

# Pranav Agarwal

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## Research Interests

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Robotics, Reinforcement Learning, Representation Learning, World models, Inverse Reinforcement Learning

## Education

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### École de Technologie Supérieure & Mila

*Ph.D. in Information Technology Engineering*

*Advisors: Prof. Sheldon Andrews*

**Sep 2022 – present**

*Montréal, Canada*

*GPA: 4.13/4.33*

### École de Technologie Supérieure & Mila

*M.Sc in Information Technology Engineering*

*Advisors: Prof. Sheldon Andrews*

Fast-tracked to Doctorate Programme.

**Jan 2022 – Aug 2022**

*Montréal, Canada*

*GPA: 4.09/4.33*

### Indian Institute of Information Technology

*Bachelors in Electronics and Communication Engineering*

*Advisor: Prof. Soumyajit Poddar*

**Aug 2015 – May 2019**

*Guwahati, India*

*GPA: 9.40/10.0*

## Research Experience

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### CM Labs

*Research Intern*

*Advisor: Dr. Marek Teichmann*

**Jan 2022 – August 2022**

*Montréal, Canada*

- Developed a framework to automate the evaluation of excavator operators using self-supervised learning.
- Applied the developed framework as a reward function to automate excavators in simulation (Vortex) using Reinforcement Learning (RL).

### INRIA, RITS

*Research Assistant*

*Advisor: Dr. Raoul de Charette*

**Aug 2019 – Mar 2021**

*Paris, France*

- Modeled RL algorithms (DDPG, TD3, and PPO) for autonomous driving.
- Implemented an OpenAI-gym-like wrapper for Carla simulator.
- Proposed a novel curriculum-driven multi-policy RL agent to learn to drive using only sparse rewards.

### INRIA, Flowers

*Research Collaborator*

*Advisor: Prof. Natalia Díaz-Rodríguez*

**May 2019 – Apr 2020**

*Paris, France*

- Annotation of Egoshots dataset.
- Modeled Image Captioning (IC) Algorithms (YOLO, NOC, and DNOC) to caption the Egoshots dataset.
- Proposed a new IC metric, Semantic Fidelity to evaluate diversity in image captioning models.

### Singapore University of Technology and Design

*Research Intern*

*Advisor: Prof. Gemma Roig*

**May 2018 – July 2018**

*Singapore*

- Worked on Eccentricity Convolution Neural Network (ECNN).
- Compared the performance of ECNN on ImageNet and FaceScrub to the existing models like AlexNet.

## Academic Activities

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- Served as a reviewer for ICCV, SIGGRAPH.
- Served as an ICRA, SII, IROS, Robotics and Automation Letters reviewer.

## Publications

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1. **Learning to Play Atari in a World of Tokens**  
*International Conference on Machine Learning (ICML), 2024*  
Pranav Agarwal, Sheldon Andrews, Samira Ebrahimi Kahou
2. **TPTO: A Transformer-PPO based Task Offloading Solution for Edge Computing Environments**  
*IEEE, 29th International Conference on Parallel and Distributed Systems, ICPADS 2023*  
Niloofar Gholipour, Marcos Dias de Assuncao, **Pranav Agarwal**, Rajkumar Buyya
3. **Empowering Clinicians with MeDT: A Framework for Sepsis Treatment**  
*Goal-Conditioned Reinforcement Learning, Neurips Workshop, 2023, **Spotlight***  
Aamer Abdul Rahman, **Pranav Agarwal**, Vincent Michalski, Rita Noumeir, Samira Ebrahimi Kahou
4. **Transformers in Reinforcement Learning: A Survey**  
*Under Review*  
**Pranav Agarwal**, Aamer Abdul Rahman, Pierre-Luc St-Charles, Simon JD Prince, Samira Ebrahimi Kahou
5. **Automatic Evaluation of Excavator Operators using Learned Reward Functions**  
*Reinforcement Learning for Real Life, NeurIPS Workshop, 2022*  
**Pranav Agarwal**, Marek Teichmann, Sheldon Andrews, Samira Ebrahimi Kahou
6. **Sparse Curriculum Reinforcement Learning for End-to-End Driving**  
*arXiv preprint, 2021*  
**Pranav Agarwal**, Pierre De Beaucorps, Raoul De Charette
7. **Egoshots, an ego-vision life-logging dataset and semantic fidelity metric to evaluate diversity in image captioning models**  
*Machine Learning in Real Life, ICLR Workshop, 2020*  
**Pranav Agarwal**, Alejandro Betancourt, Vana Panagiotou, Natalia Díaz-Rodríguez
8. **Learning to Synthesize Faces Using Voice Clips for Cross-Modal Biometric Matching**  
*IEEE Region 10 Symposium, TENSYP 2019*  
**Pranav Agarwal**, Soumyajit Poddar, Anakhi Hazarika, Hafizur Rahaman

## Technical Skills

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- **Programming:** Python, C, C++, Matlab, ROS
- **Simulators:** Carla, Vortex, IssacGym, MuJoCo
- **Software:** OpenCV in Python, Numpy, Scipy, Matplotlib, Git, Linux
- **Frameworks:** Pytorch, Tensorflow, Keras

## Relevant Courses

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- **Mathematics:** Linear Algebra, Multivariate Calculus, Probability and Statistics
- **Programming:** C, Data Structure, Operating System, Computer Architecture
- **Robotics:** Learning & Optimization, Advance Control System, Reinforcement Learning
- **Online:** Python, Deep Learning, AI for Medical Diagnosis, Algorithms

## Awards

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- ETS Substance Research Dissemination Scholarship worth 1000\$.
- Mitacs Accelerate Fellowship for Graduate Studies.
- Quebec Exemption from International Master's Fees.
- Awarded the President's Gold Medal for graduating with the highest GPA.
- Received the best Technology award by the Government of India at Vibrant Gujarat 2019.
- Silver Medalist at YUVAAN cricket - An Intra Collge sport's fest of IIIT Guwahati.
- Winner of ElectroWarFare - An Intra College Techno Fest event of IIIT Guwahati.
- Merit certificate for being in the top 0.1% (securing full marks) across India in standard XII exams.