

RISHABH S. CHAUHAN

Postdoctoral Research Associate at Princeton University

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I am a Postdoctoral Research Associate in the Department of Civil and Environmental Engineering at Princeton University. I have published 10 peer reviewed journal articles, 5 research posters, given 5 presentations at professional venues, and prepared 2 technical reports and one dataset. My research has been featured in major media outlets like *The Washington Post* and *The Wall Street Journal*. Additionally, I am the recipient of the UIC's 2022 *David Boyce Graduate Scholarship* and achieved 3rd place in the *UIC GIS Day 2019* poster competition.

EDUCATION

Doctor of Philosophy (PhD) Civil Engineering (August 2023)

Technical Concentration: Transportation Engineering

University of Illinois Chicago (UIC), IL, USA

Dissertation: "From Correlation to Causation: Travel Behavior Modeling with Causal Discovery and Inference"

Advisor: Prof. Sybil Derrible

Master of Science (MS) Civil Engineering (June 2019)

Technical Concentration: Transportation System Engineering

University at Buffalo, The State University of New York (UB), NY, USA

Thesis: "Short-Term Traffic Delay Prediction at the Niagara Frontier Border Crossings using Deep Learning"

Advisor: Prof. Adel W. Sadek

Bachelor of Engineering (BE) Civil Engineering (June 2017)

Technocrat Institute of Technology (TIT), Bhopal, MP, IND

First division with Honors

AWARDS AND RECOGNITION

Awarded **David Boyce Graduate Scholarship** in recognition of exceptional academic achievement in Civil, Materials and Environmental Engineering at UIC. November 2022.

Achieved **3rd place** for poster on 'Comparing the Access to Rapid Transit Systems in the Major U.S. Cities' at UIC GIS Day 2019. November 2019.

1st prize at the event Pravah in 'Loca-De-Festa- 2016' for presentation on 'Solid Waste Management' at TIT, Bhopal. April 2016.

1st rank in the fourth semester examination of B.E. in the Civil Engineering Department (out of 100+ students) of TIT, Bhopal. June 2015.

7th rank in the Popsicle Bridge Designing Competition at Megastructure 2k14, organized by the Department of Civil Engineering, TIT Bhopal. April 2014.

Mr. M.G. Agrawal Memorial scholarship for highest marks in English in class 12th Board examination (out of about 150 students), from Champion School, in the year 2012-13.

WORK
EXPERIENCE

Postdoctoral Research Associate
Princeton University
Supervisor: Prof. Anu Ramaswami.
September 2023 – Present

Equitable and Sustainable Transportation. Developing strategies to advance equitable climate adaptation as well as to develop zero carbon infrastructure in rapidly urbanizing cities. Conducting surveys to gather fine-scale ward-level data for enhanced understanding of travel behavior and emissions from transportation. Sep 2023 - Present

Graduate Research Assistant
University of Illinois Chicago.
Advisor: Prof. Sybil Derrible.
August 2019 – August 2023

Causality in Transportation. Developed causality-based travel mode choice models by combining Structural Equation Modeling (SEM) with four Causal Discovery Algorithms, namely Peter-Clark (PC), Fast Causal Inference (FCI), Fast Greedy Equivalence Search (FGES), and Direct Linear Non-Gaussian Acyclic Models (Direct LiNGAM). Estimated causal models for travel demand, electricity usage, and water consumption using Causal Discovery and Inference techniques. Compared the performance of causal models with predictive models in travel behavior modeling. Oct 2021 – Aug 2023

COVID Future Study. Conducted a Nationwide Online Longitudinal Survey in the United States on transportation related attitudes and behavior before, during, and after COVID-19. Helped in project planning, survey design, survey deployment, data preparation, and data analysis. May 2020 – June 2021

Graduate Research Assistant
University at Buffalo, The State University of New York.
Advisor: Prof. Adel W. Sadek.
May 2018 – May 2019

Olli Bus Project. Obtained Autonomous Vehicle Driverless License from Local Motors by successfully completing the Steward Training for a self-driving, electric and cognitive shuttle (Olli Bus). The training involved unmanned and manned operations, safety operations, data collection, charging, parking, loading, and unloading. Conducted Autonomous vehicle tests and Demonstrations, and prepared Observation Reports. May 2018 – May 2019

Short-Term Traffic Delay Prediction at the Niagara Frontier Border Crossings. Predicted passenger cars' traffic delays at the three Niagara Frontier Border Crossings for the next 60 minutes into the future using four deep learning techniques, namely Multilayer Perceptron (MLP), Convolutional Neural Networks (CNN), Long Short-Term Memory Recurrent Neural Networks (LSTM-RNN), and Gated Recurrent Unit Recurrent Neural Networks (GRU-RNN). May 2018 – May 2019

Teaching Assistant
University of Illinois Chicago
CME 434: Capstone Design. Spring 2023.
CME 434: Finite Element Analysis. Spring 2022.
CME 440: Cities and Sustainable Infrastructure. Spring 2021.
CME 203: Strength of Materials. Fall 2020.
CME 201: Statics. Summer 2020.
CME 112: Evolution of Infrastructure and Society. Spring 2020.
CME 201: Statics. Spring 2020.

CME 201: Statics. Fall 2019.

PUBLICATIONS

Peer-Reviewed Journal Publication

[J10] Sutradhar, U., Badhrudeen, M., **Chauhan, R. S.**, & Derrible, S., "[A survey to investigate transport conditions in depopulating cities in Illinois.](#)" Transportation Research Interdisciplinary Perspectives 21 (2023): 100886.

[J9] Magassy, T. B., Batur, I., Mondal, A., Asmussen, K. E., Bhat, C. R., Salon, D., Bhagat-Conway, M., Javadinasr, M., **Chauhan, R. S.**, Mohammadian, A., Derrible, S., & Pendyala, R. M., "[Evolution of Mode Use During the COVID-19 Pandemic in the United States: Implications for the Future of Transit.](#)" Transportation Research Record (2023): 03611981231166942.

[J8] Salon, D., Mirtich, L., Bhagat-Conway, M. W., Costello, A., Rahimi, E., Mohammadian, A., **Chauhan, R. S.**, Derrible, S., da Silva Baker, D., & Pendyala, R. M., "[The COVID-19 Pandemic and the Future of Telecommuting in the United States.](#)" Transportation Research Part D: Transport and Environment (2022): 103473.

[J7] Taghipour, H., Parsa, A. B., **Chauhan, R. S.**, Derrible, S., & Mohammadian, A., "[A novel deep ensemble based approach to detect crashes using sequential traffic data.](#)" IATSS Research (2022).

[J6] **Chauhan, R. S.**, Conway, M., Capasso da Silva, D., Salon, D., Shamshiripour, A., Rahimi, E., Khoeini, S., Mohammadian, A., Derrible, S., & Pendyala, R. M., "[A Database of Travel-Related Behaviors and Attitudes Before, During, and After COVID-19 in the United States.](#)" Scientific Data (2021).

[J5] Mirtich, L., Conway, M. W., Salon, D., Kedron, P., **Chauhan, R. S.**, Derrible, S., Khoeini, S., Mohammadian, A., Rahimi, E., & Pendyala, R. M., "[How Stable Are Transport-Related Attitudes over Time?.](#)" Findings (2021): 24556.

[J4] **Chauhan, R. S.**, Capasso da Silva, D., Salon, D., Shamshiripour, A., Rahimi, E., Sutradhar, U., Khoeini, S., Mohammadian, A., Derrible, S., & Pendyala, R. M., "[COVID-19 related attitudes and risk perceptions across urban, rural, and suburban areas in the United States.](#)" Findings (2021): 23714.

[J3] Capasso da Silva, D., Khoeini, S., Salon, D., Conway, M. W., **Chauhan R. S.**, Pendyala R. M., Shamshiripour A., Rahimi, E., Magassy, T., Mohammadian, A., & Derrible, S., "[How are Attitudes Toward COVID-19 Associated with Traveler Behavior During the Pandemic?.](#)" Findings (2021): 24389.

[J2] Salon, D., Conway, M. W., Capasso da Silva, D., **Chauhan, R. S.**, Derrible, S., Mohammadian, A., Khoeini, S., Parker, N., Mirtich, L., Shamshiripour, A., Rahimi, E., & Pendyala, R. M., "[The potential stickiness of pandemic-induced behavior changes in the United States.](#)" Proceedings of the National Academy of Sciences 118, no. 27 (2021).

[J1] **Chauhan, R. S.**, Shi, Y., Bartlett, A., & Sadek, A. W., "[Short-Term Traffic Delay Prediction at the Niagara Frontier Border Crossings: Comparing Deep Learning and Statistical Modeling Approaches.](#)" Journal of Big Data Analytics in Transportation 2, no. 2 (2020): 93-114.

Preprint/Under Review

[PR6] **Chauhan, R. S.**, Acosta-Sequeda, J., & Derrible, S., "Capturing the Causal Relationships Behind the Demand for Energy and Resources" (2023, under review).

[PR5] **Chauhan, R. S.**, Sutradhar, U., Rozhkov, A., & Derrible, S., "[Causation versus Prediction: Comparing Causal Discovery and Inference with Artificial Neural Networks in Travel Mode Choice Modeling.](#)" *arXiv preprint arXiv:2307.15262* (2023, under review).

[PR4] **Chauhan, R. S.**, Riis, C., Adhikari, S., Derrible, S., Zheleva, E., Choudhury, C. F., & Pereira, F. C., "[Causality in Travel Mode Choice Modeling: A Novel Methodology that Combines Causal Discovery and Structural Equation Modeling.](#)" *arXiv preprint arXiv:2208.05624* (2022, under review).

[PR3] **Chauhan, R. S.**, Bhagat-Conway, M. W., Magassy, T., Corcoran, N., Rahimi, E., Dirks, A., Pendyala, R. M., Mohammadian, A., Derrible, S., & Salon, D., "[COVID Future Panel Survey: A Unique Public Dataset Documenting How US Residents' Travel Related Choices Changed During the COVID-19 Pandemic.](#)" *arXiv preprint arXiv:2208.12618* (2022, under review).

[PR2] Mirtich, L., Weisman, H., Salon, D., **Chauhan, R. S.**, Derrible, S., & Magassy, T., "The impact of COVID-19 on the restaurant industry." (2022, under review).

[PR1] Batur, I., Dirks, A., Mondal, A., Magassy, T., Haddad, A., Bhat, C., Chen, C., Salon, D., Bhagat-Conway, M. W., Mohammadi, M., **Chauhan, R. S.**, Mohammadian, A., Derrible, S., & Pendyala, R. M., "Access to Food in a Severe Prolonged Disruption: The Case of Grocery and Meal Shopping During the COVID-19 Pandemic." (2022, under review).

Technical Report

[T3] Mirtich, L., Conway, M.W., Salon, D., Kedron, P., **Chauhan, R. S.**, Derrible, S., Khoeini, S., Mohammadian, A., Rahimi, E., & Pendyala, R. M., "[The Stability of Transport-Related Attitudes over Time: A Case Study During COVID-19](#)" Teaching Old Models New Tricks (TOMNET) Transportation Center (2022).

[T2] Salon, D., Conway, M. W., da Silva Baker, D., **Chauhan, R. S.**, Derrible, S., Mohammadian, A., Khoeini, S., Parker, N., Mirtich, L., Shamshiripour, A., Rahimi, E., & Pendyala, R. M., "[Investigating Attitudinal and Behavioral Changes in US Households Before, During, and After the COVID-19 Pandemic.](#)" Teaching Old Models New Tricks (TOMNET) Transportation Center (2022).

[T1] Lin, L., Bartlett, A., **Chauhan, R. S.**, Shi, Y., Wang, Q., & Sadek, A. W., "[Developing Predictive Border Crossing Delay Models.](#)" Transportation Informatics Tier I University Transportation Center (2019).

Poster

[P7] Magassy, T., Batur, I., Mondal, A., Asmussen, K. E., Pendyala, R. M., Bhat, C. R., Salon, D., Bhagat-Conway, M. W., Javadinasr, M., **Chauhan, R. S.**, & Mohammadian, A.K., & Derrible, S. (2023). "Evolution of Mode Use Due to COVID-19 Pandemic in the United States: Implications for the Future of Transit." *Transportation Research Board Annual Meeting 2023 (Forthcoming)*.

[P6] Salon, D., Bhagat-Conway, M. W., Mirtich, L., Costello, A., Rahimi, E., Mohammadian, A., **Chauhan, R. S.**, Derrible, S., da Silva Baker, D., Khoeini, S., & Pendyala, R. M. (2022). "The Effects of the COVID-19 Pandemic on Telecommuting in the United States." *Transportation Research Board Annual Meeting 2022*.

[P5] Khoeini, S., Sharda, S., da Silva Baker, D., Pendyala, R. M., Bhagat-Conway, M. W., Salon, D., Mirtich, L., **Chauhan, R. S.**, Derrible, S., Rahimi, E., Javadinasr, M., & Mohammadian, A. (2022). "Expected Change in US Air Travel after the COVID-19 Pandemic." *Transportation Research Board Annual Meeting 2022*.

[P4] Javadinasr, M., Magassy, T., Rahimi, E., Mohammadi, M., Davatgari, A., Mohammadian, A., **Chauhan, R. S.**, Bhagat-Conway, M. W., Pendyala, R. M., Salon, D., Derrible, S., & Khoeini, S. (2022). "*Observed and Expected Impacts of COVID-19 on Travel Behavior in the United States: A Panel Study Analysis.*" *Transportation Research Board Annual Meeting 2022*.

[P3] Mohammadi, M., Rahimi, E., Davatgari, A., Javadinasr, M., Mohammadian, A., Bhagat-Conway, M. W., Salon, D., **Chauhan, R. S.**, Derrible, S., da Silva Baker, D., & Pendyala, R. M. (2022). "Examining the Stickiness of Telecommuting after the COVID-19 Pandemic." *Transportation Research Board Annual Meeting 2022*.

[P2] Parsa, A. B., **Chauhan, R. S.**, Taghipour, H., Derrible, S., & Mohammadian, A. (2020). *Applying Deep Learning to Detect Traffic Accidents in Real Time Using Spatiotemporal Sequential Data*. *Transportation Research Board Annual Meeting 2020*.

[P1] **Chauhan, R. S.**, & Alahmadi, A. (2019). *Comparing the access to Rapid Transit Systems in the major U.S. Cities using GIS*. UIC GIS Day 2019. (Won third prize).

Thesis/Dissertation

[TH2] **Chauhan, R. S.**, "[From Correlation to Causation: Travel Behavior Modeling with Causal Discovery and Inference](#)" PhD dissertation, University of Illinois Chicago, 2023.

[TH1] **Chauhan, R. S.**, "[Short-Term Traffic Delay Prediction at the Niagara Frontier Border Crossings Using Deep Learning.](#)" MS thesis, State University of New York at Buffalo, 2019.

Dataset

[D1] Deborah, S., Conway, M. W., Capasso da Silva, D., **Chauhan, R. S.**, Shamsheeripour, A., Rahimi, E., Mirtich, L., Khoeini, S., Mohammadian, A., Derrible, S., & Pendyala, R. M. 2021, "COVID Future Wave 1 Survey Data v1.0.0", <https://doi.org/10.48349/ASU/OO7BTC>, ASU Library Research Data Repository, V1, UNF:6:Z61cxFCm14zzNxiO4fCbFA== [fileUNF]

PRESENTATIONS

[PT5] **Chauhan, R. S.** (2021). Commute during COVID-19 in Urban, Rural, and Suburban United States. AScUS Unconference 2021. Online.

[PT4] **Chauhan, R. S.**, & Derrible, S. (2020). Travel Mode Choice during and after the Pandemic. TOMNET hosted webinar. Online.

[PT3] Bartlett, A., & **Chauhan, R. S.** (2018). Predicting Border Crossing Delay through Newly Available Real-Time Data and Deep Learning Methods. Fourth Annual Symposium on Transportation Informatics, UB, NY, USA.

[PT2] **Chauhan, R. S.** (2016). Solid Waste Management. Event Pravah at 'Loca-De-Festa-2016', TIT, MP, IND.

[PT1] **Chauhan, R. S.** (2014). Classification of bridges. Seminar and Group Discussion, TIT Bhopal, MP, IND.

PROFESSIONAL
INTERNSHIPS AND
TRAININGS

Road construction from Khajuri Itkhedi Mughaliya to Neelbad, Bhopal. Observed placing of formworks, laying of separation membrane, usage of miller, screed vibrator, and concrete float, creation of contraction joints using contraction joint cutter (saw), applying sealant, and curing by ponding method. *Public Works Department (P.W.D.) West Sub-division, Bhopal.* August 2 – September 1, 2016.

Construction of concrete roads. Observed the preparation of subgrade, sub-base and concrete slab. Performed tests such as standard proctor test, CBR test of soil, Atterberg limit test, determination of bitumen content and aggregate impact value, free swell index test of soil, fineness modulus of sand, and compression strength testing of concrete at the Central Laboratory, *Madhya Pradesh Rural Road Development Authority (M.P.R.R.D.A.), Bhopal.* April 23 – May 6, 2016.

Construction of Multilevel Parking at M.P. Nagar, Zone-I, Bhopal. Studied the plan of multilevel parking. Observed reinforcement in slab and staircase, tying of reinforcement, formwork for column, slab and staircase, on-site batching plant, pouring of concrete, concrete bleeding, curing, masonry construction, electrification work, etc. Performed workability tests (slump test) on concrete, shape and size test, soundness test, and structure test on brick. *Municipal Corporation, Bhopal.* April 4 –17, 2016.

One-day geological field training program in and around Bhojpur Area. Studied vindhyan sandstones and their bedding, folds and joints. October 11, 2014.

GRADUATE
COURSE PROJECTS

Analyzing the Public Bus System Network in the Major U.S. Cities. Studied, analyzed and compared the public bus transportation system in the top five most populated cities in the U.S., namely New York City, Los Angeles, Chicago, Houston, and Phoenix. Used ArcGIS, Data analysis, and data visualization techniques. Course: Transportation Network (CME 509), Spring 2020.

Comparing the access to Rapid Transit Systems in the Major U.S. Cities. Compared the access to rapid transit systems among the five most populated cities in the U.S., namely New York City, Los Angeles, Chicago, Houston, and Pheonix. Calculated the percentage of population living within half a miles of a rapid transit station Using Geographic Information System (GIS). Course: GIS for planning and policy (UPP 461), Fall 2019.

Applications of Discrete Choice Modeling. Estimated Multinomial Logit (MNL) and Nested Logit (NL) models to predict the mode choice probabilities for intrazonal trips occurring in Buffalo, NY and determined the best model out of the two based on the modeling results. Course: Discrete Choice Analysis (CIE 555), Spring 2018.

Design Project. Designed horizontal and vertical alignments, drawn typical cross-sections, calculated earthwork and estimated cost using Carlson software for a relocated highway section at West Lafayette, Indiana, and determined the best alternative based on safety, cost, environmental and social impact. Course: Geometric Design of Highways (CIE 576), Spring 2018.

Metro Rail Project. Developed a new transit plan of Metro rail in Buffalo, NY for the year 2050. Course: Transportation (GEO 519), Fall 2017.

UNDERGRADUATE
PROJECTS

Analysis of Roller Compacted Concrete Pavement (RCCP). RCCP of under-construction road from Bhopal-Kolar road to Mahabadia was tested for gradation of aggregates and slump test. Its crushing strength was determined by performing core and cube test to draw a comparison

between RCCP and traditional concrete pavements and the reduction in cost for RCCP was estimated. November 2016.

Lime stabilization of sub-grade soil. Treated the black cotton soil (of CBR value less than 8%) with different percentages of lime to make it suitable for its use in sub-grade. CBR values of all soil samples were determined by performing CBR test as per IS: 2720 (Part 16). Optimum percentage of lime to be mixed for this purpose was determined. October 2016.

PROFESSIONAL COURSES

The Art of Structural Engineering – Bridges. *Princeton University Massive Open Online Course (MOOC)* via edx. Earned 100% out of knowledge checks, calculation assignments and creative challenges. January 29 - April 09, 2016.

Municipal Solid Waste Management in Developing Countries. *Massive Open Online Course (MOOC)* by École Polytechnique Fédérale de Lausanne and Sandec/Eawag via coursera. February 22 – March 28, 2016.

COMPUTER SKILLS

Software- GREET life-cycle model, MOVES motor vehicle emission simulator, Limdep, Minitab, Synchro, PTV Vissim, CARLSON, ArcGIS, AutoCAD, Microsoft Office.
Programming language- Python (including tensorflow, keras, scikit-learn, scipy, matplotlib, pandas, and numphy libraries), R, Matlab.
Operating System- Microsoft Windows XP, 7 and 10.

LANGUAGE SKILLS

Proficient in *English*, Native Speaker in *Hindi*.

SERVICE

Student volunteer at AScUS unconference. June 2021.

Scribe for the Sustainable World Without Waste workshop. May 2021.

Student Volunteer for ‘Science is Elementary!’ at West Minster Charter School, Buffalo, NY. Taught science to 5th grade students. September 2018 – November 2018.

Reviewer

Civil Engineering and Environmental Systems (2023)
Journal of Infrastructure Systems (2023)
Soft Computing (2023)
Transportation Research Board Annual Meeting (2023)
Transportation Research Part C (2023, 2022)
Transportation Research Part F (2023)
Scientific Data (2022, 2021)
Scientific Reports (2022)
Transportation Research Record (2022)

SELECTED PRESS

Asian News International (ANI) News (2021). COVID-19 disrupt normal modes of working, socialising, travelling among youth in US: Report.
<https://www.aninews.in/news/world/us/covid-19-disrupt-normal-modes-of-working-socialising-travelling-among-youth-in-us-report20210618070102/>

Hindustan Times (2021). How Covid-19 disrupts normal modes of working, socialising, travelling in youth. <https://www.hindustantimes.com/lifestyle/relationships/how-covid-19-disrupts-normal-modes-of-working-socialising-travelling-in-youth-101624012065421.html>

The New York Times (2021). A Little More Remote Work Could Change Rush Hour a Lot. <https://www.nytimes.com/2021/06/11/upshot/rush-hour-remote-work.html>

The Wall Street Journal (2021). Covid-19 Pandemic Likely Improved Your Commute to Work. <https://www.wsj.com/articles/covid-19-pandemic-likely-improved-your-commute-to-work-11609669801>

The Washington Post (2021). Millions plan to travel for Christmas, New Year's as omicron spreads. <https://www.washingtonpost.com/transportation/2021/12/17/omicron-variant-christmas-travel/>

UIC Today (2020). What will America look like after pandemic ends? <https://today.uic.edu/what-will-america-look-like-after-pandemic-ends>

UB Now (2019). New NSF program aims to speed discovery, research results. <http://www.buffalo.edu/ubnow/stories/2019/04/france-critical-conversation.html>

METRO Magazine (2018). Local Motors' self-driving shuttle makes University at Buffalo debut. <http://www.metro-magazine.com/technology/news/730954/local-motors-self-driving-shuttle-makes-university-at-buffalo-debut>

NGT News (2018). University at Buffalo Tests Self-Driving Electric Shuttle. <https://ngtnews.com/university-at-buffalo-tests-self-driving-electric-shuttle>

PR Newswire (2018). Robotic Research And Local Motors Launch Operations Of Autonomous Shuttle At University of Buffalo. <https://www.prnewswire.com/news-releases/robotic-research-and-local-motors-launch-operations-of-autonomous-shuttle-at-university-of-buffalo-300706096.html>

The Spectrum (2018). Two-year Olli bus testing begins on UB's North Campus. <http://www.ubspectrum.com/article/2018/08/two-year-olli-bus-testing-begins-on-ubs-north-campus>