

# Debojjal Bagchi

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## EDUCATION

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### Master of Science in Engineering (Thesis) 2023-Present

The University of Texas at Austin

*Major:* Civil Engineering (Transportation), *Minor:* Operations Research & Industrial Engineering

*CGPA:* 4.00 / 4.00

*Thesis:* Error Bounds for Stochastic User Equilibrium Traffic Assignment (Ongoing)

### Bachelor of Science (Research) 2019-2023

Indian Institute of Science, Bengaluru

*Major:* Earth & Environmental Science, *Minor:* Mathematics

*CGPA:* 8.7/10 (*Major CGPA:* 9.4/10)

*Thesis:* Efficient and Safe Routing for Electric Vehicles Last Mile Logistics

## RESEARCH EXPERIENCE

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### Graduate Research Assistantship Sept 2023 – Dec 2024

“Data-Driven Multimodal Freight Modeling for Waterways and Port” sponsored by Coastal and Hydraulics Laboratory, US Army Corps of Engineers ERDC, *PI: Dr. Stephen Boyles*

- Part of the research team that processed and integrated data from multiple transport modes.
- Identified bottlenecks in multimodal freight networks through discrete event simulation.
- Simulated disruption scenarios to examine resilience and recovery bottlenecks.
- Proposed a queueing theory based model for defining operating capacity in multimodal port networks.

### Graduate Research Assistantship Sept 2023 – May 2024

Sponsored by Centre for Transportation Research, UT Austin, *PI: Dr. Stephen Boyles*

- Implemented a Gradient Projection algorithm for Vista Software in Java.
- Developed Python and Bash scripts for database management on network modelling centre servers.
- Conducted an extensive literature review of data frameworks for vehicle-to-everything technologies.

### MITACS Globalink Research Internship May 2022 – Aug 2022

“Integrating Waste and Resource Management: Data-Driven Optimization of Urban Mining Logistics” sponsored by MITACS at Université du Québec à Trois-Rivières, *PI: Dr. Amina Lamghari*

- Performed an extensive literature review of heuristics for Reverse Logistics (RL) network design problems including Tabu-Search, Simulated Annealing, and Bee Colony Optimisation.
- Developed a Scenario-based Mixed Integer Linear Program (MILP) formulation for the RL network design problem under uncertainties for wood industries of Quebec.
- Developed an Adaptive Large Neighbourhood Search (ALNS) heuristic for the RL network design problem and introduced the concept of adaptive neighbourhoods.
- Solved the MILP using CPLEX and implemented the ALNS heuristic on Python.

## Undergraduate Research Assistantship

July 2021 – July 2023

“A Local Search Heuristics for the Bi-criteria Steiner Travelling Salesman Problem with Time Windows (BSTSPTW)” at the Indian Institute of Science, Bengaluru, India, *Guide: Prof. Tarun Rambha*

- Performed extensive literature review of existing heuristic algorithms for the Travelling Salesman Problem, including Pareto Local Searches, Lin-Kernighan Heuristic, and r-opt.
- Developed and implemented two brute-force exact methods for the Multi-Objective Steiner Travelling Salesman Problem (BSTSP).
- Formulated a new scalarisation-based Mixed Integer Program (MIP) formulation for BSTSPTW which improves the single commodity flow formulation for STSP and implemented it using CPLEX.
- Proposed a novel local search-based heuristic with six operators that performs better than an adapted version of Lin-Kernighan-Helsgaun (LKH) Heuristic.
- Bench-marked results on real world instances focusing on Amazon delivery routes in Austin, US

## MANUSCRIPTS UNDER REVIEW

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- [M3] **Bagchi, D.**, Bathgate, K., and Boyles S. D. (2024). A queuing-theory-based operating capacity model for multimodal port operations\*
- [M2] Bathgate, K., **Bagchi, D.**, and Boyles S. D. (2024). Use of AIS data to characterize vessel mix in Houston port operations for simulation\*
- [M1] Agarwal, P.<sup>†</sup>, **Bagchi, D.**<sup>†</sup>, Rambha, T., and Pandey, V. (2024). A Bi-criterion Steiner Traveling Salesperson Problem with Time Windows for Last-Mile Electric Vehicle Logistics. [\[Code\]](#)

<sup>†</sup> Equal contribution; \* For conference(s)

## REFEREED CONFERENCE PRESENTATIONS

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- [C4] Kyle Bathgate, **Debojjal Bagchi**, Stephen D. Boyles (2024, October). Identifying capacities in a multimodal maritime freight network. *Accepted in Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting 2024, Seattle, USA.*
- [C3] **Debojjal Bagchi**, Stephen D. Boyles. (2024, October). Error Bounds for Stochastic User Equilibrium Traffic Assignment. *Accepted in Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting 2024, Seattle, USA.*
- [C2] **Debojjal Bagchi**, Prateek Agarwal, Tarun Rambha, Venktesh Pandey. (2023, January). *A Local Search Heuristic for Bi-criterion Steiner Travelling Salesman Problem. Presented in Transportation Research Board (TRB) 102nd Annual Meeting 2023, Washington, D.C., USA.*
- [C1] **Debojjal Bagchi**, Prateek Agarwal, Tarun Rambha, Venktesh Pandey. (2022, October). A Local Search Heuristic for Bi-criterion Steiner Travelling Salesman Problem. *Presented in Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting 2022, Indianapolis, USA.*

## TECHNICAL PRESENTATIONS AND POSTERS

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- [T1] Kyle Bathgate, **Debojjal Bagchi**, Stephen D. Boyles (2024, October). Data-Driven Modelling for Multimodal Port Resilience Assessment. *Presented in UT Austin Center for Transportation Research Annual Symposium, 2024, Austin, USA.*

## HONORS AND AWARDS

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- Graduate School Fellowship awarded by UT Austin Graduate School (2023-2027)
- Mitacs Globalink Research Internship (GRI) awarded by Mathematics of Information Technology and Complex Systems (MITACS), Canada (2022)
- Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship awarded by Department of Science and Technology, Government of India (2019-2023)
- Awarded “Special Honor” in category “Academic excellence by a student” in The Telegraph School Awards (2019)
- Awarded Dhirubhai Ambani Scholarship by Reliance Foundation (2019)
- Jagadis Bose National Talent Search (JBNSTS) Fellowship (2018)
- National Talent Scholarship (NTSE) Scholar awarded by National Council of Education Research and Training, India (2017)

## TEST SCORES

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- Graduate Record Examination (GRE) – 155/170 (Verbal Reasoning), 167/170 (Quantitative Reasoning), 4.0/6.0 (Analytical Writing), 2023
- Test of English and Foreign Language (TOEFL) iBT Test – 29/30 (Reading), 29/30 (Listening), 26/30 (Writing), 25/30 (Speaking), 109/120 (Overall) 2023
- 99.3 percentile score in Joint Entrance Examination (Main) out of 1.5 million candidates
- Among top 1% in Joint Entrance Examination (Advanced) out of 1.2 lakh candidates
- All India Rank 40 in National Creativity Aptitude Test (NCAT), 2020
- 96% in All India Senior School Certificate Examination (12th Board examination), 2019
- CGPA 10/10 in All India Secondary School Examination (10th board examination), 2017

## SOCIETY SERVICE

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### **Institute of Transportation Engineers (ITE)**

*University of Texas at Austin Student Chapter*

- Member (2023-Present)
- Social Service Officer (2023-Present)

### **Women’s Transportation Seminar (WTS)**

*University of Texas at Austin Student Chapter*

- Member (2023-Present)
- Social Service Officer (2023-Present)

### **NoteBook Drive (NBD)**

*Indian Institute of Science*

- Member (2019-2021)

## CO-CURRICULAR ACTIVITIES

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- **Spanish Guitar:** Diploma with first-division distinction from Nikhil Bharat Sangeet Samiti
- **Chess:** Member of All India Chess Federation, Peak rating of 1378 on Lichess (Rapid) and 1346 (Bullet)

## LEADERSHIP ROLES

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- Co-founded [CoachIO](#), an ed-tech startup to provide affordable bootcamp courses to KVPY and olympiad aspirants across India. Managed a team of 9 members with gross revenue over 5 lakh INR.
- Co-ordinated and sourced funding for [Quadspark](#), a national level quiz competition as a part of Pravega, IISc, Bengaluru. The event witnessed 1200+ participants and was held in 3 stages.
- Content creator on personal YouTube channel [Debojjal Bagchi](#). The channel currently has over 10k subscribers and 1M+ views.

## SKILLS

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- **Programming Languages:** C, Python, Java, GAUSS
- **Software and Libraries:** SimPy, CPLEX, GAMS, OR-Tools, OSMnx (OpenStreetMap), NetworkX, TensorFlow, Pandas, NumPy, Scikit-learn, Matplotlib, Plotly, Streamlit, SciDavis, MS Office, L<sup>A</sup>T<sub>E</sub>X, Git, GitHub