Natalia Zuniga-Garcia

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Qualifications

- Advanced researcher in the area of transportation and operations research with a focus on emerging transportation technologies.
- Experience in data and big-data modeling with a strong background in Bayesian and classical statistical methods.
- Skilled in statistical modeling and data analysis in R and Python, and spatial evaluations using ArcGIS and GIS data.
- Excellent written and verbal communication skills with experience in presentations for technical and non-technical individuals.

Education

Ph.D. in Civil Engineering | Transportation Engineering *2018 - Present*

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 and Data Sciences *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*

B.Sc. and Licentiate in Civil Engineering *December 2012*

School of Civil Engineering, University of Costa Rica *San Jose, Costa Rica*

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 *(refer to the next section).*
- 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.

Relevant Research Projects

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 web app (using Shiny in R) for the evaluation of multimodal performance metrics at corridor level.
- Processing and mining of Intelligent Transportation Systems (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*

- Using R for cleaning and mining 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.
- Applying advanced spatial econometric models, such as seemingly unrelated regression models (SUR), using R.

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

- Using R for cleaning and mining data from more than 1.5 million ride-sourcing trips, collected by an Austin-based TNC.
- Using big data statistical models to assess ride-sourcing search frictions, driver productivity, and demand density.
- Implementing an ADMM algorithm to solve the graph-fused lasso applied to ride-sharing data to detect spatial effects.

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.
- Using MATLAB to implement a Monte-Carlo simulation for statistical life-cycle cost analysis.

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

Skills

Computing R | SQL | Python | MATLAB | C++

Statistics / ML Spatial models | Linear regression | Bayesian methods and MCMC | Hypothesis testing

Software TSIS-CORSIM | SPSS | SAS | MS Office | LaTeX | ArcGIS | AutoCAD

Languages English *(Full professional proficiency)* | Spanish *(Native proficiency)* | Portuguese *(Elementary proficiency)*

Relevant Coursework

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

Selected Publications & Presentations

[Google Scholar page]

- Tec, M., **N. Zuniga-Garcia**, R.B. Machemehl and J.G. Scott. (2020). 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*. arXiv preprint arXiv:1911.08106.
- **Zuniga-Garcia, N.**, M. Tec, J.G. Scott, N. Ruiz-Juri, and R.B. Machemehl. (2020). 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`.
- Gurumurthy, K.M., K.M. Kockelman, and **N. Zuniga-Garcia**. (2020). First-mile-last-mile collector-distributor system using shared autonomous mobility. Under review for publication in *Transportation Research Record*.
- **Zuniga-Garcia, N.** and R.B. Machemehl. (2020). Dockless electric scooters and transit use in an urban/university environment. *99th Annual Meeting of the Transportation Research Board*, Washington, DC, January 2020.
- **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`.
- **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`.

Honors & Awards

2020 **Graduate Research Award,** Airport Cooperative Research Program (ACRP), Transportation Research Board (TRB)

2020 **Mary Kate Collins Memorial Endowed Presidential Scholarship in Civil Engineering,** UT-Austin

2020 **GLUE Mentor Award,** Women in Engineering Program (WEP), UT-Austin

2019 **Study in Intelligent Transportation Systems (ITS) Scholarship,** Intelligent Transportation Society (ITS) Texas

2018 **Diane Woodend Jones Leadership Legacy Scholarship,** Women's Transportation Seminar (WTS), International

2016 **Innovation and Human Capital Program Scholarship,** Inter-American Development Bank (IDB), Costa Rica

Teaching Experience

Teaching Assistant *Aug. 2016 - Dec. 2019*

Department of Civil, Architectural and Environmental Engineering, University of Texas at Austin *Austin, TX*

- CE 392M Public Transportation Engineering (Instructor: Dr. Randy B. Machemehl)
- CE 367P Pavement Design and Performance (Instructor: Dr. Jorge A. Prozzi)

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)*.

Leadership & Relevant Activities

***President*, Women in Transportation Seminar (WTS) Student Chapter | UT-Austin** *2017 - 2019*

Achievements: Re-activated the chapter, increased students participation, and doubled the budget.

***Seminar Series Director*, Graduate Engineering Council (GEC) | UT-Austin** *2017 - 2018*

Activities: Organized monthly seminars for graduate engineering students.

Journal Referee, Transportation Research Record (TRR) Journal *2017 - 2020*

Committees: Artificial Intelligence (AED50), Statistical Methods (ABJ80).

***Friend of Committee*, Transportation Research Board (TRB)** *2017 - 2020*

Activities: In charged of the website development and communication update for the AI committee.