

# ABHILASHA SAROJ

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## EDUCATION

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### Georgia Institute of Technology, USA

August 2020

Ph.D. in Civil Engineering

Minor in Computer Science

Dissertation Title: Development of a real-time connected corridor data-driven digital twin and data imputation methods

Overall GPA: 3.88/4.00

### Georgia Institute of Technology, USA

August 2016

M.S. in Civil Engineering

Overall GPA: 4.00/4.00

### Indian Institute of Technology Bombay, India

May 2012

B.Tech. in Civil Engineering

Overall GPA: 7.52/10.00

## RESEARCH INTERESTS

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Smart Cities, Smart City Applications, Digital Twin, Intelligent Transportation Systems, Traffic Simulation and Analysis, Connected Corridors, Connected/Autonomous Vehicles, Driving Behaviour, Machine Learning, Reinforcement Learning/Artificial Intelligence for Traffic Operations, Traffic Safety

## RESEARCH AND PROFESSIONAL EXPERIENCE

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### Georgia Institute of Technology

October 2020 - Present

*Postdoctoral Fellow*

*Atlanta, GA*

- Designing a new simulation modeling approach capable of reflecting emerging human driver behaviors in interactions with cooperative and autonomous vehicles
- Developing a real-time simulation model for connected vehicle environment to investigate feasibility of traffic signal control system optimized for fuel consumption

### Georgia Institute of Technology

August 2014 - August 2020

*Graduate Research Assistant*

*Atlanta, GA*

- Project Title: Guidance for Design of Vissim Simulation Models:
  - Developed guidance manual to design freeway interchange simulation model in PTV's Vissim 11.00 traffic simulation software
- Project Title: Smart Cities Atlanta – “North Avenue Smart Corridor” Digital Twin
  - Developed digital twin of the North Avenue Smart Corridor in Atlanta, capable of leveraging connected corridor data to drive traffic simulation and estimate the traffic and environmental performance measures at near real-time rate
  - Investigated characteristics of gaps in connected corridor data streams and impacts of Long Short-Term Memory (LSTM) Recurrent Neural Networks (RNN) imputation method on digital twin generated travel time measures
  - Archived data digital twin performance metric [visualization website](#)

- Project Title: Operational Evaluation of the "Don't Block the Box" (DBTB) Campaigns
  - Developed a Vissim probabilistic simulation model that emulated vehicle blocking behavior to investigate the impact of vehicle's blocking behavior on intersection delay and loss of capacity
  - Built a python-based software application – Georgia Tech Multi Video Player ([GT-MVP](#)) to aid video traffic data extraction to study vehicle's blocking behavior at intersections
  - Conducted Before-After Comparative Analysis to measure effectiveness of DBTB treatments

## **Indian Institute of Technology Bombay**

September 2013 - May 2014

*Research Assistant*

*Mumbai, India*

- Worked on a methodology to measure street walkability index based on walking facilities and street connectivity
- Developed a VISSIM model to simulate the congestion impact from Bandra Worli Sea Link
- Assisted in conduct of road safety audit of Pilot Bus Rapid Transit System Corridor at Pune, India

## **Boston Analytics**

July 2012 - June 2013

*Analyst*

*Mumbai, India*

- Developed a quantitative model of an expansion roadmap estimating the market size for motors and drives in India
- Created an analytical model to gauge relative prospects of waste management market of 14 EU countries

## **PUBLICATIONS**

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### **Peer-Reviewed Journal Publications**

1. **Saroj, A.**, A. Guin, and M. Hunter. Applicability of Long Short-Term Memory Traffic Volume Imputation Model to Drive Connected Corridor Simulation. *Journal of Modern Mobility Systems*, Dec 2020, Vol.1, 119-124. DOI: <https://doi.org/10.13021/jmms.2020.2929>
2. **Saroj, A.**, A. Guin, and M. Hunter. Deep LSTM Recurrent Neural Networks for Arterial Traffic Volume Data Imputation. *Journal of Big Data Analytics in Transportation*, 2021. DOI: <https://doi.org/10.1007/s42421-021-00043-2>

### **Refereed Conference Proceedings**

1. **Saroj, A.** A Sensitivity Analysis Study to Measure Impact of Real-Time Traffic Volume Data Imputations on Traffic Performance Measures. Winter Simulation Conference, National Harbor, Maryland, 2019. (Ph.D. Colloquium - Extended Abstract, Podium Presentation, and Poster Presentation) [[WSC 2019 proceedings](#)]
2. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Operational Evaluation of Don't Block the Box Campaigns. Transportation Research Board, Washington, D.C., 2019. (Extended Abstract and Poster Presentation) [[Link to TRID database](#)]
3. **Saroj, A.**, S. Roy, R. Fujimoto, A. Guin, and M. Hunter. Smart City Real-Time Data-Driven Simulation. Winter Simulation Conference, Gothenburg, Sweden, 2018. (Podium Presentation) [[IEEE proceeding](#)]
4. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Video Tool for Manually Extracting Complex Traffic Data. Transportation Research Board, Washington, D.C., 2018. (Podium Presentation Delivered by Co-Author) [[Link to TRID database](#)]
5. **Saroj, A.**, S. Harris, A. Guin, M. Rodgers, and M. Hunter. Analysis of Vehicle Blocking Behavior on Intersection Performance. Transportation Research Board, Washington, D.C., 2017. (Poster Presentation) [[Link to TRID database](#)]

## Work in Progress - Peer-Reviewed Journal Submissions

1. **Saroj, A.**, S. Roy, A. Guin, and M. Hunter. Development of a Connected Corridor Real-Time Data-Driven Traffic Simulation Model – Digital Twin. *Journal of Transportation Engineering, Part A: Systems*. 2021. (Revised and Resubmitted)
2. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Measuring Effectiveness and Operational Performance of Do Not Block the Box Campaigns. 2021. *Journal of Transportation Engineering, Part A: Systems*. (Under review)
3. **Saroj, A.**, S. Roy, A. Guin, and M. Hunter. Impact of Connected Corridor Volume Data Imputations on Digital Twin Performance Measures. 2021. (in preparation)

## Technical Reports

1. Hunter, M. P., R. L. Guensler, A. Guin, **A. Saroj**, and S. Roy. “Smart Cities Atlanta - North Avenue.” City of Atlanta, Atlanta, Georgia, December 2019.
2. Guin, A., M. P. Hunter, M. O. Rodgers, **A. Saroj**, N. Choudhary, and H. G. Kim. “Operational Evaluation of Do Not Block the Box Campaigns in Georgia.” Georgia Department of Transportation, Atlanta, Georgia, Report No. FHWA-GA-18-1443, April 2018.
3. Guin, A., M. P. Hunter, M. O. Rodgers, and **A. Saroj**. “Enhanced Role of Activity Center Transportation Organizations in Regional Mobility.” Georgia Department of Transportation, Atlanta, Georgia, Report No. FHWA-GA-16-1316, February 2017.

## CONFERENCE AND WORKSHOP PRESENTATIONS

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1. Hunter, M., A. Guin, **A. Saroj**, and S. Roy. Data Analysis for Smart Transportation, North Avenue Digital Twin. Invited presentation (online) for Midwest Energy Research Consortium (M-WERC). April 9th, 2020. (Approx. 10 real-time logins). (Speaker - Dr. Hunter)
2. Hunter, M., A. Guin, **A. Saroj**, and S. Roy. Smart City Real-Time Data Driven Simulation, North Avenue Digital Twin. Invited presentation (online) for A Better Half: Using Digital Twins to Improve City Infrastructure, Engineering News-Record (ENR), March 30th, 2020. (Approx. 250+ real-time logins). (Speaker - Dr. Hunter)
3. **Saroj, A.**, S. Roy, R. Fujimoto, A. Guin, and M. Hunter. Smart City Connected Digital Twin. GDOT/GTRI Research Expo, Atlanta, Georgia, September 13th, 2019.
4. Roy, S., **A. Saroj**, A. Guin, and M. Hunter. Connected Infrastructure Data Loss Patterns. GDOT/GTRI Research Expo, Atlanta, Georgia, September 13th, 2019.
5. Hunter, M., **A. Saroj**, S. Roy, R. Fujimoto, R. Guensler, and A. Guin. Smart City Real-Time Data Driven Simulation – North Avenue Digital Twin. ITE Summer Seminar, St. Simons Island, Georgia, July 21st to July 24th, 2019. (Speaker - Dr. Hunter)
6. Hunter, M., **A. Saroj**, S. Roy, R. Fujimoto, R. Guensler, and A. Guin. North Avenue Smart City Digital Twin. Georgia Power – A Southern Company, Atlanta, Georgia, July 25th, 2019. (Speaker - Dr. Hunter)
7. **Saroj, A.**, S. Roy, R. Fujimoto., R. Guensler, A. Guin, and M. Hunter. Smart City Digital Twin – Connected Data-Driven Traffic Simulation Model. Automated Vehicles Symposium, Orlando, Florida, July 15th to 18th, 2019.
8. Roy, S., **A. Saroj**, A. Guin, and M. Hunter. Investigation of Data Loss Patterns in Real-Time Connected Transportation Infrastructure Data. Automated Vehicles Symposium, Orlando, Florida, July 15th to 18th, 2019.

9. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Operational Evaluation of Don't Block the Box Campaigns. Southeastern Transportation Research, Innovation, Development, and Education Center Student Poster Competition, Washington, D.C., January 13th to 17th, 2019.
10. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Operational Evaluation of Don't Block the Box Campaigns. Transportation Research Board Annual Meeting, Washington, D.C., January 13th to 17th, 2019.
11. **Saroj, A.**, S. Roy, A. Guin, and M. Hunter. Smart Corridor Real-Time Dynamic Simulation. University Transportation Center Conference for the Southeastern Region, Clemson, South Carolina, October 24th to 25th, 2018.
12. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Operational Evaluation of DBTB Campaigns in Georgia. University Transportation Center Conference for the Southeastern Region, Clemson, South Carolina, October 24th to 25th, 2018.
13. Hunter, M., A. Guin, R. Guensler, R. Fujimoto, M. Rodgers, **A. Saroj**, S. Roy, J. Bolen, and A. Biswas. Smart Cities Atlanta – Real-Time Data-Driven Transportation Simulation. GDOT/GTRI Research Expo., Atlanta, Georgia, September 6th, 2018.
14. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, S. Harris, C. Maddox, M. O. Rodgers, and M. Hunter. Operational Evaluation of DBTB Campaigns in Georgia. GDOT/GTRI Research Expo., Atlanta, Georgia, September 6th, 2018.
15. **Saroj, A.**, N. Choudhary, H. Kim, A. Guin, M. Rodgers, and M. Hunter. Analysis of Vehicle Blocking Behavior on Intersection Performance. University Transportation Center Conference for the Southeastern Region, Gainesville, Florida, November 16th to 17th, 2017.
16. Hunter, M., R. Guensler, A. Guin, M. O. Rodgers, R. Fujimoto, J. Bolen, A. Biswas, S. Roy, and **A. Saroj**. Energy, Emissions, and a Smarter North Avenue – City of Atlanta Demonstration Project, Smart Cities Advisory Board Meeting, Atlanta, Georgia, October 2017.
17. **Saroj, A.**, A. Guin, S. Harris, C. Maddox, M. O. Rodgers, and M. Hunter. Operational Evaluation of DBTB Campaigns in Georgia. GDOT/GTRI Research Expo., Atlanta, Georgia, October 5th, 2017.
18. **Saroj, A.**, A. Guin, S. Harris, C. Maddox, M. O. Rodgers, and M. Hunter. Enhanced Role of Activity Center Transportation Organizations in Regional Mobility and Operational Evaluation of DBTB Campaigns in Georgia. GDOT/GTRI Research Expo., Atlanta, Georgia, September 13th, 2016.
19. **Saroj, A.**, S. Harris, A. Guin, M. O. Rodgers, and M. Hunter. Sensitivity Analysis of Vehicle Blocking Behavior on Intersections. University Transportation Center Conference for the Southeastern Region, Knoxville, Tennessee, March 31st to April 1st, 2016.
20. **Saroj, A.**, A. Guin, S. Harris, C. Maddox, M. O. Rodgers, and M. Hunter. Enhanced Role of Activity Center Transportation Organizations in Regional Mobility. GDOT/GTRI Research Expo., Atlanta, Georgia, September 22nd, 2015.

## GRANTS

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1. "Online Hybrid Digital Twin Simulation and Symbiotic Optimization for Robust Transportation Control Strategies (HySy)", National Science Foundation, June 2020. (**Senior Personnel**)
2. "Developing an Energy-Conscious Traffic Signal Control System for Optimized Fuel Consumption in Connect Vehicle Environments", U.S. Department of Energy, 2020. (**Senior Personnel**)

3. “Real-Time Data-Driven Simulation Development to Test Connected Infrastructure Environmental Applications: A Case Study of North Avenue Smart Corridor”, National Center for Sustainable Transportation, March 2019. **(PI)**
4. “Algorithms to Convert Basic Safety Messages into Traffic Measures”, National Cooperative Highway Research Program, January 2019. **(Senior Personnel)**

## TEACHING EXPERIENCE

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**Georgia Institute of Technology** Spring 2020  
*Co-Instructor, Graduate Course CEE 6300: Traffic Engineering* Atlanta, GA

- Designed syllabus, lecture content, and laboratory assignment for two-week duration on the topic of Traffic Simulations
- Delivered prerecorded asynchronous video lectures and synchronous online lectures

**Georgia Institute of Technology** Spring 2017, Fall 2017, and Spring 2018  
*Graduate Teaching Assistant, Undergraduate Course CEE 4600: Transportation Planning and Design*  
 Atlanta, GA

- Conducted laboratory lectures to teach fundamentals of traffic engineering and roadway design
- Advised student groups on semester project of roadway design.
- Graded coursework - homework, laboratory reports and semester project reports
- Received an average course evaluation feedback of 4.4 on a scale of 5.0 on overall effectiveness over the three semesters

## MENTORING EXPERIENCE

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**Stempower at Georgia Tech** Fall 2018 and Spring 2019  
*Mentor* Atlanta, GA

- Mentored at The Paideia School in Atlanta as part of Stempower - a mentoring program offered by Georgia Tech women students that encourages girls to explore STEM
- Conducted sessions to teach coding using python programming language to middle school girls; student count - 5
- Conducted activities and experiments to introduce STEM concepts to elementary school girls; student count - 3

**Georgia Institute of Technology** Spring 2017, Fall 2017, and Fall 2020  
*Graduate Student Mentor* Atlanta, GA

- Mentored two graduate students to lead data collection and analysis efforts for research project “Operational Evaluation of the Don’t Block the Box Campaigns”
- Co-authored papers on this effort with the graduate students
- Currently mentoring one graduate student

## HONOURS AND AWARDS

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1. 2020-2021 Civil and Environmental Engineering Future Faculty Fellow, Georgia Tech, 2020
2. National Science Foundation Travel Grant for Winter Simulation Conference, NSF, 2019
3. National Center for Sustainable Transportation Dissertation Fund, NCST, 2019
4. 2nd Best Poster, Southeastern Transportation Research, Innovation, Development and Education Center Student Poster Competition, 2019
5. Mobility Award. City of Atlanta’s North Avenue Smart Corridor Project (Research Project). Smart City Expo World Congress. Barcelona. November 2018, 2018

6. Winter Simulation Conference Travel Grant, Winter Simulation Conference Foundation, 2018
7. Helen M. Overly Memorial Scholarship, Women's Transportation Seminar Atlanta, 2018
8. John D. Edwards Memorial Scholarship, Institute of Transportation Engineers Georgia Section, 2017
9. Institute of Transportation Engineers Scholarship, Institute of Transportation Engineers Georgia Section, 2016
10. Traffic Bowl Winner Team, Institute of Transportation Engineers Georgia Section, 2015
11. BA's Best Employee Award, Project: "Power Conversion Market Assessment of India", Boston Analytics, 2013

## MEDIA COVERAGE

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1. Georgia Tech: [Future Faculty Fellows Bring Passion for Teaching, Research](#), Nov 2020.
2. Georgia Tech: [North Ave Smart Corridor wins mobility award at international Smart City Expo](#), Nov 2018.
3. Georgia Tech: [Four Tech women win WTS Atlanta scholarships and move on to national competition](#), Nov 2018.
4. Georgia Tech: [One Year Later: North Avenue Smart Corridor](#), Oct 2018.
5. Gov Tech: [Atlanta's Smart Corridor to Serve as Living Lab for Smart Transportation](#), Oct 2017.
6. Georgia Tech: [Energy, emissions and a smarter North Ave: Hunter, Guensler crunch data from new smart corridor to improve traffic, safety](#), Sep 2017.

## PROFESSIONAL DEVELOPMENT

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1. Center for the Integration of Research, Teaching, and Learning (CIRTL) Associate Level Certificate, May 2020
2. Tech to Teaching Certificate in college teaching, Center for Teaching and Learning, Georgia Tech, May 2020
3. [Deep Learning Specialization Certificate](#), Coursera - DeepLearning.AI, Series of five courses: Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Structuring Machine Learning Projects, Convolutional Neural Networks, and Sequence Models, May 2020
4. [DeepLearning.AI TensorFlow Developer Professional Certificate](#), Coursera - DeepLearning.AI, Series of four courses: Introduction to TensorFlow for Artificial Intelligence, Machine Learning, and Deep Learning, Convolutional Neural Networks in TensorFlow, Natural Language Processing in TensorFlow, and Sequences, Time Series, and Prediction, July 2020
5. [Fundamentals of Reinforcement Learning Course Certificate](#), Coursera – University of Alberta, August 2020
6. [Predictive Modelling with Azure Machine Learning Studio Course Certificate](#), Coursera, September 2020
7. [Machine Learning Pipeline with Azure ML Studio Course Certificate](#), Coursera, September 2020
8. [C for Everyone: Programming Fundamentals Course Certificate](#), Coursera - UCSC, December 2020
9. [C for Everyone: Structured Programming Course Certificate \(Honors\)](#), Coursera - UCSC, December 2020

## SERVICE TO UNIVERSITY

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<b>Board Member</b>	Graduate Student Advisory Council, CEE Georgia Tech	2016-2020
<b>Mentor</b>	Stempower Mentoring Program, Georgia Tech	2018-2019
<b>President</b>	Institute of Transportation Engineers, Georgia Tech	2018-2019
<b>Vice President</b>	Institute of Transportation Engineers, Georgia Tech	2016-2017
<b>Secretary</b>	Institute of Transportation Engineers, Georgia Tech	2015-2016
<b>Social &amp; Outreach Chair</b>	American Society of Highway Engineers, Georgia Tech	2015-2016
<b>Publicity Manager</b>	Technical Festival, Department of Civil Engineering, IITB	2010-2011

## SERVICE TO PROFESSION

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1. **Programming Committee Member and Reviewer:** Winter Simulation Conference 2021, 2020  
- Agent Based Modeling Track
2. **Associate Member:** American Society of Civil Engineers - Artificial Intelligence Committee
3. **Reviewer:** Standing Committee on Highway Traffic Monitoring, TRB Committee
4. **Reviewer:** Standing Committee on Highway Traffic Monitoring, TRB Committee
5. **Reviewer:** Standing Committee on Intelligent Transportation Systems, TRB Committee
6. **Reviewer:** Artificial Intelligence and Advanced Computing Applications, TRB Committee
7. **Reviewer:** Women's Issues in Transportation, TRB Committee
8. **Member:** ACM SIG SIM and American Society of Civil Engineers

## SERVICE TO COMMUNITY

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1. Communications Coordinator, 500 Women Scientists - Atlanta Pod (2021 - 22)
2. TEAMBuzz Georgia Tech Volunteering Service (Spring & Fall 2017)
3. Grader, 2016 MATHCOUNTS Georgia Competition at Marietta High School, Engineering Outreach Event, Institute of Transportation Engineers Georgia
4. Event Assistant, Woodruff Arts Center: Create ATL Family Fun Event