

Natalia Zuniga-Garcia

CURRICULUM VITAE

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Education

- Ph.D. in Civil Engineering** May 2020 (*Expected*)
Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin Austin, TX
Dissertation: Characterizing emerging urban transportation modes: Models and methods. *Advisor:* Randy B. Machemehl.
- M.Sc. in Statistics** May 2018
Department of Statistics and Data Sciences, University of Texas at Austin Austin, TX
Thesis: Spatial pricing evaluation of ride-sourcing trips using the graph-fused lasso. *Advisor:* James G. Scott.
- M.Sc. in Civil Engineering** May 2017
Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin Austin, TX
Thesis: Predicting friction with improved texture characterization. *Advisor:* Jorge A. Prozzi.
- B.Sc. and Licentiate in Civil Engineering** December 2012
School of Civil Engineering, University of Costa Rica San Jose, Costa Rica

Academic Appointments

- Interim Professor** Aug. 2014 - Dec. 2014
School of Civil Engineering, University of Costa Rica San Jose, Costa Rica
 - Led weekly sessions for fourth-year civil engineering students. Course: IC 0810 Diseño Vial (*Geometric Design*).

Research Experience

- Graduate Research Assistant** 2015 - Present
Center for Transportation Research (CTR), University of Texas at Austin
 - Performed data analysis and statistical modeling for several transportation research projects.
 - Authored and co-authored more than 20 research reports, journal publications, and conference proceedings.
- Research Engineer** 2013 - 2014
Sustainable Urban Development Program (ProDUS), University of Costa Rica
 - Collaborated in the preparation of research proposals and public bidding / Authored and co-authored technical reports.
 - Led more than 50 undergraduate research assistants in the development of field data collection activities.
- Undergraduate Research Assistant** 2010 - 2012
Sustainable Urban Development Program (ProDUS), University of Costa Rica
 - Collaborated in data collection, analysis, and processing for urban planning projects / Use of Geographic Information Systems.

Teaching Experience

TEACHING ASSISTANT

- CE 392M Public Transportation Engineering (Instructor: Dr. Randy B. Machemehl)** Fall 2018 / Fall 2019
Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin
- CE 367P Pavement Design and Performance (Instructor: Dr. Jorge A. Prozzi)** Spring 2016 / Fall 2016
Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin

MENTOR

- Graduates Linked with Undergraduates in Engineering (GLUE)** Fall 2017 / Spring, Fall 2019
Women in Engineering Program (WEP), University of Texas at Austin
- Directed Reading Program (DRP)** Fall 2018
Department of Mathematics, University of Texas at Austin
- University Transportation Center Undergraduate Internship (UTC-UI)** Summer 2015 / Summer 2016
Center for Transportation Research (CTR), University of Texas at Austin

Honors & Awards

- 2020 **Graduate Research Award**, Airport Cooperative Research Program (ACRP), Transportation Research Board (TRB)
- 2019 **Study in Intelligent Transportation Systems (ITS) Scholarship**, Intelligent Transportation Society (ITS) Texas
- 2019 **Mary Kate Collins Memorial Endowed Presidential Scholarship in Civil Engineering**, UT-Austin
- 2018 **Graduate Engineering Travel Grant**, Graduate Engineering Council (GEC), UT-Austin
- 2018 **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) Chapter
- 2018 **Leadership Collaborative Leader Award**, Women in Engineering Program (WEP), UT-Austin
- 2016 **Professional Development Award**, Department of Civil, Architectural and Environmental Engineering, UT-Austin
- 2016 **Innovation and Human Capital Program for Competitiveness Scholarship**, Inter-American Development Bank (IDB) and Ministry of Science and Technology (Costa Rica)

Publications

REFEREED JOURNAL PUBLICATIONS

1. **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. *Transportation Research Part C: Emerging Technologies*, 110, 346–367. <https://doi.org/10.1016/j.trc.2019.11.021>.
2. **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>.
4. 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>.
5. **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>.

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.

UNDER REVIEW

1. Tec, M., **N. Zuniga-Garcia**, R.B. Machemehl and J.G. Scott. Large-scale spatiotemporal density smoothing with the graph-fused elastic net: Application to ride-sourcing driver productivity. Under review for publication in *Journal of the American Statistical Association*.
2. 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*.
3. **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 *Journal of Management in Engineering*.

Technical Reports

1. **Zuniga-Garcia, N.** and R.B. Machemehl. (2019). Traffic analysis: Estimation of 24-hour travel times. Report prepared for the Texas Department of Transportation (TxDOT) Dallas District.
2. **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.
3. 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.
4. Pujol-Mesalles, R., J. Agüero-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.

Conference Presentations

1. **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. *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
2. **Zuniga-Garcia, N.** and R.B. Machemehl. Dockless electric scooters and transit use in an urban/university environment. *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
3. Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. First-mile-last-mile collector-distributor system using shared autonomous mobility. *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
4. 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. *XX Congreso Ibero Latinoamericano del Asfalto (CILA)*, Guadalajara, Mexico, November 2019.
5. Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. (2019). First-mile-last-mile collector-distributor system using shared autonomous mobility. *Automated Vehicles Symposium*, Orlando, FL, July 2019.
6. **Zuniga-Garcia, N.**, H.W. Ross, and R.B. Machemehl. (2019). Evaluation of the multimodal performance of arterial corridors. *Transportation Planning Applications Conference (TRBAppcon)*, Portland, OR, June 2019.
7. **Zuniga-Garcia, N.**, M. Tec, J.G. Scott, N. Ruiz-Juri, and R.B. Machemehl. (2019). Evaluation of ride-Sourcing search frictions and driver productivity. *98th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2019.
8. **Zuniga-Garcia, N.** and J.A. Prozzi. High-definition field texture measurements for predicting pavement friction. (2019). *98th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2019.
9. **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.
11. **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.
12. **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.
13. **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.
14. **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.
15. **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.
16. 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 of the Transportation Research Board*, Washington, DC, January 2017.
17. **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.
18. **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.
19. **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.

Skills

Languages	English (<i>Full professional proficiency</i>) Spanish (<i>Native proficiency</i>) Portuguese (<i>Elementary proficiency</i>)
Programming	<i>Advanced proficiency</i> : R, <i>Intermediate proficiency</i> : Python MATLAB, <i>Basic proficiency</i> : SQL C++
Software Packages	TSIS-CORSIM SPSS SAS MS Office L ^A T _E X ArcGIS AutoCAD

Research Projects

PRINCIPAL INVESTIGATOR

Impact of Transportation Network Companies on Ground Access to Airports

Aug. 2019 - Present

With Dr. Randy B. Machemehl

Sponsored by ACRP at TRB

- Using Intelligent Transportation Systems (ITS) data sources to evaluate the impact of ride-sourcing on ground access to airports.
- Cleaning and processing transit location and demand information for multiple years.

Evaluation Ride-Sourcing Search Frictions and Driver Productivity

Aug. 2017 - Aug. 2018

With Dr. Randy B. Machemehl, Dr. James G. Scott, Mauricio Tec 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.
- Using big data statistical models to assess ride-sourcing search frictions, driver productivity, and demand density.

Evaluation of the Multimodal Performance of Arterial Corridors

Jun. 2017 - Dec. 2017

With Dr. Randy B. Machemehl and Heidi W. Ross

Sponsored by HDR

- Implementing multimodal level of service metrics for corridor-level analysis.
- Assessing bicycle, pedestrian, and transit performance in arterial corridors to evaluate the multimodal level of service.

Economic Analysis of Pavement Preservation Techniques

Jan. 2016 - Dec. 2016

With Dr. Jorge A. Prozzi and Dr. Andre de Fortier Smith

Sponsored by TxDOT

- Implementing a stochastic life-cycle cost analysis of pavement preservation techniques using data +14,000 construction projects.

High-Definition Field Texture Measurements for Predicting Pavement Friction

Jan. 2016 - Dec. 2016

With Dr. Jorge A. Prozzi, Dr. Andre de Fortier Smith and Dr. Christian Claudel

Sponsored by USDOT

- Developing Multiple Linear Regression models to predict highway friction using transportation infrastructure data.
- Implementing signal processing techniques (such as linear filters) in Python, to enhance pavement texture characterization.

Selection and Design of Quiet Pavement Surfaces

Jan. 2015 - Dec. 2015

With Dr. Jorge A. Prozzi and Dr. Andre de Fortier Smith

Sponsored by TxDOT & FHWA

- Developing laboratory procedures to measure and evaluate asphalt and concrete pavement noise.

CO-INVESTIGATOR

Bond Corridor Performance Analysis

Jun. 2017 - Present

With Dr. Randy B. Machemehl, Dr. Natalia Ruiz-Juri and Heidi W. Ross

Sponsored by HDR

- Developing a Shiny on-line application (using R) for the evaluation of multimodal performance metrics at corridor level.
- Processing and mining of ITS data from multiple sources, e.g. GTFS, AVL, APC, Bluetooth.

Transit in the Context of New Transportation Paradigms

Jan. 2019 - Aug. 2019

With Dr. Randy B. Machemehl, Dr. Natalia Ruiz-Juri and Heidi W. Ross

Sponsored by D-STOP Center

- Cleaning and mining of data from more than 3 million dock-less bikes and scooters trips in Austin, Texas.
- Using 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

Jan. 2019 - Aug. 2019

With Dr. Kara M. Kockelman and Khrisna Murthy Gurumurthy

- Using agent-based simulation (MATSim) to evaluate operations impacts of using SAVs as a FMLM transit solution.

Work Zones Traffic Analysis for Freeway Maintenance Projects

Jan. 2017 - Aug. 2019

With Dr. Randy B. Machemehl and Nabeel A. Khwaja

Sponsored by TxDOT

- Using microsimulation software (TSIS-CORSIM) and ITS information to assess the traffic impact of work-zones in Dallas, Texas.

Graduate Coursework

Transportation Engineering: Public Transportation Engineering, Infrastructure System Management, Sensors and Signal Interpretation, Linear Regression and Discrete Choice Methods, Transportation Network Analysis, Advanced Theory of Traffic Flow.

Infrastructure Materials: Pavement Design and Performance, Paste and Concrete Rheology, Advanced Concrete Materials, Concrete Durability, Computational Methods for Geological Sciences, Advanced Legal Concepts in Civil Engineering.

Statistics and Data Sciences: Design and Analysis of Experiments (ANOVA), Bayesian Statistical Methods, Statistical Consulting Seminar, Statistical Modeling, Statistical Models for Big Data, Mathematical Statistics I and II.

Engineering Education: Knowing and Learning in STEM Education, Supervised Teaching in Civil Engineering, Assessment and Curriculum Design in Engineering, Engineering Teaching Practicum, Teaching Portfolio Preparation.

Teaching Certifications

Graduate Certificate in Engineering Education

May 2020 (Expected)

Cockrell School of Engineering, University of Texas at Austin

Austin, TX

Requirements: 16 credits. *Graduate coursework:* Knowing and Learning in STEM Education, Supervised Teaching in Civil Engineering, Assessment and Curriculum Design in Engineering, Engineering Teaching Practicum, Teaching Portfolio Preparation.

Advanced Teaching Preparation Certificate

Fall 2018

Faculty Innovation Center, University of Texas at Austin

Austin, TX

Requirements: 7 workshops and a qualifying teaching statement.

Inclusive Classrooms Leadership Certificate

Nov. 2018

Division of Diversity and Community Engagement, University of Texas at Austin

Austin, TX

Requirements: 2-days workshop.

Undergraduates Supervised

GLUE Program: Neve Enloe (Fall 2019) / Emily Tyndall (Spring 2019) / Tiffany Tang (Fall 2017), *winner of the GLUE Award.*

DRP Program: Emily Nguyen (Fall 2018), *winner of the 2018 Carey Scholarship.*

UTC-UI Program: Luis Arruti (Summer 2016) / Andres Sanchez (Summer 2015).

Leadership and Relevant Activities

UNIVERSITY SERVICE

Chair, Tenant Advisory Board (TAB)

2019 - 2020

University Housing and Dining, University of Texas at Austin

Committee Member, University of Texas Shuttle Bus Committee

2016 - 2020

Parking and Transportation Services, University of Texas at Austin

President, Women in Transportation Seminar (WTS) Student Chapter

2017 - 2018

Cockrell School of Engineering, University of Texas at Austin

Seminar Series Director, Graduate Engineering Council (GEC)

2017 - 2018

Cockrell School of Engineering, University of Texas at Austin

PROFESSIONAL SERVICE

Committee Chair, Women in Transportation Seminar (WTS)

2018 - 2020

Heart of Texas (WTS-HOT) Professional Chapter

Conference and Journal Referee

2017 - 2020

Transportation Research Board (TRB) Meeting & Transportation Research Record (TRR) Journal

Committees: Artificial Intelligence and Advanced Computing Applications (ABJ70), Statistical Methods (ABJ80), Bicycle and Pedestrian Data (ABJ35), Pavement Surface Properties and Vehicle Interaction (AFD90).

Friend of Committee, Transportation Research Board (TRB)

2017 - 2020

Artificial Intelligence and Advanced Computing App. (ABJ70), Statistical Methods (ABJ80).

Activities: In charged of the website development and communication update for the committee ABJ70 (currently AED50).

VOLUNTEER EXPERIENCE

2017-2019 **Explore UT - Cockrell School of Engineering**, University of Texas at Austin Open House.

2017-2019 **Introduce a Girl to Engineering (Girl Day)**, Women in Engineering Program, University of Texas at Austin.

Oct. 2017 **Keep Austin Beautiful Adopt a Street Clean-Up**, Capital Area Section of ITE (CAS-ITE).

Professional Affiliations

Student Member, Institute of Transportation Engineers (ITE).

Student Member, Intelligent Transportation Society (ITS).

Student Member, American Society of Civil Engineers (ASCE).

Student Member, Institute for Operations Research and the Management Sciences (INFORMS).