2012, Winter 2014, Winter 2015
- IEMS 468 Stochastic Control, Spring 2014

University of Michigan

Primary Instructor

- IOE 316 Introduction to Markov Processes, Fall 2006, Winter 2007, Fall 2007, Winter 2008, Fall 2008, Winter 2009

Graduate Student Instructor (assistant)

- IOE 201 Economic Decision Making, Fall 2005, Winter 2006
- IOE 202 Operations Modeling, Fall 2005, Winter 2006

Service

Department of Industrial Engineering and Management Sciences

IEMS Undergraduate Program Committee, 2011 - present

Undergraduate Student Advisor, 2011-present

IEMS Undergraduate Interim Chair, Fall 2013

Departmental Seminar Chair, 2010 - 2011, 2013 - 2014

Faculty Search Committee, 2009 - 2010

Faculty advisor to a Senior Design Project Team
- Winter 2011 team won IEMS senior design award
- Winter 2012 team won IEMS senior design award and Honorable Mention in the 2012 INFORMS Undergraduate Operations Research Prize competition

Faculty Advisor to an Honors Thesis

McCormick School of Engineering

McCormick Teacher/Adviser-of-the-Year Selection Committee, 2015

Transportation Center Dissertation Year Fellowship Committee, 2012

Freshmen Faculty Adviser, 2009 - 2011

Panel Facilitator, "Civically Engaged Young Alumni," November 2010

Dean's Centennial Seminar Organizer, "Humanitarian Logistics: A View From Haiti," June 2010

McCormick Graduate Leadership Council Panel Member, "Preparing Future Faculty Seminar Series," March 2010

Thesis Reading Committee:
- Hamed Babai
- Charlotte Frei
- Mehrnaz Ghamami
- Hooram Halat
- Tian Hou
- Michael Huang
- Ali Zockaie Kheiraie
- Bill Pun
- Ismail Omer Verbas

Northwestern University

University Graduate Student Parent Task Force, 2015 - 2016

Professional Service

Organizing Committee Member, 22nd International Symposium on Transportation and Traffic Theory (ISTTT) (July 23 26, 2017).

Cluster Chair, INFORMS Transportation Science and Logistics Society, 2014, 2015.

Review Panel Member, National Science Foundation, 2009, 2013

Humanitarian Logistics and Disaster Relief Cluster Organizer and Chair, INFORMS 2011 Annual

Meeting, Public Programs, Service and Needs Section.

Outside Thesis Reading Committee:
- Pablo Andres Maya, University of Antwerp, Belgium
- Sara Guerrero, Kuhne Logistics University, Germany - **co-advisor**

Editorial Service

Referee:
- Annals of Management Science
- Computational Optimization and Applications
- European Journal of Operational Research
- IEEE Control Systems Society Conference
- IEEE Transactions on Robotics
- IEEE/RSJ International Conference on Intelligent Robots and Systems
- IIE Annual Conference, 2011
- IIE Transactions
- INFORMS Computing Society Meeting
- INFORMS Journal on Computing
- Journal of Global Optimization
- Journal of Heuristics
- Journal of Operations Management
- Journal of the Operational Research Society
- Natural Hazards Review
- Networks and Spatial Economics
- Neural Network World
- Operations Research
- Optimization Letters
- Transportation Research Part E: Logistics and Transportation Review
- Transportation Science

University of Michigan

Treasurer, Graduate Society of Women Engineers, 2008 - 2009

Director, Graduate Society of Women Engineers, 2005 - 2008

Invited Speaker, College of Engineering Transfer Student Orientation, Fall 2007, 2008

Invited Speaker, Freshmen Orientation, Summer 2006, 2007

Freshmen Mentor, Office of New Students, Fall 2006

Peer Mentor, College of Engineering International Students Program, 2005 - 2006

Professional Society Membership

Institute for Operations Research and the Management Sciences (INFORMS)

Institute of Industrial Engineers (IIE)

Outreach

Academic Career Panel of Young Faculty Members (panelist), Northwestern University Postdoctoral Forum, Summer 2015.

Preparing Future Faculty Conference Panelist, University of Michigan, Fall 2014.

Role Model Webinar Presenter, Jason STEM Role Model Project Series, event for elementary and middle school children nation wide, http://www.jason.org/live/stemcareer-qa-irina-dolinskaya-industrial-engineer, Fall 2013.

Role Model Panelist, Oakton Community College "Futures Unlimited," STEM event for 8th grade girls, Spring 2012.

Student Reception Panelist, INFORMS Student Affairs Committee, Fall 2011.

Preparing Future Faculty Panelist, McCormick Graduate Leadership Council, Winter 2010.

Industry Experience

Cummins Engine Inc.
Intern in the Fluids Metrology lab — Summer 2005

Environmental Health and Safety at University of Florida
Industrial Hygiene Technician — May 2002 - August 2004