# Sirisha Rambhatla


**Contact Information**

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**Research Focus**

Statistical machine learning, spatiotemporal data analysis, representation learning, interpretability and blackbox explainability, with applications to healthcare, intelligent automation, & computer vision

**Experience**

**Assistant Professor – Tenure-Track** — July. 2021 – Present
University of Waterloo — Waterloo, ON, Canada

Department of Management Science & Engineering, Faculty of Engineering (*Primary*)
David R. Cheriton School of Computer Science, Faculty of Mathematics (*Cross-appointment*)
Systems Design Engineering Department, Faculty of Engineering (*Cross-appointment*)

Director, Critical Machine Learning Lab

*Faculty Affiliate* Waterloo Data and Artificial Intelligence Institute • Waterloo Institute for Sustainable Aeronautics (WISA) • Computational Mathematics Program • Cybersecurity and Privacy Institute (CPI)

**Postdoctoral Scholar – Research Associate** — Oct. 2019 – July, 2021
Computer Science Department (Supervisor: Prof. Yan Liu ) — Los Angeles, CA, USA
University of Southern California

**Graduate Research Assistant** — 2011 – 12 & 2014 – 19
Department of Electrical and Computer Engineering — Minneapolis, MN, USA
University of Minnesota – Twin Cities

**Science Advisor** — Mar. 2013 – Jun. 2014
Intellectual Property (IP) and Technology Litigation — Minneapolis, MN, USA
Robins Kaplan LLP

**Engineering Intern (R&D)** — Jun.– Aug. 2011 & Jun.– Oct. 2012
Technology and Engineering Division — St. Paul, MN, USA
Ativa Medical Inc.

**Undergraduate Research Intern** — May 2009 – Jul. 2009
Networked Control Systems Lab — Kanpur, India
Indian Institute of Technology Kanpur (IIT-K)

**Education**

**Doctor of Philosophy (Ph.D.)** in Electrical Engineering — Sep. 2014 - Sep. 2019
University of Minnesota – Twin Cities — Minneapolis, MN
Thesis: *Provably Learning from Data: New Algorithms for Matrix/Tensor Decompositions & Factorizations*
Advisor: Prof. Jarvis Haupt

**Master of Science (M.S.)** in Electrical Engineering — Aug. 2010 - Dec. 2012
University of Minnesota – Twin Cities — Minneapolis, MN
Thesis: *Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning*
Advisor: Prof. Jarvis Haupt

**Bachelor of Technology (B.Tech) Honors** in Electronics & Telecom. Eng. — Aug. 2006 - May 2010
College of Engineering Roorkee (COER), *Uttarakhand Technical University* — Roorkee, India
University Bronze Medalist (*Top 0.003% in the university*)

## Awards and Honors

Best Vision Paper Award, 10th Annual Conference on Vision and Intelligent Systems (CVIS) 2024
Department Nominee, Teaching Excellence Academy, *Center for Teaching Excellence, UWaterloo* 2024
Highlighted Reviewer ( 8% of reviewers), *International Conference on Learning Representations (ICLR)* 2022
Outstanding Paper Presentation Award, *Plastic Surgery: the Meeting* 2021
Merit Award for Excellence in Postdoctoral Research, *University of Southern California* 2020 – 21
ICLR Travel Award, *International Conference on Learning Representations (ICLR)* 2019
Selected Presenter, "Graduation Day" Session, *Information Theory & Applications Workshop* 2019
Finalist, Student Best Paper Award, *Asilomar Conference on Signals, Systems & Computers* 2017
National Science Foundation (NSF) Travel Award, *GlobalSIP* 2016
E. Bruce Lee Memorial Fellowship, *University of Minnesota – Twin Cities* 2014 – 2015
SciTechsperience Fellowship, *Minnesota High Tech Association* 2012
University Merit List, Third Place – ECE (Bronze Medal), *Uttarakhand Technical University, India* 2010
Proficiency Award for Academic Excellence, *COER, India* 2009 – 10
Proficiency Award for Academic Excellence, *COER, India* 2006 – 07

## Awards Won by Supervised Students

Yuen Family Foundation Awards for Healthy Aging Capstone Award 2024
*Team:* Saad Hossain, Tom Chiu, Michael Frew, and Ryan Yan
For AI for Improving Lung Ultrasound Scan Acquisition

Indigenous Black Engineering Technology (IBET) PhD Fellowship, *Faculty of Engineering* 2024
*Student:* Kimathi Kaai

Vector AI Fellowship (Masters), *Vector Institute* 2024
*Student:* Joshua Kurien

Konrad Capstone Design Award, *Konrad Group* 2023
*Team:* Justine Archer, Francois Barnard, Arden Song, Christiana Wu, and Charles Yu, For *Collaborative Selection Systems in Recruiting*

Management Engineering Design Award, *Department of Management Science and Engineering* 2023
*Team:* Justine Archer, Francois Barnard, Arden Song, Christiana Wu, and Charles Yu
For *Collaborative Selection Systems in Recruiting*

Semi-Finalist for the Norman Esch Entrepreneurship Award, *The Esch Foundation* 2023
*Team:* Gunchica Bhalla, Laurie Gao, Soohyun Kim, Ashwuni Kumar,and Olivia You
For *AI-based Non-expert Assistive System*

I-Beam Award, Interdisciplinary Design Project (GENE 404) 2021
*Team:* Kimathi Kaai (MME), Peter Marshall (SyDE), Nathan Rowe (MME), and James Serez (SyDE)
For *Vysio: AI for improving Physiotherapy Adherence and Outcomes*

## Refereed Publications Overview

In the area I work in, conferences are long-form and the primary form of dissemination; workshop papers are also refereed and are extremely important to report cutting-edge work-in-progress. The first author is generally the students (in the order of contributions) followed by the senior authors (according to seniority). In my collaborations with clinicians, in some cases, it is customary to list the clinician as the first author. Students under my supervision are marked by *, and † denotes equal authorship.

## Refereed Conference Publications

"*" denotes a personnel supervised by me. x

[1] B. Balaji*, J. Bright, Y. Chen, **S. Rambhatla**, J. S. Zelek, D. A. Clausi. Seeing Beyond the Crop: Using Language Priors for Out-of-Bounding Box Keypoint Prediction. *Proceedings of Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2024.

Table 1: Summary of Publications

| **Publications** | **Number** |
|---|---|
| Conference | 17 |
| Workshops | 11 |
| Abstracts | 6 |
| Journals | 7 |
| Under review | 4 |
| Other Publications | 3 |
| Theses | 2 |
| **Total** | **50** |

[2] P. Bhowal*, A. Soni*, **S. Rambhatla**. Why do Variational Autoencoders Really Promote Disentanglement? *Proceedings of the 41th International Conference on Machine Learning (ICML), PMLR*, 2024.

[3] B. Balaji*, J. Bright, **S. Rambhatla**, Y. Chen, A. Wong, J. Zelek, and D. A. Clausi. Domain-Guided Masked Autoencoders for Unique Player Identification. *21st Conference on Robotics and Vision (CRV)*, 2024. **Selected for Oral Presentation**.

[4] J. Park, K. Kaai*, S. Hossain*, N. Sumi, **S. Rambhatla**, P. Fieguth. Domain-Guided Spatio-Temporal Self-Attention for Egocentric 3D Pose Estimation. *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*, 2023.

[5] **S. Rambhatla**, Z. Che, and Y. Liu. I-SEA: Importance Sampling and Expected Alignment-based Deep Distance Metric Learning for Time Series Analysis and Embedding. *36th Association for the Advancement of Artificial Intelligence (AAAI) conference on Artificial Intelligence*, 2022.

[6] **S. Rambhatla**†, S. Huang†, L. Trinh, M. Zhang, M. Dong, V. Unadkat, H. A. Yenikomshian, J. Gillenwater, and Y. Liu. `DL4Burn`: Burn surgical candidacy using multimodal deep learning. *American Medical Informatics Association (AMIA) Annual Symposium*, 2021.

[7] C. Meng, **S. Rambhatla**, and Y. Liu. Cross-Node Federated Graph Neural Network for Spatio-Temporal Data Modeling. *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*, 2021.

[8] S. Seo†, C. Meng†, **S. Rambhatla**, and Y. Liu. Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning. *International Joint Conferences on Artificial Intelligence (IJCAI)*, 2021. [Link]

[9] L. Trinh, M. Tsang, **S. Rambhatla**, and Y. Liu. Interpretable and Trustworthy Deepfake Detection via Dynamic Prototypes. IEEE Winter Conference on Applications of Computer Vision (WACV), 2021. [Link]

[10] M. Tsang, **S. Rambhatla**, and Y. Liu. How does this interaction affect me? Interpretable attribution for feature interactions. *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Link]

[11] **S. Rambhatla**, X. Li, and J. Haupt. Provable Online CP/PARAFAC Decomposition of a Structured Tensor via Dictionary Learning. *Advances in Neural Information Processing Systems (NeurIPS)*, 2020. [Link]

[12] **S. Rambhatla**, X. Li, and J. Haupt. NOODL: Provable Online Learning for Dictionary Learning and Sparse Coding. *International Conference on Learning Representations (ICLR)*, 2019. **Travel Award**. [Link]

[13] **S. Rambhatla**, N. Sidiropoulos, and J. Haupt. TensorMap: Lidar-based Topological Mapping and Localization via Tensor Decompositions. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2018. [Link]

[14] X. Li, J. Ren, **S. Rambhatla**, Y. Xu, and J. Haupt. Robust PCA via Dictionary Based Outlier

Pursuit. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018. [Link]

[15] **S. Rambhatla**, X. Li, and J. Haupt. Target Based Hyperspectral Demixing via Generalized Robust PCA. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2017. **Student Best Paper Award Finalist**. [Link]

[16] **S. Rambhatla**, X. Li, and J. Haupt. A Dictionary Based Generalization of Robust PCA. *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, 2016. **National Science Foundation (NSF) Travel Award**. [Link]

[17] **S. Rambhatla** and J. Haupt. Semi-Blind Source Separation via Sparse Representations and Online Dictionary Learning. *Asilomar Conference on Signals, Systems, and Computers (Asilomar)*, 2013. [Link]

## Refereed Workshop Papers

[18] S. Rajabi*, **S. Rambhatla**. Enhancing Fine-Tuning Efficiency of LLMs Through Gradient Subspace Tracking.*Neural Information Processing Systems (NeurIPS) Workshop on Adaptive Foundation Models: Evolving AI for Personalized and Efficient Learning (AFM)*, 2024.

[19] C. Liu*, S. Hossain*, C Thomas, K.H. Lai, R. Vemulapalli, **S. Rambhatla**, A. Wong. LangDA: Adapting Visual Features with Instruction Tuning for Semantic Segmentation.*Neural Information Processing Systems (NeurIPS) Workshop on Adaptive Foundation Models: Evolving AI for Personalized and Efficient Learning (AFM)*, 2024.

[20] S. Rajabi*, **S. Rambhatla**. Accelerating Memory-Efficient LLM Training and Fine-Tuning via Tracking the Gradient Subspace.*Neural Information Processing Systems (NeurIPS) Workshop on Machine Learning and Compression*, 2024.

[21] S. Rajabi*, **S. Rambhatla**. Memory-Efficient Large Language Model (LLM) Training and Fine-Tuning via Gradient Subspace Tracking.*Neural Information Processing Systems (NeurIPS) Workshop on Optimization for Machine Learning (OPT+ML)*, 2024.

[22] S. Rajabi*, **S. Rambhatla**. Memory-Efficient Large Language Model (LLM) Training and Fine-Tuning via Gradient Subspace Tracking.*Neural Information Processing Systems (NeurIPS) Workshop on Optimization for Machine Learning (OPT+ML)*, 2024.

[23] K. McGuigan*, **S. Rambhatla**, A. Scott. Icy Waters: Developing a Test-Suite to Benchmark Sea Ice Concentration Forecasting .*Neural Information Processing Systems (NeurIPS) Workshop on Tackling Climate Change with Machine Learning (CCAI)* , 2024.

[24] K. Kaai*, S. Hossain*, **S. Rambhatla**. Are all classes created equal? Domain Generalization for Domain-Linked Classes, *Neural Information Processing Systems (NeurIPS) Workshop on Distribution Shifts*, 2023.

[25] J. Park, F. Barnard*, S. Hossain*, **S. Rambhatla**. Implicit Stylization for Domain Adaptation. *Workshop on What do we need for successful domain generalization?*, *International Conference on Learning Representations (ICLR)*, 2023.

[26] J. Park, K. Kaai*, S. Hossain*, N. Sumi, **S. Rambhatla**, P. Fieguth. Building Spatio-temporal Transformers for Egocentric 3D Pose Estimation. *Joint International Workshop on Egocentric Perception, Interaction and Computing (EPIC) and Ego4D, IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR)*, 2022. **Oral Presentation**.

[27] N. Xu†, L. Trinh†, **S. Rambhatla**, S. Assefa, J. Chen, Z. Zeng, and Y. Liu. Simulating continuous-time human mobility trajectories. *Deep Learning for Simulation Workshop, International Conference on Learning Representations (ICLR)*, 2021.

[28] S. Seo†, C. Meng†, **S. Rambhatla**, Y. Liu. Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning. *Neural Information Processing Systems (NeurIPS) Workshop on Machine Learning and the Physical Sciences*, 2020. [Link]

## Refereed Abstracts

[29] A. Biswal*, **S. Rambhatla**, F. Gzara, Airline Crew Pairing Optimization with Learning, *65th Annual Canadian Operational Research Society (CORS) Conference*, *Abstract*, 2024.

[30] G. Punchhi*†, Y. Sun*†, **S. Rambhatla**, M. Bhat. Deep Learning to Predict Trajectories and Identify Features Associated with Death and Transplant in Waitlisted NASH Patients. *Canadian Donation and Transplantation Research Program (CDTRP) Annual Scientific Meeting*, *Abstract*, 2022. **Selected for Oral Presentation**

[31] G. Punchhi*†, Y. Sun*†, **S. Rambhatla**, M. Bhat. Deep learning to predict trajectories and identify features associated with death and transplant in waitlisted NASH patients. *American Association for the Study of Liver Diseases (AASLD)*, *Abstract*, 2022. **Selected for Oral Presentation**

[32] G. Punchhi*†, Y. Sun*†, **S. Rambhatla**, M. Bhat. Predicting Future Trajectories of the Waitlisted NASH patients using Deep Learning. *International Liver Transplantation Society (ILTS) Annual Congress*, *Abstract*, 2022. **Selected for Oral Presentation**

[33] S. Huang†, **S. Rambhatla**†, L. Trinh, M. Zhang, M. Dong, V. Unadkat, J. Lin, M. K. Sheth, J. Dang, H. A. Yenikomshian, Y. Liu, and J. Gillenwater. Predicting burn surgical candidacy using deep learning on photographic images. *Plastic Surgery: the Meeting*, *Abstract*, 2021. **Outstanding Presentation Award**

[34] A. J. Hung, **S. Rambhatla**, N. Pachauri, D. I. Sanford, J. H. Nguyen, and Y. Liu. Automating suturing skills assessment with a limited surgeon dataset: Meta learning. *American Urology Association, Journal of Urology*, *Abstract*, 2021. **Selected for Podium Talk**

## Refereed Journal Publications

[35] A. Biswal*, **S. Rambhatla**, and F. Gzara. Embedding-Based Representation Learning for Forecasting Flight Characteristics, *Transportation Research Record*, 2024.

[36] H. Y. M. Pang, S. Meshkat, B. G. Teferra, A. Rueda, R. Samavi, S. Krishnan, T. Doyle, **S. Rambhatla**, S. DeJong, S. Sockalingam, T. Horsley, B. Hodges, and V. Bhat. Opportunities and Barriers of Generative Artificial Intelligence in the Training of Psychiatrists: A Competencies-Based Perspective, *Academic Psychiatry*, Springer, 2024.

[37] A. B. Chen, T. Haque, S. Roberts, **S. Rambhatla**, G. Cacciamani, P. Dasgupta, A. J. Hung. Artificial Intelligence Applications in Urology: Reporting Standards to Achieve Fluency for Urologists. *Journal of Urology Clinics of North America*, 49(1): 65–117, 2022.

[38] **S. Rambhatla**†, S. Zeighami†, K. Shahabi, C. Shahabi, and Y. Liu. Towards Accurate Spatiotemporal COVID-19 Risk Scores using High Resolution Real-World Mobility Data. ACM Transactions on Spatial Algorithms and Systems (TSAS) , 8(2):1-30 2022. [Link]

[39] A. J. Hung, **S. Rambhatla**, D. I. Sanford, N. Pachauri, E. Vanstrum, J. H. Nguyen, and Y. Liu. Road to Automating Robotic Suturing Skills Assessment: Battling Mislabeling of the Ground Truth. *Journal of Surgery*, 171(4): 915-919, 2022.

[40] N. Kamra, Y. Zhang, **S. Rambhatla**, C. Meng, and Y. Liu. PolSIRD: Modeling Epidemic Spread Under Intervention Policies: Analyzing the First Wave of COVID-19 in the USA. *Journal of Healthcare Informatics Research*, 5(3):231-248, 2021. [Link]

[41] **S. Rambhatla**, X. Li, J. Ren and J. Haupt. A Dictionary-Based Generalization of Robust PCA With Applications to Target Localization in Hyperspectral Imaging. *IEEE Transactions on Signal Processing*, vol. 68, pp. 1760 – 1775, 2020. [Link]

## Manuscripts Under Review

[42] T. Zada*, N. Tam*, F. Barnard*, M. V. Sittert*, **S. Rambhatla**, V. Bhat. Large Language Models for Self-Diagnosis: A New Front for Medical Misinformation, *Journal Under Review*, 2024.

[43] K. Kaai*, S. Hossain*, **S. Rambhatla**. Domain Generalization for Domain-Linked Classes. *Under Review at Transactions of Pattern Analysis and Machine Intelligence (T-PAMI)*, 2024.

[44] A. Murugan*, **S. Rambhatla**, A. Wong. Re-evaluating Fairness in Real-World Healthcare Machine Learning: Data-Centric Approach via MIMIC Analysis. *Under Review at NeurIPS Dataset and Benchmark Track*, 2024.

[45] G. Punchhi*†, Y. Sun*†, **S. Rambhatla**, M. Bhat. DeepNASH: A Competing Risk Neural Network Model to Forecast NASH Patient Trajectories on the Liver Transplant Waitlist. *Under Review at American Journal of Gastroenterology*, 2024.

## Other Publications

[46] **S. Rambhatla**. Making Canadian Healthcare Systems "AI Ready": What Do We Need to Build AI-Powered Trustworthy Primary Healthcare Solutions? *Cybersecurity, Privacy, and Artificial Intelligence in Health Data: Advancements and Challenges*, Book Chapter, 2023.

[47] V. Abdelzad, F. Barnard, K. Czarnecki, L. D'Souza, H. Gunraj, D. Mao, **S. Rambhatla**, M. V. Sittert, Y. V. Pant, A. Wong. Explainable AI and AI Bias in Connected and Autonomous Vehicles, *Report commissioned by Transport Canada* (141 pages), 2023.

[48] K. Sharma, S. Seo, C. Meng, **S. Rambhatla**, Y. Liu. COVID-19 on Social Media: Analyzing Misinformation in Twitter Conversations, *Report* 2020. [Link]

## Theses

[49] **S. Rambhatla**. Provably Learning from Data: New Algorithms for Matrix/Tensor Decompositions & Factorizations. (Doctoral Thesis), *Department of Electrical and Computer Engineering, University of Minnesota – Twin Cities, Minneapolis, MN*, 2019.

[50] **S. Rambhatla**. Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning. (Masters Thesis), *Department of Electrical and Computer Engineering, University of Minnesota – Twin Cities, Minneapolis, MN*, 2012.

## Research Grants

Table 2: Awarded Funding (Excluding In-Kind) in CAD

| **Funding** | **Total Amount** | **My Share** |
|---|---|---|
| Grants | 2,876,983 | 2,107,615 |
| Start-up Fund | 45,000 | 45,000 |
| Equipment/Resource Allocation | 25,483 | 12,742 |
| From Another Institute | 29,871 | 29,871 |
| **Total** | 3,07,2850 | 2,189,338 |
| **As a Sole PI** | 1,741,636 | |

- *AI for Intelligent Production Monitoring* — $ 1,413,265
  - — NSERC Alliance Grant with Apple Canada Inc. — 2023 – 28
  - — PI: **S. Rambhatla** — Share: 100%
- *A Novel AI-Powered System for Building Shared Understanding in Teams* — USD $ 50,000
  - — Microsoft AI and the New Future of Work, Microsoft Research — 2024 – 25
  - — PI: S. Ferguson, Co-PI: A. Olechowski, **S. Rambhatla** — Share: TBD
- *AI for Liver Transplantation* — $ 29,871
  - — Funds Transfer from University Health Network, Toronto — 2023 – 25
  - — PI: **S. Rambhatla** — Share: 100%
- *Developing Data Strategies to Enable Healthcare Machine Learning* — $ 6000
  - — Mitacs Globalink Research Award to Support Ukrainian Students in Canada — 2024
  - — PI: **S. Rambhatla** — Share: 100%
- *Good Data Housekeeping: Building Data Strategies to Make Canadian Hospitals AI-Ready* — $ 25,000
  - — Graham Seed Funding to develop Transformative Health Technologies — 2024

— PI: **S. Rambhatla**, Co-PI: C. Girolametto (GRH), and Collab.: A. Wong — Share: 50%

- *Improving Door-to-Needle Time in Acute Stroke at Grand River Hospital* — $25,000
  — Graham Seed Funding to develop Transformative Health Technologies — 2024
  — PI: Fatma Gzara, Co-PI: T. Lulic (GRH), Collab.: **S. Rambhatla**, H. Mahmoudzadeh, U. Shah, C. Girolametto, S. Gliilck, and T. Tebbutt — Share: 25%

- *A Feasibility Study of Synthetic Health Data's Privacy, Utility, and Value* — $ 20,000
  — Cybersecurity and Privacy Institute (CPI) and Waterloo.AI Joint Seed Grant — 2023 – 24
  — PI: H. Chen, Co-PI: M. Grossman, A. Wong, V. Ganesh, A. Sen, **S. Rambhatla**, and X. He — Share: 14%

- *Data Analytics for Robust Crew Pairing* — $ 140,218
  — NSERC Alliance Program with Navblue Inc., ON, Canada — 2022 – 24
  — PI: F. Gzara, and Co-PI: **S. Rambhatla** — Share: 50%

- *Robot Learning from Demonstrations Under Attacks by Adversarial Experts* — $ 20,000
  — Cybersecurity and Privacy Institute (CPI) and Robohub Joint Seed Grant — 2023
  — PI: Y. V. Pant and Co-PI: **S. Rambhatla** — Share: 50%

- *Novel Video Analytics Through Advanced Deep Learning* — $ 14,253
  — *Compute Canada Resource Allocation (RAC)* — 2023 – 24
  — PI: P. Fieguth (PI), Co-PI: **S. Rambhatla** (Co-PI) — Share: 50%

- *AI for identifying and addressing inequities in the health systems* — $ 25,000
  — Graham Seed Funding to develop Transformative Health Technologies — 2023
  — PI: A. Wong and Co-PI: **S. Rambhatla**, Collab.: C. Girolametto (GRH), and Payal Agarwal (GRH) — Share: 50%

- *AI to improve hospital workflows and improve patient outcomes* — $ 150,000
  — Sponsored Research Agreement with Grand River Hospital, Kitchener, ON — 2023 – 25
  — PI: A. Wong and Co-PI: **S. Rambhatla** — Share: 50%

- *AI Transparency in Connected Autonomous Vehicles Report* — $ 35,000
  — Transport Canada — 2022 – 23
  — PI: K. Czarnecki, Co-PI: A. Wong, S. Rambhatla, and Y. V. Pant — Share: 25%

- *Automated Full-Game Ice Hockey Analytics* — $ 720,000
  — NSERC Alliance Grants - Mitacs Accelerate with Stathletes Inc. — 2023 – 26
  — PI: D. A. Clausi, Co-PI: J. Zelek, **S. Rambhatla**, A. Wong, and M. J. Shafiee — Share: 20%

- *Developing a Tool to Minimize Information Asymmetry Between Car Owner & Expert Mechanic* — $ 60,000
  — Mitacs Accelerate Grant with AutoCate/Miss Mechanic Inc. — 2023 – 24
  — PI: **S. Rambhatla** — Share: 100%

- *Data Collection & Market Study of Women-Identifying Car Owners* — $ 30,000
  —Mitacs Business Strategy Internship (BSI) with AutoCate/Miss Mechanic Inc. — 2022
  — PI: **S. Rambhatla** — Share: 100%

- *Interpretable Time Series Representation Learning via Disentanglement and Domain Priors* — $ 145,000
  — NSERC Discovery Grants Program — 2022 – 27
  — PI: **S. Rambhatla** — Share: 100%

- *Interpretable Time Series Representation Learning via Disentanglement and Domain Priors* — $ 12,500
  — NSERC Discovery Launch Supplement — 2022 – 23

— PI: **S. Rambhatla** Share: 100%

- *Deep Learning for Human Pose Estimation* $ 50,000
  — Sponsored Research Agreement with Nissan AI and Mobility Lab, Japan Mar. 2022
  — PI: **S. Rambhatla**, Co-PI: P. Fieguth (co-PI), J. Zelek, D. A. Clausi, and A. Wong Share: 20%

- *Novel Video Analytics Through Advanced Deep Learning* $ 11,230
  — *Compute Canada Resource Allocation (RAC)* 2022 – 23
  — PI: P. Fieguth, Co-PI: **S. Rambhatla** Share: 100%

- Start-up Fund, Management Science and Engineering Department (Since 2021) $ 45,000
  — PI: **S. Rambhatla** Share: 100%

## Supervision & Mentoring

**Overview and Impact:** My real-world focused research is attracting remarkably talented students from UW and abroad, and is witnessing unprecedented growth and supports a thriving group of masters, PhD, URAs, and multiple award-winning capstone students across the university. Group alumni are transforming the landscape of AI/ML in Canada by continuing state-of-the-art research as PhD students, driving generative AI at NVIDIA, and launching a woman-led tech start-up to empowering under-represented groups.

- **Ongoing Graduate Supervision**
  - Daniel Lu, *Ph.D. Student, Systems Design Engineering* Jan. '24 – *Present*
    — Thesis: *Hockey Analytics via Multi-Camera Set-ups*
    — Co-supervised with Prof. D. A. Clausi
  - Bavesh Balaji, *Ph.D. Student, Systems Design Engineering* Sept. '24 – *Present*
    — Thesis: *Domain Guided Masked Autoencoders for Unique Player Identification*
    — Co-supervised with Prof. D. A. Clausi
  - Kimathi Kaai, *Ph.D. Student, Systems Design Engineering* Sept. '22 – *Present*
    — Thesis: *Domain Generalization for Domain Linked Classes*
    — Co-supervised with Prof. A. Wong
  - Chang Liu, *MASc Student, Systems Design Engineering* Sept. '23 – *Present*
    — Thesis: *Domain Bridging for Real-world Computer Vision Tasks*
    — Co-supervised with Prof. A. Wong
  - Yingke Wang, *MMath Student, David Cheriton School of Computer Science* Sept. '23 – *Present*
    — Thesis: *Fair Synthetic Tabular Data Generation for Healthcare*
    — Co-supervised with Prof. X. He
  - Achint Soni, *MMath Student, David Cheriton School of Computer Science* Sept. '23 – *Present*
    — Thesis: *Disentangled Representation Learning in Generative Modeling*
    — Co-supervised with Prof. C. Clarke
  - Kiernan McGuigan, *MASc Student, Systems Design Engineering* Sept. '23 – *Present*
    — Thesis: *Multi-Kernel Neural Operators for Sea-Ice Forecasting*
    — Co-supervised with Prof. A. Scott

- **Completed Graduate Supervision**
  - Aniket Biswal, *MASc, Management Science and Engineering* Sept. '22 – Aug. '24
    — Thesis: *Uncertainty Quantification via Survival Analysis for Large Scale Optimization*
    — Co-supervised with Prof. F. Gzara
  - Kimathi Kaai, *MASc, Systems Design Engineering* Sept. '22 – Aug. '24

— Thesis: *Domain Generalization for Domain Linked Classes*
— Co-supervised with Prof. A. Wong

- Bavesh Balaji, *MASc, Systems Design Engineering* Nov. '22 – Aug. '24
  — Thesis: *Domain Guided Masked Autoencoders for Unique Player Identification*
  — Co-supervised with Prof. D. A. Clausi
- Anand Murugan, *MASc Student, Systems Design Engineering* Nov. '22 – May '24
  — Thesis: *Implementing Fairness in Real-World Healthcare ML through Datasheet for Database*
  — Co-supervised with Prof. A. Wong

- **Undergraduate Supervision: Co-op Students, Mitacs Interns, and NSERC USRAs**
  - Aditya Sridhar, *Co-op Student in MS&E* Winter '24
  - Noah Wilshire, *Co-op Student in MS&E* Fall '23
  - Sheila Afros, *NSERC USRA, Management Sciences* Fall '22
    — Present: MASc (MS&E) since Fall 2023
  - Mariam Sedik *Mitacs Business Strategy Intern* Spring – Fall '22
  - Vanshaj Vohra *Mitacs Business Strategy Intern* Spring – Fall '22

- **Undergraduate Supervision: Undergraduate Research Assistants (URA)**
  - Mahip Singh, *URA, Computer Science* Spring '24
  - Natalie Tam, *URA, Management Science and Engineering* Winter '24
  - Troy Zada, *URA, Management Science and Engineering* Winter '24
  - Calvin Tran, *URA, Mechanical and Mechatronics Engineering* Winter '24 – *Present*
  - Daniel Jemin Kim, *URA, Computer Science* Spring '23 – *Present*
  - Saad Hossain, *URA, Biomedical Engineering* Winter '22 – *Present*
  - Joshua Kurien, *URA, Mechanical and Mechatronics Engineering* Fall '22
    — Incoming MASc (SyDE) in Spring 2024, Critical ML
  - Danny Chen, *URA, Combinatorics and Optimization* Fall '23
  - Bruce Wang, *URA, Mechanical and Mechatronics Engineering* Winter '23
  - Chang Liu, *URA, Statistics and Computational Mathematics* Fall '22 – Winter '23
    — Present: MASc (SyDE) since Fall 2023, Critical ML
  - Marlize Van Sittert, *URA, Faculty of Arts* Fall '22 – Winter '23
    — Present: Pursing Degree in Law as a direct result of the experience working on policy aspects of AI
  - Francois Barnard, *URA, Management Sciences* Fall '22 – Winter '23
    — Present: System Software Engineer, NVIDIA, Canada as a direct result of research experience
  - Madison Mussari, *URA, Software Engineering* Fall '22
  - Vivek Alamuri, *URA, Electrical and Computer Engineering* Fall '22
  - Yipeng Du, *URA, Statistics and Computational Mathematics* Spring – Fall '22
  - Kimathi Kaai, *URA, Mechanical and Mechatronics Engineering* Winter '22
    — Present: MASc (SyDE) since Fall 2022, Critical ML

- **Other Supervision, and Mentoring**
  - Jinman Park, *Ph.D. Student, Systems Design Engineering* Nov. '21 – Oct. '23
    — Supervisors: Prof. P. Fieguth & Prof. D. A. Clausi — *University of Waterloo*
  - Stefanie Bruinsma, *Mitacs Accelerate Intern* Feb. '23 – Mar. '24
    — *Developing a Tool to Minimize Information Asymmetry Between Car Owner and Expert Mechanic*
    — *AutoCate, Kitchener, ON, Canada* Academic Supervisor
  - Yingji Sun, *Machine Learning Analyst with the Bhat Lab* Dec. '22 – *Present*
    — *Ajmera Transplant Center, University Health Network, Toronto, ON, Canada* Research Mentor
  - María Belén Guaranda Cabezas, *Master's Student* Mar. '22 – *Present*
    — *Université Paris-Saclay, Paris, France* Women in Machine Learning Mentor
  - Pratik Bhowal, *Undergraduate Research Intern* Mar. '22 – *Present*
    — *National Institute of Technology, Jadhavpur, India and NVIDIA*

- **Final Year Design Team Supervision**
  - "AI for Improving Lung Ultrasound Scan Acquisition" 2024 – 25
    — Saad Hossain, Tom Chiu, Michael Frew, and Ryan Yan BME 461
  - "Assistive AI for Improving Student Learning" 2023 – 24
    — Johayer Chowdury, Sanad Swileh, Ke Yu Li Ge, Rashad Arbab, and Nikolaos Topaloglou-Mundy MSCI 401
  - "Collaborative Selection Systems in Recruiting" 2022 – 23
    — Justine Archer, Francois Barnard, Arden Song, Christiana Wu, and Charles Yu MSCI 401
    — **Konrad Capstone Design Award**
    — **Management Engineering Design Award**
  - "AI-based Non-expert Assistive System" 2022 – 23
    — Gunchica Bhalla, Laurie Gao, Soohyun Kim, Ashwuni Kumar,and Olivia You MSCI 401
    — Industry partner: AutoCate Inc.
    — **Semi-Finalist for the Norman Esch Entrepreneurship Award for Capstone Design**
  - "Vysio: AI for improving Physiotherapy Adherence and Outcomes" 2021 – 22
    — Kimathi Kaai (MME), Peter Marshall (SyDE), Nathan Rowe (MME), and James Serez (SyDE)
    — **I-Beam Award** Interdisciplinary Group (GENE404)

## Service on Committees

- Research Advisory Committees in Canada
  — External Reviewer for two applications, Discovery Grants Program, *NSERC*, Dec. '23- Jan. '24
  — AI Transparency in Connected Autonomous Vehicles Report, *Transport Canada*, Dec. '22- Mar. '23
  — External Reviewer, Discovery Grants Program, *NSERC*, Dec. '22- Jan. '23
- University and Departmental Committees
  — Department Advisory Committee on Appointments (DACA), *Management Sciences*, 2022-23, 2023-24
  — Engineering Faculty Council (EFC), 2021-22, 2022-23
  — Engineering Representative to Arts Faculty Council, 2021-22, 2022-23
- Ph.D. Exam Committees
  — Arvin Hosseinzadeh, *MME*, Supervisor: Prof. A. Khajepour Sept., '23
  — Zhiying Jiang, *CS*, Supervisor: Prof. Jimmy Lin July, '23
  — Mohammedreza Ghobrani, *MME*, Supervisor: Prof. A. Khajepour April, '23

— Amin Oji, *SyDE*, Supervisors: Prof. P. Fieguth — Dec. '22
— Kyle Gao, *SyDE*, Supervisors: Prof. J. Li & Prof. L. Zhu — Dec. '22
— Shayan Shirahmad Gale Bagi, *ECE*, Supervisors: Prof. M. Crowley & Prof. K. Czarnecki — Aug. '22

- Masters Thesis Committee
  — Marjan Shahi *SyDE*, Supervisors: Prof. D. A. Clausi & Prof. J. Zelek — Sept. '23
  — Jason Shang *SyDE*, Supervisors: Prof. D. A. Clausi & Prof. J. Zelek — Aug. '23
  — Christopher Mannes *ECE*, Supervisors: Prof. K. Czarnecki — May '23
  — Marawan Abdel Hameed *SyDE*, Supervisors: Prof. D. A. Clausi & Prof. J. Zelek — Aug. '22
  — Mohammad Parsa, *MSCI*, Supervisor: Prof. L. Golub — Jul. '22

## Teaching Experience

**Overview and Impact:** Viewing teaching as an extension of research, I aim to inspire and train students in the state-of-the-art in AI/ML. Since July 2021, I have built three courses ground-up (MSCI 436, 546, 700) and am also bringing my expertise to MSCI 623. All of these courses have received tremendous responses from the students even at the first offering. At the time of the offering, MSCI 436 was the third of its kind in the world (after UCSD and Stanford), and the first in Canada. I was also selected for Teaching Excellence Academy (TEA) in April 2024. Through my teaching and research interactions with students, I have witnessed how the skills that students gain in the courses them exceptionally sought after.

Table 3: Summary of Teaching: Student Course Perception (SCP) out of 5

| Term | Course | SCPQ1-Q3 (stdev) | SCPQ4-Q6 (stdev) | # Students |
|---|---|---|---|---|
| S 2024 | MSCI 436: Decision Support Systems | 4.5 (0.2) | 4.2 (0.1) | 94 |
| S 2024 | MSCI 623: Big Data Analytics | 4.2 (0.1) | 3.9 (0.2) | 40 |
| W 2024 | MSCI 546: Advanced Machine Learning | 4.52 (0.56) | 4.36 (0.67) | 64 |
| W 2024 | MSCI 598: Special Topics in MGTE | N/A | N/A | 3 |
| S 2023 | MSCI 436: Decision Support Systems | 3.30 (1.21) | 3.29 (1.12) | 87 |
| S 2023 | MSCI 700: Foundations of Machine Learning | 4.93 (0.13) | 4.60 (0.63) | 11 |
| W 2023 | MSCI 546: Advanced Machine Learning | 4.31 (0.73) | 4.08 (0.94) | 52 |
| W 2023 | MSCI 598: Special Topics in MGTE | N/A | N/A | 2 |
| S 2022 | MSCI 436: Decision Support Systems | 3.78 (0.94) | 3.41 (0.99) | 76 |
| **New Courses** | **Developed Three New Courses (MSCI 700, 546, and 436)** | | | |

### Other Teaching Experience

- Instructor, CSCI 567 - Machine Learning (Graduate, Class size: 85) — Spring 2021
  — *University of Southern California, Los Angeles, CA, U.S.A.*
- Guest Lecturer, CSCI 699 - Advanced Topics in Deep Learning (Class size: 40) — Fall 2020
  — *University of Southern California, Los Angeles, CA, U.S.A.*
- Guest Lecturer, EE 3025 - Statistical Methods in Elec. and Comp. Eng. (Class size: 150) — Fall 2017
  — *University of Minnesota – Twin Cities, Minneapolis, MN, U.S.A.*

## Technical Service

### Editorial Activities, and Conference and Workshop Organization

- Area Chair, *Neural Information Processing Systems (NeurIPS)* — 2024, 2023
  — *New Orleans, USA*
- Associate Editor, *IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)* — 2024
- Mentor at the Mentorship Roundtables, WiML@ICML, *Women in Machine Learning Workshop* — 2024
  — *Women in Machine Learning (WiML)*
- Social and Engagement Co-Chair, *International Conference on Learning Representations (ICLR)* — 2023
  — *Kigali, Rwanda*

- Workshop Co-chair, *International Conference on COMmunication Systems & NETworkS (COMSNETS)*
  — *Chancery Pavilion Hotel, Bangalore, India* Jan. 2023
- WiML Mentor, *Women in Machine Learning Workshop and Dreami* 2022
  — *Women in Machine Learning (WiML)*
- Senior Program and Mentorship Co-chair, *Women in Machine Learning Workshop* 2021 – 22
  — *Women in Machine Learning (WiML) at Neural Information Processing Systems (NeurIPS) 2021*
- Workshop Co-chair, *International Conference on COMmunication Systems & NETworkS (COMSNETS)*
  — *Chancery Pavilion Hotel, Bangalore, India* Jan. 2022
- Organizer & Host, Computer Science Colloquium on "Algorithmic Fairness and the Law" Apr. 2021
  — *University of Southern California, Los Angeles, CA*
- Organizer, AI for COVID-19 in LA Virtual Symposium (attended by over 350 participants) 2020
  — *University of Southern California, Los Angeles, CA*
- Ambassador, Women in Data Science (WiDS) 2020
  — *University of Southern California, Los Angeles, CA*
- Organizer, "Patent basics for Engineers and Researchers" 2019
  — *Digital Technology Center, University of Minnesota–Twin Cities, Minneapolis, MN*
- Session Co-Chair, Reinforcement Learning, and High-dimensional Statistics 2019
  — *Information Theory and Applications (ITA) Workshop 2019, San Diego, CA*
- Session Chair, Deep Learning-based Signal Processing for Wireless Communication 2018
  — *GlobalSIP 2018, Anaheim, CA*

**Reviewing Activities**

- Program Committee, International Joint Conferences on Artificial Intelligence (IJCAI) 2024, 2023
- Program Committee, Association for the Advancement of Artificial Intelligence (AAAI) 2023, 2022, 2021
- Reviewer, International Conference on Learning Representations (ICLR) 2024, 2023, 2022, 2021
- Reviewer, Neural Information Processing Systems (NeurIPS) 2023, 2022, 2021, 2020
- Reviewer, International Conference on Machine Learning (ICML) 2024, 2023, 2022, 2021, 2020
- Reviewer, ACM Transactions on Spatial Algorithms and Systems (TSAS), 2022.
- Reviewer, Journal of Selected Topics in Signal Processing (JSTSP) 2020
- Reviewer, IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI) 2021, 2020
- Reviewer, ACM Transactions on Computing for Healthcare 2021, 2020
- Reviewer, International Conference on Artificial Intelligence & Statistics (AISTATS) 2018, 2016
- Reviewer, International Conference on Acoustics, Speech & Signal Processing (ICASSP) 2016, 2015
- Reviewer, Transactions on Signal Processing (T-SP) 2021, 2020, 2019, 2018, 2016, 2015, 2014
- Reviewer, Signal Processing Letters (SPL) 2017
- Reviewer, SIAM Journal of Imaging Sciences 2017
- Reviewer, Transactions on Industrial Informatics (T-II) 2017

## Panels and Media

- Panelist, She Talks Tech - AI and Ethics: Navigating Bias & Fairness, *Accelerator Center, Waterloo, ON* July 2024
- Featured in a televised news segment titled University of Waterloo Using AI to Analyze Hockey Decisions on The Ice, C. Wiens, *CTV News, Kitchener-Waterloo* Mar. 2024
- Featured in the news article Revving up female car owners' confidence to bring trust to auto repairs, Media Relations, *University of Waterloo* Mar. 2024
- Featured in news article 'Make them pay': journalism archives like digital oil for AI developers, R. Williams, *The Record* Oct. 2023
- Panelist, Generative AI for Media: a Panel Discussion , *MINDS Conference for media organizations across the world* Oct. 2023
- Sirisha Rambhatla's real-world machine learning revolution is just beginning, Profile in CPI Spotlight Series, *Cybersecurity and Privacy Institute, University of Waterloo* Aug. 2023
- Quoted in the news article Will AI replace journalists?: Waterloo researchers share their expertise in AI with leaders from international media organizations, *R. Jones, Waterloo News* Oct 2023
- Featured in article titled *Cybersecurity, privacy and AI in health*, *S. Toman, Waterloo News* May 2023
- "The AI Tsunami: Where will it take us?", *Research Panel, University of Waterloo* Jan. 2023
- Invited Speaker, Let's Talk AI Podcast, *Waterloo AI Institute* Dec. 2022

## Talks/ Posters

**Invited Talks**

- Building AI for the Real World: An illustrative guide to think, build, and deploy reliable models for healthcare, Artificial Intelligence Applications in Neurosciences Session, *31st Annual Conference of the Indian Academy of Neurology (IANCON)*, Vishakapatnam, India Oct. 2024
- Making Canadian Healthcare Systems "AI Ready": What do we need to build AI-powered Trustworthy Healthcare Solutions?, *AI for Enhancing Public Health and Healthcare in Canada Minisymposium, Canadian Applied and Industrial Mathematics Society (CAIMS)*, Kingston, Canada June 2024
- "Theory-guided Machine Learning for the Real World", Waterloo-NRC Workshop: Health and Beyond, *University of Waterloo* Mar. 2024
- "AI for Identifying & Addressing Inequities in the Health Systems to Improve Patient Outcomes", Graham Trust Annual Meeting, *University of Waterloo* Jan. 2024
- "Do you trust me? Building Trustworthy Machine Learning Models for the Real-World", AI Invited Talk, *Cybersecurity and Privacy Institute Annual Conference*, Waterloo, Canada Oct. 2023
- "Should I explain, or choose interpretable models? Building Trustworthy Models for Real-world Healthcare", Invited Talk, *Waterloo.AI's AI Literacy Mini-Series* June 2023
- Making Canadian Healthcare Systems "AI Ready": What Do We Need to Build AI-Powered Trustworthy Primary Healthcare Solutions?, Invited Talk, *the Cybersecurity, Privacy, and Artificial Intelligence in Health Data: Advancements and Challenges Conference*, Ottawa, Canada May 2023
- "Theory Guided Machine Learning for the Real World", *Vision and Image Processing lab, Systems Design Engineering Department, University of Waterloo* Nov. 2021
- "Provable Online Dictionary Learning and Sparse Coding", *Department of Electrical and Computer Engineering, Georgia Tech., Atlanta, GA* May 2019

- "Provable Online Dictionary Learning and Sparse Coding", *CyberOptics Corporation, Minneapolis, MN, U.S.A.* Jun. 2019
- "Provably Recovering Patterns from Data: Matrix to Tensors.", Yahoo! Research, San Jose, CA Nov. 2017

**Talks and Posters at Conferences**

- "I-SEA: Importance Sampling and Expected Alignment-based Deep Distance Metric Learning for Time Series Analysis and Embedding" Nov. 2022
  —*Association for the Advancement of Artificial Intelligence (AAAI) conference*
- "Cross-Node Federated Graph Neural Network for Spatio-Temporal Data Modeling" Aug. 2021
  — *ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*
- "Physics-aware Spatiotemporal Modules with Auxiliary Tasks for Meta-Learning" Aug. 2021
  — *International Joint Conferences on Artificial Intelligence (IJCAI).*
- "Provable Online CP/PARAFAC Decomposition via Dictionary Learning" Apr. 2021
  — *Women in Theoretical Machine Learning Symposium, Virtual Symposium.*
- "Provable Online CP/PARAFAC Decomposition via Dictionary Learning" Dec. 2020
  — *Neural Information Processing Systems (NeurIPS), Virtual Conference.*
- "How does this interaction affect me? Interpretable attribution for feature interactions." Dec. 2020
  — *Neural Information Processing Systems (NeurIPS), Virtual Conference.*
- "NOODL: Provable Online Dictionary Learning and Sparse Coding" May 2019
  — *International Conference on Learning Representations, New Orleans, LA.*
- "Provable Online Dictionary Learning and Sparse Coding" Feb. 2019
  — *Information Theory and Applications (ITA) Workshop, San Diego, CA.*
- "Lidar-based Topological Mapping & Localization via Tensor Decompositions." Nov. 2018
  — *GlobalSIP 2018, Anaheim, CA.*
- "Provable Online Dictionary Learning and Matrix Factorization" Sept. 2018
  — *Digital Technology Center, Minneapolis, MN.*
- "Target-Based Hyper Spectral Demixing via Generalized Robust PCA." Mar. 2018
  — ECE Seminar on Signal Processing, Information Theory, and Communication, *University of Minnesota – Twin Cities, Minneapolis, MN.*
- "Dictionary-based Generalization of Robust PCA." Dec. 2016
  — *GlobalSIP 2016, Washington D.C.*
- "Semi-Blind Source Separation via Sparse Approximation & Online Dictionary Learning."
  — *Asilomar Conference on Signals, Systems & Computers, Pacific Grove, CA.* Nov. 2013

**Software Packages Developed**

| | |
|---|---|
| `TensorNOODL`: | Provable Online CP/PARAFAC Decomposition via Dictionary Learning (MATLAB). |
| `NOODL`: | Provable Online Learning Algorithm for Dictionary Learning and Sparse Coding.<br>• Distributed implementations via MATLAB and TensorFlow. |
| `D-RPCA`: | Dictionary-Based Generalization of Robust PCA. (MATLAB)<br>• Analysis of Theoretical Properties, and Target Localization in Hyperspectral Images. |
| `TensorMap`: | Lidar-based Mapping and Localization via Tensor Decompositions. (MATLAB) |

**Professional Memberships**

Member, *Association of Computer Machinery (ACM)* since 2021
Member, *IEEE*, since 2011