# KARUSH SURI

## EDUCATION

**University of Toronto** — 2025 - 2029 (Expected)
*PhD, Electrical & Computer Engineering* — *Toronto, Canada*
Thesis: TBD
GPA: TBD

**University of Toronto** — 2019 - 2021
*MASc, Electrical & Computer Engineering* — *Toronto, Canada*
Thesis: Deep Hierarchical Reinforcement Learning
GPA: 4/4

**Amity University** — 2015 - 2019
*BTech, Electrical & Computer Engineering* — *Delhi, India*
Thesis: Sign Language Translation from Wearable Sensors (demo)
GPA: 8.78/10 (rank: 4/142)

## AWARDS

**Academic**

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|---|---|
| University of Toronto Doctoral Scholarship | 2025 - 2029 |
| Laura Bassi Scholarship (declined) | 2025 |
| Electrical & Computer Engineering Fellowship, University of Toronto | 2020 - 2021 |
| Edward S. Rogers Graduate Scholarship, University of Toronto | 2019 - 2020 |
| Best in Technical Innovation Award (Class of 2015-2019), Amity University | 2019 |
| Most Frugal Innovation Award, Amity University | 2018 |
| 100% Curriculum Merit Scholarship, Amity University | 2015 |
| Young Achievers in Mathematics Award | 2015 |

**Industrial**

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|---|---|
| Outstanding Reviewer, NeurIPS | 2023 |
| Outstanding Intern Buddy, Google X | 2022 |

## EMPLOYMENT

**Valence Labs (Mila)** — 2023 - 2025
*Research Engineer* — *Montreal, Canada*
Advisors: Dr. Emmanuel Bengio
Projects: **(1)** Multi-Modal Phenomic Foundational Models, **(2)** Amortized Inference with GFlowNets

**Google X** — 2021 - 2023
*AI Resident* — *Mountain View, USA*
Advisors: Grace Brentano & Dr. Lam Nguyen
Project: Undisclosed

## INTERNSHIPS

**Borealis AI** — 2020 - 2021
*Student Researcher* — *Toronto, Canada*
Advisors: Xiao Qi Shi
Projects: Deep Hierarchical Reinforcement Learning for Trade Execution

## PUBLICATIONS

∗ = equal contribution

"*A Cross Modal Knowledge Distillation & Data Augmentation Recipe for
Improving Transcriptomics Representations through Morphological Features*" — ICML 2025

Ihab Bendidi, Yassir El Mesbahi, Alisandra Kaye Denton, <u>Karush Suri</u>,
Kian Kenyon-Dean, Auguste Genovesio, Emmanuel Noutahi

*"Understanding Conditional Computation in Contrastive Phenomic Retrieval"*     Technical Report 2025
<u>Karush Suri</u>, Puria Moghadam, Frederik Wenkel, Maciej Sypetkowski,
Emmanuel Bengio, Emmanuel Noutahi, Dominique Beaini

*"How Molecules Impact Cells: Unlocking Contrastive PhenoMolecular Retrieval"*     NeurIPS 2024
Philip Fradkin\*, Puria Moghadam\*, <u>Karush Suri</u>, Frederik Wenkel,
Ali Bashashati, Maciej Sypetkowski,     FM4S @ NeurIPS 2024 **(oral)**
Dominique Beaini     <span style="color:red">**(best paper award)**</span>

*"On the Scalability of GNNs for Molecular Graphs"*     NeurIPS 2024
Maciej Sypetkowski, Frederik Wenkel, Farimah Poursafaei,
Nia Dickson, <u>Karush Suri</u>, Philip Fradkin, Dominique Beaini

*"Surprise Minimizing Multi-Agent Learning with Energy-based Models"*     NeurIPS 2022
<u>Karush Suri</u>, Xiao Qi Shi, Konstantinos Plataniotis, Yuri Lawryshyn

*"Off-Policy Evolutionary Reinforcement Learning with Maximum Mutations"*     AAMAS 2022 **(oral)**
<u>Karush Suri</u>

*"Continuous Sign Language Recognition from Wearable IMUs
using Deep CapsNet and Game Theory"*     CEE, Elsevier, 2019
<u>Karush Suri</u>, Rinki Gupta

*"Transfer Learning for sEMG-based Hand Gestures using
Deep Learning in a Master- Slave Architecture"*     IEEE IC3I 2018
<u>Karush Suri</u>, Rinki Gupta

## PENDING PATENTS

*"Generating Actions for a Supply Chain Network"*     2024
Lam Nguyen, Grace Brentano, Sze Lee, <u>Karush Suri</u>, Anikait Singh,
Salil Pradhan, David Andre
Google X, Application Number: 52862.

*"Large Language Model Derived Environment State Changes In Supply Chain Logistics"*     2023
Lam Nguyen, Grace Brentano, Salil Pradhan, David Andre, Gearoid Murphy,
Sze Lee, <u>Karush Suri</u>, Raja Panjwani, Anikait Singh, Klara Kaleb
Google X, Application Number: 52750.

*"Large Language Model Interface for Supply Chain Networks"*     2023
Lam Nguyen, Grace Brentano, David Andre, Salil Pradhan, Anikait Singh, <u>Karush Suri</u>
Google X, Application Number: 52503.

*"Generating Network Alignment Information"*     2022
Raja Panjwani, Anikait Singh, Ashish Chona, Sze Lee, Grace Brentano,
<u>Karush Suri</u>, Lam Nguyen, Salil Pradhan
Google X, Application Number: 52766.

## SERVICES

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|---|---|
| Reviewer, *ICML* | 2024 - Present |
| Reviewer, *ICLR* | 2024 - Present |
| Reviewer, *NeurIPS* | 2024 - Present |
| Teaching Assistant, *Digital Image Processing*, University of Toronto | 2021 |
| Teaching Assistant, *Computational Thinking*, University of Toronto | 2021 |
| Teaching Assistant, *Computer Networks*, University of Toronto | 2020 |
| Teaching Assistant, *Computer Organization*, University of Toronto | 2020 |

# Autodidactic Learning

**1. Reading**

I shortlist and read 3-5 conference papers every week. Papers are shortlisted based on how different they are from my current research or engineering topic. I also revisited old mathematics and machine learning textbooks. Some of the material I have read and solved over the years is listed below-

- Topology, James Munkres, all chapters
- Topics in Algebra, I.N. Herstein, all chapters
- Convex Optimization, Stephen Boyd, chapters 6-11
- Neuro-dynamic Programming, Dimitri Bertsekas and John Tsitsiklis, chapters 1-6
- Abstract Dynamic Programming, Dimitri Bertsekas, chaters 1-2
- Machine Learning: A Probabilistic Perspective, Kevin Murphy, chapters 20-24
- Pattern Recognition and Machine Learning, Christopher Bishop, chapters 8-12

**2. Writing**

I write my ideas in a document once every week. I tend to summarize my idea in 0.5-1 page. In addition to my ideas, I used to summarize important papers. Length of the summary was kept 1 page. The list of paper summaries can be found here.

**3. Code Implementations**

I previously implemented large codebases as open-source projects once every two months. Below is the list of polished as well as unpolished codebases-

- Toy Examples (JAX and PyTorch) (here)
- Hierarchical DQN (JAX) (here)
- Proximal Policy Optimization (JAX) (here)
- Conservative Q Learning (JAX) (here)
- Discrete Gumbel Samplers (JAX) (here)
- Eligibility Traces with Neural Networks (PyTorch) (here)
- Evolution Strategies (PyTorch) (here)
- Lagrangian Algorithms and Vector Products (Autograd) (here)