Natalia Zuniga-Garcia

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Natalia is a doctoral candidate in Civil Engineering at The University of Texas at Austin. She is interested in the applications of data analytics in transportation engineering and bridging the gap between these areas to provide planning and operations solutions.

Education

- **The University of Texas at Austin** *Ph.D. in Civil Engineering* | *Transportation Engineering* — May 2020 *(Expected)*
- **The University of Texas at Austin** *M.Sc. in Statistics and Data Sciences* (GPA: 3.814) — May 2018
- **The University of Texas at Austin** *M.Sc. in Civil Engineering* | *Infrastructure Materials* (GPA: 3.709) — May 2017
- **University of Costa Rica** *B.Sc. in Civil Engineering* (GPA: 8.46/10) — December 2012

Professional Experience

- **Graduate Research Assistant** *The University of Texas at Austin (Prof.: Randy B. Machemehl, Jorge A. Prozzi)* 2015 - Present
  - Perform statistical modeling of transportation data for several funded research projects.
  - Authored and co-authored more than 20 research reports, journal publications, and conference proceedings.
- **Teaching Assistant** *The University of Texas at Austin - Cockrell School of Engineering*
  - CE 392M Public Transportation Engineering *(Prof.: Dr. Randy B. Machemehl)* — Fall 2018/Fall 2019
  - CE 367P Pavement Design and Performance *(Prof.: Dr. Jorge A. Prozzi)* — Spring/Fall 2016
- **Interim Professor** *University of Costa Rica - Civil Engineering Department* — II Semester 2014
  - IC 0810 Diseño Vial *(Geometric Design)* | Led weekly sessions for fourth-year Civil Engineering students.
- **Research Engineer** *University of Costa Rica - Sustainable Urban Development Program (ProDUS)* — 2013 - 2014
  - Used Geographic Information Systems (GIS) and remote sensing in urban development projects.
- **Undergraduate Research Assistant** *University of Costa Rica - ProDUS and LanammeUCR* — 2010 - 2012
  - Collaborated in data collection, analysis, and processing for urban planning projects.

Honors and Awards

- **2019-2020 Graduate Research Award** Airport Cooperative Research Program, Transportation Research Board (TRB) *2019*
- **2019 Mary Kate Collins Memorial Endowed Presidential Scholarship in Civil Engineering**, UT-Austin *2019*
- **2018-2019 Graduate Engineering Travel Grant** Graduate Engineering Council (GEC), UT-Austin *2019*
- **WTS Diane Woodend Jones Leadership Legacy Scholarship** Women's Transportation Seminar (WTS), International *2018*
- **WTS Leadership Legacy Scholarship** Women's Transportation Seminar, Heart of Texas (WTS-HOT) *2018*
- **Leadership Collaborative Leader Award** Women in Engineering Program (WEP), UT-Austin *2018*
- **Professional Development Award** Graduate School, UT-Austin *2016*
- **Innovation and Human Capital Program for Competitiveness Scholarship** *2015*
  Inter-American Development Bank (IDB) and Ministry of Science and Technology (Costa Rica)

Journal Publications

7. Zuniga-Garcia, N., R.B. Machemehl, N.A. Khwaja, K.D. Pruner, and M. Fu. Estimating Road User Costs in Data-Limited or Time-Constrained Environments. Under review for publication in *Transportation Research Record*.

6. Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. First-Mile-Last-Mile Collector-Distributor System using Shared Autonomous Mobility. Under review for publication in *Transportation Research Record*.

5. Zuniga-Garcia, N., M. Tec, J.G. Scott, N. Ruiz-Juri, and R.B. Machemehl. Evaluation of Ride-Sourcing Search Frictions and Driver Productivity: A Spatial Denoising Approach. arXiv preprint arXiv:1809.10329. Under review for publication in *Transportation Research Part C: Emerging Technologies*. `https://arxiv.org/abs/1809.10329`.

4. Zuniga-Garcia, N. and J.A. Prozzi. (2019). High-Definition Field Texture Measurements for Predicting Pavement Friction. Transportation Research Record, 2673(1), 246–260. `https://doi.org/10.1177/0361198118821598`.

3. Zuniga-Garcia, N., H.W. Ross, and R.B. Machemehl. (2018). Multimodal Level of Service Methodologies: Evaluation of the Multimodal Performance of Arterial Corridors. Transportation Research Record, 2672(15), 142–154. `https://doi.org/10.1177/0361198118776112`.

2. Kouchaki, S., H. Roshani, J.A. Prozzi, **N. Zuniga-Garcia**, and J.B. Hernandez. (2018). Field Investigation of Relationship between Pavement Surface Texture and Friction. Transportation Research Record, 2672(40), 395–407. `https://doi.org/10.1177/0361198118777384`.

1. Zuniga-Garcia, N., W. Martinez-Alonso, A. de Fortier Smit, F. Hong, and J.A. Prozzi. (2018). Economic Analysis of Pavement Preservation Techniques. Transportation Research Record, 2672(12), 10–19. `https://doi.org/10.1177/0361198118768515`.

Conference Proceedings

19. Zuniga-Garcia, N. and R.B. Machemehl. Dockless Electric Scooters and Transit Use in an Urban/University Environment. Under review for presentation in *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
18. Zuniga-Garcia, N., R.B. Machemehl, N.A. Khwaja, K.D. Pruner, and M. Fu. Estimating Road User Costs in Data-Limited or Time-Constrained Environments. Under review for presentation in *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
17. Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. First-Mile-Last-Mile Collector-Distributor System using Shared Autonomous Mobility. Under review for presentation in *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
16. El Hachem, Y., **N. Zuniga-Garcia**, and J.A. Prozzi. (2019). Uso de Láser 3D para ajustar la dosis de ligante asfáltico en tratamientos superficiales. Accepted for presentation in *XX Congreso Ibero Latinoamericano del Asfalto (CILA)*, Guadalajara, Mexico, November 2019.
15. Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. First-Mile-Last-Mile Collector-Distributor System using Shared Autonomous Mobility. Automated Vehicles Symposium, Orlando, FL, July 2019.
14. Zuniga-Garcia, N., H.W. Ross, and R.B. Machemehl. Evaluation of the Multimodal Performance of Arterial Corridors. Transportation Planning Applications Conference (TRBAppcon), Portland, OR, June 2019.
13. Zuniga-Garcia, N., M. Tec, J.G. Scott, N. Ruiz-Juri, and R.B. Machemehl. Evaluation of Ride-Sourcing Search Frictions and Driver Productivity. 98th Annual Meeting of the Transportation Research Board, Washington, DC, January 2019.
12. Zuniga-Garcia, N. and J.A. Prozzi. High-Definition Field Texture Measurements for Predicting Pavement Friction. 98th Annual Meeting of the Transportation Research Board, Washington, DC, January 2019.
11. Zuniga-Garcia, N., M. Tec, J.G. Scott, N. Ruiz-Juri, and R.B. Machemehl. (2018). Evaluating Spatial Pricing in Ride-Sourcing Systems: A Graph Fused Lasso Denoising Approach. 2018 Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting, Phoenix, AZ, November 2018.
10. Zuniga-Garcia, N., H.W. Ross, and R.B. Machemehl. (2018). Multimodal Level of Service Methodologies: Evaluation of the Multimodal Performance of Arterial Corridors. 97th Annual Meeting of the Transportation Research Board, Washington, DC, January 2018.
9. Zuniga-Garcia, N., S. Kouchaki, H. Roshani, J.A. Prozzi, and J.B. Hernandez. (2018). Field Investigation of Relationship between Pavement Surface Texture and Friction. 97th Annual Meeting of the Transportation Research Board, Washington, DC, January 2018.
8. Zuniga-Garcia, N., W. Martinez-Alonso, A. de Fortier Smit, F. Hong, and J.A. Prozzi. (2018). Economic Analysis of Pavement Preservation Techniques. 97th Annual Meeting of the Transportation Research Board, Washington, DC, January 2018.
7. Zuniga-Garcia, N., A. de Fortier Smit, and J.A. Prozzi. (2018). Predicting Friction with Improved Texture Characterization. 97th Annual Meeting of the Transportation Research Board, Washington, DC, January 2018.
6. Zuniga-Garcia, N., J.A. Prozzi, and A. de Fortier Smit. (2017). Cuantificación de la macro- y micro-textura del pavimento para la estimación de fricción. XIX Congreso Ibero Latinoamericano del Asfalto (CILA), Medellín, Colombia, November 2017.
5. Zuniga-Garcia, N., J.A. Prozzi, and W. Martinez-Alonso. (2017). Análisis estocástico del costo del ciclo de vida de técnicas de preservación de pavimentos. XIX Congreso Ibero Latinoamericano del Asfalto (CILA), Medellín, Colombia, November 2017.
4. Martinez-Alonso, W., **N. Zuniga-Garcia**, A. de Fortier Smit, and J.A. Prozzi. (2017). Life-Cycle Cost Analysis of Pavement Preservation Techniques in Texas. 96th Annual Meeting the Transportation Research Board, Washington, DC, January 2017.
3. Zuniga-Garcia, N., A. de Fortier Smit, M. Trevino, P. Buddhavarapu, and J.A. Prozzi. (2016). Laboratory Design of Quieter Asphalt Surfaces. 95th Annual Meeting of the Transportation Research Board, Washington, DC, January 2016.
2. Zuniga-Garcia, N., A. de Fortier Smit, M. Trevino, P. Buddhavarapu, and J.A. Prozzi. (2015). Laboratory Design of Quieter Asphalt Surfaces. 27th Annual Road Profile Users' Group (RPUG) Meeting, Raleigh, NC, November 2015.
1. Zuniga-Garcia, N., and F. Elizondo-Arrieta (2013). Propuesta de una metodología para la evaluación del desempeño de tratamientos superficiales. XVII Congreso Ibero Latinoamericano del Asfalto (CILA), Antigua, Guatemala, November 2013.

Magazine Publications

1. Zuniga-Garcia, N. and J.A. Prozzi (2018, Sept.). Análisis probabilístico del costo del ciclo de vida de técnicas de preservación de pavimentos. Revista Asfalto y Pavimentación, VIII(30), 23-31.

Theses

3. Zuniga-Garcia, N. (2018). Spatial Pricing Empirical Evaluation of Ride-Sourcing Trips Using the Graph-Fused Lasso for Total Variation Denoising (Master's Thesis Report). The University of Texas at Austin, Austin, TX, United States.
2. Zuniga-Garcia, N. (2017). Predicting Friction with Improved Texture Characterization (Master's Thesis). The University of Texas at Austin, Austin, TX, United States.
1. Zuniga-Garcia, N. (2012). Propuesta de una metodología para la evaluación del desempeño de tratamientos superficiales en laboratorio (Licentiate's Thesis). University of Costa Rica, San José, Costa Rica.

Technical Reports

3. Zuniga-Garcia, N. and J.A. Prozzi. (2016). Contribution of Micro- and Macro-Texture for Predicting Friction on Pavement Surfaces. Center for Highway Pavement Preservation (CHPP) Report UTA No. 3-2016.
2. Smit, A. de Fortier, M. Trevino, **N. Zuniga-Garcia**, P. Buddhavarapu, and J.A. Prozzi. (2016). Selection and Design of Quiet Pavement Surfaces. Texas Department of Transportation (TxDOT) Report FHWA/TX-16/0-6819-1.
1. Pujol-Mesalles, R., J. Aguero-Velverde, and **N. Zuniga-Garcia** (2014). Elaboración de auditorías de demanda y cálculo de parámetros operativos del servicio de transporte remunerado de personas, modalidad autobús - Interlineas. Report prepared for Autoridad Reguladora de Servicios Públicos (ARESEP), San José, Costa Rica.

Working Papers

2. Tec, M., J.G. Scott, and **N. Zuniga-Garcia**. Large-Scale Spatiotemporal Density Smoothing with the Graph-fused Elastic Net: Application to Ride-sourcing Driver Productivity Analysis. Working Paper.
1. Zuniga-Garcia, N. and R.B. Machemehl. Dockless Electric Scooters and Transit Use in an Urban/University Environment. Working Paper.

Notable Research Projects

- **Transit in the Context of New Transportation Paradigms** (D-Stop) Jan. 2019 - Present
  With Dr. Natalia Ruiz-Juri, Heidi W. Ross, and Dr. Randy B. Machemehl
  - Cleaning and mining of data from more than 3 million dock-less bikes and scooters trips in Austin, Texas.
  - Use of spatial statistical models to evaluate the impact of dock-less scooters on public transportation demand.
- **First-Mile-Last-Mile Collector-Distributor System using Shared Autonomous Vehicles (SAVs)** Jan. 2019 - Present
  With Dr. Kara M. Kockelman and Khrisna Murhy Gurumurthy
  - Use agent-based simulation (MATSim) to evaluate operations impacts of using SAVs as a collector-distributor transit system.
- **Work Zones Traffic Analysis for Freeway Maintenance Projects** (TxDOT) Jan. 2017 - Present
  With Dr. Randy B. Machemehl and Nabeel A. Khwaja
  - Use microsimulation software (TSIS-CORSIM) and ITS information to asses traffic impact of work-zones in Dallas, Texas.
- **Evaluation Ride-Sourcing Search Frictions and Driver Productivity** Jan. 2018 - Aug. 2018
  With Dr. Randy B. Machemehl, Mauricio Tec, Dr. James G. Scott, and Dr. Natalia Ruiz-Juri
  - Cleaning and mining of data from more than 1.5 million ride-sourcing trips, collected by an Austin based e-hailing company.
  - Used big data statistical models to assess ride-sourcing search frictions, driver productivity, and demand density.
- **Evaluation of the Multimodal Performance of Arterial Corridors** (HDR) Jun. 2017 - Dec. 2017
  With Dr. Randy B. Machemehl, Heidi W. Ross, and Dr. Natalia Ruiz-Juri
  - Processing and mining of Intelligent Transportation Systems (ITS) data, such as Bluetooth, AVL, APC, and GTFS.
  - Assessed bicycle, pedestrian, and transit performance in arterial corridors to evaluate the multimodal level of service.
- **Economic Analysis of Pavement Preservation Techniques** (TxDOT) Mar. 2016 - Aug. 2016
  With Dr. Jorge A. Prozzi and Dr. Andre de Fortier Smith
  - Implemented a stochastic life-cycle cost analysis of pavement preservations techniques, using a Monte Carlo simulation in MATLAB, with information from more than 14,000 construction projects in Texas highway network.
- **High-Definition Field Texture Measurements for Predicting Pavement Friction** (USDOT) Jan. 2016 - Dec. 2016
  With Dr. Jorge A. Prozzi and Dr. Christian Claudel
  - Developed Multiple Linear Regression models to predict highway friction using transportation infrastructure data.
  - Implemented signal processing techniques (such as linear filters) in Python's SciPy, to enhance pavement texture characterization.

Skills

Languages English *(Full professional proficiency)* | Spanish *(Native proficiency)* | Portuguese *(Elementary proficiency)*
Programming Languages *Intermediate proficiency*: R | MATLAB, *Basic proficiency*: Python | SQL
Software Packages ArcGIS | AutoCAD | TSIS-CORSIM | SPSS | SAS | MS Office | LaTeX

Leadership Experience

Committee Chair: **Women Transportation Seminar** Heart of Texas (WTS-HOT) Professional Chapter 2018 - 2020
Chair: **Tenant Advisory Board (TAB)** Housing and Dinning, UT-Austin 2019 - 2020
Committee Member: **UT Shuttle Bus Committee** Parking and Transportation Services, UT-Austin 2017 - 2020
President: **Women in Transportation Seminar (WTS)** UT-Austin Student Chapter 2017 - 2018
Seminar Series Director: **Graduate Engineering Council (GEC)** Cockrell School of Engineering, UT-Austin 2017 - 2018
Student Member: **Institute of Transportation Engineers (ITE)** UT-Austin Student Chapter 2017-Present
Student Member: **Intelligent Transportation Society (ITS)** UT-Austin Student Chapter 2017-Present
Student Member: **American Society of Civil Engineers (ASCE)** ASCE Student Chapter 2017-Present

Mentoring Experience

- **Graduates Linked with Undergraduates in Engineering (GLUE)** Women in Engineering Program (WEP), UT-Austin
  Mentees: Neve Enloe (Fall 2019) / Emily Tyndall (Spring 2019) / Tiffany Tang (Fall 2017) - Winner GLUE Participation Award
- **Directed Reading Program (DRP)** Department of Mathematics, UT-Austin
  Mentee: Emily Nguyen (Fall 2018) - Winner of the 2018 Carey Scholarship
- **University Transportation Center Undergraduate Internship (UTC-UI)** Department of Civil Engineering, UT-Austin
  Mentees: Luis Arruti (Summer 2016) / Andres Sanchez (Summer 2015)

Certifications

Graduate Certificate in Engineering Education *Cockrell School of Engineering, UT-Austin* May 2020 *(Expected)*
Advanced Teaching Preparation Certificate *Faculty Innovation Center, UT-Austin* Fall 2018
Inclusive Classrooms Leadership Certificate *Division of Diversity and Community Engagement, UT-Austin* Nov. 2018
40-Hour Basic Mediation Certificate *Cockrell School of Engineering, UT-Austin* July 2017

Other Activities

Peer Reviewer of Journal Articles: **Transportation Research Board (TRB)**.
Friend of a Committee: **TRB's ABJ70** Committee on Artificial Intelligence and Advanced Computing Applications, **ABJ80** Statistical Methods, and **AFD90** Pavement Surface Properties and Vehicle Interaction **committees**.
Selection Committee: **20017-2018 Travel Grant** Graduate Engineering Council (GEC), UT-Austin.
Panelist: **Graduate School Panel** Women in Civil, Architectural and Environmental Engineering (WCAE), UT-Austin (Feb. 2019).

Volunteer Experience

Graduate and Industry Networking (GAIN) Graduate Engineering Council (GEC) UT-Austin Feb. 2019
Explore UT - Cockrell School of Engineering UT-Austin Open House Mar. 2017-2019
Introduce a Girl to Engineering Day (Girl Day) Women in Engineering Program (WEP) Feb. 2017-2019
13th/14th Annual Gala Women Transportation Seminar - Heart of Texas (WTS-HOT) May. 2017/Apr. 2018
Keep Austin Beautiful Adopt a Street Clean-Up Capital Area Section of ITE (CAS-ITE) Oct. 2017