

# Namrata Deka

COMPUTER SCIENCE · MSC.

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## Education

### The University of British Columbia

Vancouver, Canada

MASTER OF SCIENCE IN COMPUTER SCIENCE

2020 - Present

- GPA: 91.3/100

### Indraprastha Institute of Information Technology (IIITD)

New Delhi, India

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE AND ENGINEERING

2013 - 2017

- GPA: 8.41/10
- Among the 10% in the class to graduate with Honors

## Experience

### Borealis AI

Vancouver, Canada

MACHINE LEARNING RESEARCH INTERN

September 2022 - Present

- Advisor: [DR. FREDERICK TUNG](#)
- Auditing deep learning models for automated discovery of systematic errors in under-represented groups

### The University of British Columbia

Vancouver, Canada

GRADUATE RESEARCH ASSISTANT

September 2020 - Present

- Advisor: [DR. DANICA J. SUTHERLAND](#)
- I am working in the intersection of representation learning and kernel methods with applications in causality and fairness.
- Developed a novel fair representation learning paradigm using statistical two-sample tests.
- Researching kernel measures of conditional independence to learn counterfactually invariant representations. [UCL Collaboration]

### École Polytechnique Fédérale de Lausanne (EPFL)

Lausanne, Switzerland

RESEARCH INTERN, SUMMER@EPFL

June 2021 - August 2021

- Advisor: [DR. AMIR ZAMIR](#)
- Conducted research for a self-supervised method to learn articulated object models that describe part segmentations and motion dynamics from videos using 3D optical flow and depth estimates.

### Wadhvani Institute for Artificial Intelligence

Mumbai, India

RESEARCH FELLOW

August 2018 - August 2020

- Advisors: [DR. RAHUL PANICKER](#) and [DR. ALPAN RAVAL](#)
- Built a 3D vision-based solution to screen low birth-weight babies using smartphone-captured videos for public health sectors in rural India.
- Built a pipeline to generate and annotate synthetic videos of infants using a differentiable renderer.
- Created a novel deep learning algorithm to reconstruct 3D infant meshes to metric scale using deform-able models of reference objects in the scene.
- Mentored and managed interns and their research projects.

### Microsoft Research

Bengaluru, India

RESEARCH INTERN

January 2018 - July 2018

- Advisor: [DR. SREANGSU ACHARYYA](#)
- Built a classifier to identify very rare personally identifiable information (P.I.I.) of customers using a pairwise-AUROC optimization method.
- Achieved an AUROC of 99.8% for the rarest P.I.I. tag which accounted for only 0.54% of the entire dataset.
- The resulting model was adopted by internal teams across Microsoft to comply with the EU-GDPR mandate.

## Research

- **N. Deka**, D. Sutherland. MMD-B-Fair: Learning Fair Representations with Statistical Testing. *Currently under review*. [Preprint Link](#)
- R. Pogodin\*, **N. Deka**\*, Y. Li\*, D. Sutherland, V. Veitch, A. Gretton. Efficient Conditionally Invariant Representation Learning. *Currently under review*. [Preprint Link](#)
- **N. Deka**, D. Sutherland. Learning Privacy-Preserving Deep Kernels with Known Demographics. *In Proceedings of the 36th AAAI Conference on Artificial Intelligence. Workshop on Privacy-Preserving Artificial Intelligence. 2022.*
- D. Sutherland, **N. Deka**. Unbiased estimators for the variance of MMD estimators. *Technical report 2022*. [arXiv:1906.02104](#)

## Invited Talks

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### Perceiving Systems Department, Max Planck Institute for Intelligent Systems (MPI-IS)

NEONATAL ANTHROPOMETRY AND GROWTH TRACKING VIA MODEL BASED 3D RECONSTRUCTION FROM VIDEO

Tübingen, Germany

November 2019

## Projects

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### Open-ended Evolution of Embodied Intelligence in Mutating Environments

Vancouver, BC

GRADUATE COURSE PROJECT, UBC

October 2021 - December 2021

- Mentor: [DR. JEFF CLUNE](#)
- Developed an open-ended algorithm using reinforcement learning and evolutionary strategies to continuously co-evolve agent morphologies and environmental complexities to create a diverse population of agents that can learn to perform tasks faster and better.
- Tools & Frameworks: PyTorch, OpenAI Gym

### Amortized Inference with Rejection Loops for Autonomous Vehicles

Vancouver, BC

GRADUATE COURSE PROJECT, UBC

March 2021 - April 2021

- Mentor: [DR. FRANK WOOD](#)
- Created a probabilistic generative model for traffic at road intersections using the CARLA simulation engine and PyProb.
- Performed amortized inference over number of cars in intersections using inference compilation and rejection loop-based importance sampling.
- Tools & Frameworks: PyTorch, PyProb, CARLA Python API

### Push-Nav: Self-Supervised Learning of Task-Based Object Representations for Navigation Through Clutter

Vancouver, BC

GRADUATE COURSE PROJECT, UBC

October 2020 - December 2020

- Mentor: [DR. IAN MITCHELL](#)
- Developed a reinforcement learning-based system where a robot can learn task-based physical properties of objects that can maximize expected rewards.
- Augmented policy learning with a self-supervised dense optical flow objective to incentivise the learning of physical representations.
- Tools & Frameworks: PyBullet, OpenAI Gym, PyTorch, Weights & Biases

### Novel Scene Generation via Decomposition

Vancouver, BC

GRADUATE COURSE PROJECT, UBC

September 2020 - December 2020

- Mentor: [DR. HELGE RHODIN](#)
- Developed a deep generative model to synthesize novel scenes by rearranging objects in images.
- Used a stacked VAE architecture with W-GANs to learn plausible distributions of object-centric shifts for each object in the image.
- Tools & Frameworks: PyTorch, Weights & Biases

### Understanding Human Behaviour for Autonomous Vehicle Path Planning

New Delhi, India

UNDERGRADUATE RESEARCH PROJECT, IIITD

July 2016 - August 2017

- Advisors: [DR. SAKET ANAND](#) and [DR. SANJIT KAUL](#)
- Studied and implemented simple imitation learning methods infer implicit cost-maps of drivers on urban roads in India.
- Collected data and trained detection and tracking algorithms for pedestrians and vehicles.
- Also performed sensor cross-calibrations, 3D mapping of outdoor scenes and analysis of vehicle trajectory in response to other traffic agents.
- Tools & Frameworks: Python, Matlab, TensorFlow, ROS

## Teaching

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### The University of British Columbia

Vancouver, Canada

GRADUATE TEACHING ASSISTANT

Multiple Semesters

- Intelligent Systems - Level 400 (>100 students)

### Indraprastha Institute of Information Technology (IIITD)

New Delhi, India

TEACHING ASSISTANT

Multiple Semesters

- Computer Vision - Graduate Level (42 students)
- Advanced Programming - Undergraduate Level (200 students)