Rahul Singh

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EDUCATION

- **Georgia Institute of Technology** — Atlanta, GA
  PhD in Machine Learning; GPA: 4.0 — August 2018-present

- **Iowa State University** — Ames, IA
  Master of Engineering in Electrical Engineering; GPA: 3.85 — December 2018

- **Indian Institute of Space Science and Technology** — Trivandrum, India
  Master of Technology in Digital Signal Processing; GPA: 3.58 (8.94/10.0) — July 2015

- **KIIT University** — Bhubaneswar, India
  Bachelor of Technology in Electronics and Telecomm. Engineering; GPA: 3.43 (8.58/10.0) — July 2013

RELEVANT COURSES

- Natural Language Processing, Statistical Machine Learning, Convex Optimization, Digital Signal Processing, Machine Learning and Pattern Recognition, Image Processing, Computer Vision, Statistical Inference, Deep Learning, Data Science.

RESEARCH EXPERIENCE

- **Georgia Institute of Technology** — Atlanta, GA
  Graduate Research Assistant — August 2018 - Present
  - Research and publications on (i) generative modeling including probabilistic graphical models (PGMs) and generative adversarial networks (GANs), (ii) learning for graph structured data.
  - Multi-marginal optimal transport (MOMT) approach for development of fast and convergent algorithms for inference from aggregate populaion-level data generated by a PGM.
  - Algorithms for learning hidden Markov models (HMMs) from aggregate populaion-level data.
  - Utilized GANs for learning actor-critic algorithms in distributional reinforcement learning (DRL) framework resulting in robust and sample efficient policies.

- **Iowa State University** — Ames, IA
  Graduate Research Assistant — August 2016 - July 2018
  - Research and publications on machine vision assisted electrohydrodynamic printing (E-jet) and manifold learning.
  - Real-time information extraction (diameter and tilt-angle) from the images of the filament in the air.
  - Utilized vector-valued optimal mass transport (V-OMT) for manifold learning of images. Represented images using SIFT keypoints and descriptors and then computed the inter-image distances using V-OMT.

- **Indian Institute of Space Science And Technology** — Trivandrum, India
  Senior Project Fellow — August 2015 - July 2016
  - Research and publications on signal processing over complex networks.
  - Redefined Graph Fourier Transform (GFT) by utilizing the eigendecomposition of the directed Laplacian of a graph.
  - Proposed a new centrality measure (GFT-C) for complex networks using frequency analysis of signals defined on graphs.

AWARDS & RECOGNITION

- Teaching excellence award, Iowa State University, Ames, IA. *(May 2018)*
- Best paper award, International Conference on Signal Processing and Communications.*(2016)*
- Graduate study scholarship by Dept. of Space, Govt. of India. *(August 2013 - June 2016)*

SKILLS

Python, MATLAB, C, TensorFlow, PyTorch

Selected Publications

- **Book**: B. S. Manoj, A. Chakraborty, and **Rahul Singh**, "Complex Networks: A Networking and Signal Processing Perspective," *Prentice Hall PTR, New Jersey, USA,* 2018. (https://complexnetworksbook.github.io/)

- **Conference**: **Rahul Singh**, Yongxin Chen, "Sample-based Distributional Policy Gradient," *American Control Conference (ACC), 2021 (submitted).*
- **Conference**: **Rahul Singh**, Qinsheng Zhang, Yongxin Chen, "Improving Robustness via Risk Averse Distributional Reinforcement Learning," 2nd *Conference on Learning for Dynamics and Control (L4DC), 2020.*
- **Conference**: Songtao Lu, **Rahul Singh**, Xiangyi Chen, Yongxin Chen, Mingyi Hong, "Alternating Gradient Descent Ascent for Nonconvex Min-Max Problems in Robust Learning and GANs," 53rd *Asilomar Conference on Signals, Systems, and Computers, 2019.*

- **Conference**: **Rahul Singh**, A. Chakraborty, and B. S. Manoj, "Graph Fourier Transform based on Directed Laplacian," 11th *International Conference on Signal Processing and Communications (SPCOM)*, 2016. [**BEST paper award**]

- **Journal**: **Rahul Singh**, Isabel Haasler, Qinsheng Zhang, Johan Karlsson, Yongxin Chen, "Incremental Inference of Collective Graphical Models," *IEEE Control Systems Letters, Vol. 5, pp. 421-426, April 2021.*
- **Journal**: **Rahul Singh**, Isabel Hassler, Qinsheng Zhang, Johan Karlsson, and Yongxin Chen, "Multi-marginal Optimal Transport and Probabilistic Graphical Models," *IEEE Transaction on Information Theory*, 2020.
- **Journal**: **Rahul Singh**, Isabel Hassler, Qinsheng Zhang, Johan Karlsson, and Yongxin Chen, "Multi-marginal Optimal Transport and Probabilistic Graphical Models," *IEEE Transaction on Information Theory*, 2020.
- **Journal**: **Rahul Singh**, Isabel Hassler, Qinsheng Zhang, Johan Karlsson, and Yongxin Chen, "Inference with Aggregate Data: An Optimal Transport Approach," *IEEE Transaction on Automatic Control*, 2020.
- **Journal**: **Rahul Singh**, Qinsheng Zhang, and Yongxin Chen, "Filtering for Aggregate Hidden Markov Models with Continuous Observations," *IEEE Transaction on Automatic Control*, 2020.
- **Journal**: **Rahul Singh**, A. Chakraborty, and B. S. Manoj, "GFT Centrality: A New Node Importance Measure for Complex Networks," *Physica A: Statistical Mechanics and its Applications*, Volume 487, pp. 185-195, June 2017.