J. Carlos Martínez Mori

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EDUCATION

Cornell University Fall 2017 - Present
PhD in Applied Mathematics *Expected:* Spring 2023
Master of Science in Applied Mathematics (*awarded with PhD candidacy*) Fall 2020
Committee: Samitha Samaranayake (chair), David Shmoys, Bobby Kleinberg, Pamela Harris
Areas: Combinatorial Optimization, Approximation Algorithms, Transportation

University of Illinois at Urbana-Champaign Fall 2013 - Spring 2017
Bachelor of Science in Civil Engineering GPA: 3.91
Minor in Computer Science
Highest Honors at Graduation
Advisor: Daniel Work
Areas: Infrastructure Systems, Transportation Engineering

HONORS

PRISM Postdoctoral Recruitment Travel Scholarship (OPA at Stanford)	2022
Dwight David Eisenhower Transportation Fellowship (FHWA)	2017, 2018, 2020
Graduate Fellowship (Systems at Cornell)	Fall 2017
Edmund J. James Scholar (at graduation from Illinois)	Spring 2017
Melih T. Dural Undergraduate Research Prize (CEE at Illinois)	Spring 2017
Illinois Association of County Engineers Scholarship Award (CEE at Illinois)	Spring 2016
Summer Student Research Program Grant (ICT/IDOT)	Summer 2015
Grant W. Shaw Memorial Scholarship (CEE at Illinois)	Spring 2015
"Universidades de Excelencia" Scholarship (Govt. of Ecuador)	Fall 2013 - Spring 2017

RESEARCH

The symbol (a) denotes alphabetical authorship ordering.

Submitted

1. Sophie Pavia, **J. Carlos Martínez Mori**, Philip Pugliese, Abhishek Dubey, Samitha Samaranayake, and Ayan Mukhopadhyay, "Designing Equitable Transit Networks." Submitted (extended abstract), 2022.
2. [(a)] Douglas Chen, Pamela E. Harris, **J. Carlos Martínez Mori**, Eric Pabón-Cancel, and Gabriel Sargent, "Permutation Invariant Parking Assortments." Preprint arXiv:2211.01063. Submitted, 2022.
3. [(a)] Pamela E. Harris, Brian Kamau, **J. Carlos Martínez Mori**, and Roger Tian, "On the Outcome Map of MVP Parking Functions: Permutations Avoiding 321 and 3412, and Motzkin Paths." Preprint arXiv:2207.13041. Submitted, 2022.

Publications

1. **J. Carlos Martínez Mori**, M. Grazia Speranza, and Samitha Samaranayake, "On the Value of Dynamism in Transit Networks." To appear in *Transportation Science*, 2022.
2. **J. Carlos Martínez Mori** and Samitha Samaranayake, "Permutatorial Optimization via the Permutahedron." *Operations Research Letters*, 50:5, 441-445, 2022.
3. [(a)] Yasmin Aguillon, Dylan Alvarenga, Pamela E. Harris, Surya Kotapati, **J. Carlos Martínez Mori**, Casandra D. Monroe, Zia Saylor, Camelle Tieu, Dwight Anderson Williams II, "On Parking Functions and the Tower Of Hanoi." To appear in *American Mathematical Monthly*, 2022.
4. **J. Carlos Martínez Mori** and Samitha Samaranayake, "On the Request-Trip-Vehicle Assignment Problem." In *Proceedings of the 1st SIAM Conference on Applied and Computational Discrete Algorithms (ACDA21)*, pp. 228-239, 2021.
5. **J. Carlos Martínez Mori** and Samitha Samaranayake, "Bounded Asymmetry in Road Networks." *Scientific Reports*, 9, 11951, 2019.

6. William Barbour, **J. Carlos Martínez Mori**, Shankara Kuppa, and Daniel Work, "Prediction of arrival times of freight traffic on US railroads using support vector regression." *Transportation Research Part C: Emerging Technologies*, 93, pp. 211-227, 2018.
7. Yanning Li, **J. Carlos Martínez Mori**, and Daniel Work, "Estimating traffic conditions from smart work zone systems." *Journal of Intelligent Transportation Systems*, 22:6, pp. 490-502, 2018.
8. **J. Carlos Martínez Mori**, William Barbour, Shankara Kuppa, and Daniel Work, "Predicting Delay Occurrence at Freight Rail Sidings." In *Proceedings of the 97th Transportation Research Board Annual Meeting*, 2018.
9. Yanning Li, **J. Carlos Martínez Mori**, and Daniel Work, "Improving the effectiveness of smart work zone technologies." Tech. Report FHWA-ICT-16-021, *Illinois Center for Transportation*, 2016.

Academic Talks and Posters

1. "Public Transit, Stability, and Transportation Justice." Talk at the *INFORMS Annual Meeting*, Indianapolis, IN, October 16-19, 2022.
2. "On the Value of Dynamism in Transit Networks." Talk at the *11th Triennial Symposium on Transportation Analysis (TRISTAN XI)*, Mauritius, June 19-25, 2022.
3. "On the Value of Dynamism in Transit Networks." Talk at the *Institute for Pure and Applied Mathematics Mathematical Challenges and Opportunities for Autonomous Vehicles Reunion Conference 1 (AVRC1)*, Lake Arrowhead, CA, June 5-10, 2022.
4. "On the Request-Trip-Vehicle Assignment Problem: How Ridesharing Works." Talk at the *Joint Mathematics Meetings*, online, April 6-9, 2022.
5. "Permutatorial Optimization via the Permutahedron." Talk at the *Joint Mathematics Meetings*, online, April 6-9, 2022.
6. "On the Value of Demand-Responsiveness in Transit Systems." Poster at the *Google Workshop on Urban Mobility Simulation and Optimization*, online, November 16-17, 2021.
7. "On the Value of Demand-Responsiveness in Transit Systems." Talk at the *INFORMS Annual Meeting*, online, October 24-27, 2021.
8. "On the Request-Trip-Vehicle Assignment Problem." Talk at the *1st SIAM Conference on Applied and Computational Discrete Algorithms*, online, July 21, 2021.
9. "On the Request-Trip-Vehicle Assignment Problem." Talk at the *Institute for Pure and Applied Mathematics*, online, October 13, 2020.
10. "Algorithmic Challenges In Enabling High-capacity Ride Pooling Services." Talk at the *INFORMS Annual Meeting*, Seattle, WA, October 20-23, 2019.
11. "Predicting Delay Occurrence at Freight Rail Sidings." Talk at the *97th Transportation Research Board Annual Meeting*, Washington, D.C., January 7-11, 2018.
12. "Improving traffic estimation in smart work zone systems." Poster at the *65th Illinois Traffic Engineering and Safety Conference*, Champaign, IL, October 19-20, 2016.

Activities

Institute for Computational and Experimental Research in Mathematics — Providence, RI
Program: Discrete Optimization: Mathematics, Algorithms, and Computation — Spring 2023
Participant (full semester)

Institute for Pure and Applied Mathematics — Los Angeles, CA
Program: *Latinx in the Mathematical Sciences Conference* — Summer 2022
Participant

Centro de Modelamiento Matemático — Santiago, Chile (*online*)
Program: *XVII Escuela de Verano en Matemáticas Discretas* — Winter 2022
Participant

American Institute of Mathematics — San Jose, CA (*online*)
Program: *Latinx Mathematicians Research Community* — Summer 2021
Participant

Institute for Pure and Applied Mathematics — Los Angeles, CA (*online*)
Program: *Mathematical Challenges and Opportunities for Autonomous Vehicles* — Fall 2020
Participant (full semester)

INDUSTRY EXPERIENCE

Amazon.com
Research Scientist Intern, *Consumables Special Projects* Summer 2020
Manager: Elcin Cetinkaya, PhD
Designed and prototyped solution strategies for machine assignment problems arising in order fulfilment.

Bosch North America
Research Intern, *Bosch Energy Research Network* Summer 2017
Manager: Shyam Jade, PhD
Conducted city-scale traffic micro-simulations using MATSim to characterize powertrain requirements of future traffic with electric, autonomous vehicles.

TEACHING AND MENTORING

The symbol (a) denotes alphabetical authorship ordering.

Publications

1. [(a)] Tomás Aguilar-Fraga, Yasmin Aguillon, Daniel Alofamoni Quiñonez, Dylan Alvarenga, Aalliyah Celestine, Rebecca Garcia, Parneet Gill, Pamela E. Harris, Imhotep Hogan, Jakeyl Johnson, Kobe Lawson-Chavanu, Lina Liu, **J. Carlos Martínez Mori**, Casandra Monroe, Aaron Ortiz, Lauren Quesada, Cynthia Marie Rivera Sánchez, Christopher Soto, Camelle Tieu, Dirk Tolson III, Jacob van der Leeuw, and Pamela Vargas, "People Over Math: A Co-Created Principle for Successful Research Communities." MAA Focus, June/July, 2022.
2. **J. Carlos Martínez Mori** (as anonymous), "My Detour into Math." In Pamela E. Harris and Aris Winger (Eds.), "Read and Rectify: Advocacy Stories From Students of Color in Mathematics," CreateSpace, 2022.

Experience

Institute for Computational and Experimental Research in Mathematics Providence, RI
Teaching Assistant, Summer@ICERM 2022: *Computational Combinatorics* Summer 2022
Faculty Leads: Susanna Fishel, Pamela Harris, Gordon Rojas Kirby
Supported 18 undergraduate students as part of an REU program in combinatorics.

Mathematical Sciences Research Institute Berkeley, CA (*online*)
Teaching Assistant, MSRI-UP 2021: *Parking Functions: Choose your own adventure* Summer 2021
Faculty Leads: Pamela Harris, Rebecca Garcia
Supported 18 undergraduate students (from groups underrepresented in mathematics) as part of an REU program in combinatorics.

Cornell University Ithaca, NY
Teaching Assistant (head), CS 4820: *Introduction to Analysis of Algorithms* Fall 2022
Instructor: Anke van Zuylen
Supported students and graded upper-level undergraduate coursework on the design and analysis of algorithms, led a group of 10 teaching assistants (around 350 students enrolled).

Grader, ORIE 6334: *Combinatorial Optimization* Spring 2022
Instructor: David Shmoys
Graded graduate-level coursework on the design and analysis of approximation algorithms.

University of Illinois at Urbana-Champaign Champaign, IL
Engineering Learning Assistant, ENG 100: *Engineering Orientation* Fall 2015, Fall 2016
Introduced first-year students to the engineering profession, including the variety of studies and career paths.

Laboratory Assistant, GE 101: *Engineering Graphics & Design* Fall 2014, Spring 2015
Introduced students to computer-aided building design using Autodesk Revit.

RELEVANT COURSEWORK

Cornell University

CRP 6860: Sustainable Transportation
CS 6210: Matrix Computations
CS 6820: Analysis of Algorithms
CS 6815: Pseudorandonmness
CS 6810: Computational Complexity (audit)
MATH 6710, 6720: Probability Theory I, II
MATH 6410: Enumerative Combinatorics
ORIE 6334: Spectral Graph Theory
ORIE 6300: Mathematical Programming
ORIE 6180: Online Decision-Making

ACTIVITIES AND SKILLS

Programming

Python (including pandas, networkx, osmnx, numpy, scikit-learn), Gurobi, FICO Xpress, Matlab

Review Contributions

Innovations in Theoretical Computer Science, Transportation Research Part C: Emerging Technologies, IEEE Transactions on Vehicular Technology, Transactions in GIS, TRB Annual Meeting (Transportation Network Modeling, AEP40)

REFERENCES

In order:

1. Samitha Samaranayake
   Assistant Professor
   School of Civil and Environmental Engineering
   Cornell University
   samitha@cornell.edu

2. David Shmoys
   Professor
   School of Operations Research and Information Engineering
   Cornell University
   david.shmoys@cornell.edu

3. Pamela Harris
   Associate Professor
   Department of Mathematical Sciences
   University of Wisconsin-Milwaukee
   peharris@uwm.edu

4. Robert Kleinberg
   Professor
   Department of Computer Science
   Cornell University
   rdk@cs.cornell.edu

5. Daniel Work
   Professor
   Department of Civil and Environmental Engineering
   Department of Computer Science
   Vanderbilt University
   dan.work@vanderbilt.edu