

# Vihaan Misra

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## CONTACT INFORMATION

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🌐 WebPage 🎓 Google Scholar

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## EDUCATION

**Netaji Subhas University of Technology (formerly NSIT)** New Delhi, India

*B.Tech. in Electrical Engineering with minor in Artificial Intelligence*

August 2019 – Current

**GPA: 8.11/10** (Top 5% in Department)

**Relevant Coursework:** Applied Mathematics, Computer Programming, Engineering Analysis and Design, Data Structures and Algorithms, Matrix Computation and its Applications, Design and Analysis of Algorithms, Neural Networks and Fuzzy Logic, Microprocessor based System Design

## WORK EXPERIENCE

**Carnegie Mellon University** Pittsburgh, United States of America - [Bot-Intelligence Group](#)

*Research Intern - (Computer Vision)*

May 2022 - Present

- Working on building a module to convert hand-drawn sketches to life-like images image-text-sketch recognition and image synthesis techniques with [Dr. Jean Oh](#).
- Working on developing FRIDA, a fully differentiable simulation environment for painting, adopting the idea of real to simulation to real (real2sim2real).
- Extending the FRIDA framework by guiding the painting process by multimodal inputs like text, audio, sketches, style and more.

**Mercedes-Benz Research and Development** Bangalore, India

*Research Intern - (Computer Vision)*

Jan 2023 - Present

- Developing Lane level road network elements understanding (traffic line detection, traffic type recognition, traffic signs detection, and recognition) from street view imagery.
- Extracting road network data from spatial-temporal trajectory data.
- Map matching (multi-source road network matching, matching between trajectory data and road network).

**University of Alberta** Edmonton, Canada - [Rehabilitation Robotics Lab](#)

*Research Intern - (Reinforcement Learning, Natural Language Processing)*

July 2021 - April 2022

- Worked on building a conversational AI chat-bot for helping patients with social anxiety under the guidance of [Dr. Nathaniel Maeda](#).
- Collaborated with working professionals from [HealthGauge](#) to test and get feedback on the chatbot from patients.

**International Institute of Information Technology** Hyderabad -[Robotics Research Center](#)

*Research Intern - (Computer Vision, Robotics)*

February 2021 - November 2021

- Worked on automatic object rearrangement using a UR5 Robotic Arm using Deep Reinforcement Learning and Computer Vision under the guidance of [Prof. Dr. K Madhav Krishna](#).
- Reduced the dependence of planning algorithms on Euclidean distance and proposed a learning-based method to model the joint-space cost for an optimal planning framework.[[Video](#)]

**University of Miami** Florida, United States of America

*Research Intern - (Computer Vision, Transfer Learning)*

February 2021 - October 2021

- Worked on using Transfer Learning to classify the surface type for assisting wheelchair users under the guidance of [Prof. Dr. Vaskar Raychoudhury](#).
- Formulated a new activation function which adapts according to the dataset and results in better performance and more economical resource usage when compared to previous methods. - [Abstract](#)

**Indraprastha Institute of Information Technology** New Delhi, India - [TavLab](#)

*Research Intern - (Reinforcement Learning, Natural Language Processing)*

May 2020 - March 2021

- Developed the Washkaro TB Application with innovative RL-based quizzes, smart chat-bot with Deep learning, and sentiment analysis under the guidance of [Prof. Dr. Ponnurangam Kumaraguru](#), and [Prof. Dr. Tavpritesh Sethi](#).
- Supervised a team to collaborate with an NGO to get data directly from TB patients and raise awareness about the disease and its possible treatment. [[Application](#)].
- Built an informational website for COVID projections which included visualizations for predicted COVID cases using agent-based modelling and the user's option to see the plots with additional testing and lockdown percentages.

**OptimaTeq** New Delhi, India

*Co-Founder and Software Lead - (Entrepreneurship, Robotics)*

August 2019 - May 2020

- Co-founded a Technology startup specializing in Affordable Robotics and efficient Software solutions.
- Led software development efforts with customers across Manufacturing, Law and Medicine [[Website](#)]

#### PUBLICATIONS

- **Vihaan Misra**, Peter Schaldenbrand, Jean Oh, “Robot Synesthesia: A Sound and Semantics Guided AI Painter“ - AAAI-23 Workshop on Creative AI Across Modalities. [[Abstract](#)]
- **Vihaan Misra**, Peter Schaldenbrand, Jean Oh, “Text-to-Image Synthesis using Semantic Priors“ Accepted at the Robotics Institute Summer Scholars Journal, Carnegie Mellon University. [[Link](#)]
- **Vihaan Misra**, Shivshankar S. Menon, Snehanshu Saha, Vaskar Raychoudhary, “Classification Method of Accessible Surfaces: A Transfer Learning Approach with Adaptive Activation“ (*Under Review*) - Submitted to the Transactions on Emerging topics in Computing. [[Abstract](#)]
- Rohan Pandey, **Vihaan Misra**, et. al. “A Machine Learning Application for Raising WASH Awareness in the Times of COVID-19 Pandemic“ Scientific Reports, Nature. [[Link](#)]
- Ashwin Misra, Anuj Agrawal, **Vihaan Misra**, “Robotics in Industry 4.0”. Handbook of Smart Materials, Technologies, and Devices: Applications of Industry 4.0, Springer, 2021. [[Chapter Link](#)]
- Ashwin Misra, Ankit Mittal, **Vihaan Misra**, Deepanshu Pandey, “Improving non-deterministic uncertainty modelling in Industry 4.0 scheduling” [[arXiv preprint](#)].
- Painting robot demonstration at the International Joint Conference on Artificial Intelligence and the European Conference on Artificial Intelligence(IJCAI-ECAI)-2022 - [[Link](#)].

#### RESEARCH EXPERIENCE

- **Sketch2Photo**[[Link](#)] :Working on building a module to convert hand-drawn sketches to life-like images using image-text-sketch recognition and image synthesis techniques under [Dr. Aayush Bansal](#)(PhD in Robotics, CMU) and [Dr David Alexander Forsyth](#), Professor, UIUC. Leveraging the semantic power of large scale Contrastive-Language-Image-Pre-training (CLIP) models, we are working on a text-driven method that allows shifting a generative model from a sketch domain to a natural domain. (2022)
- Developed and deployed end-to-end AI-based solution for the agricultural sector. The project assists farmers to detect diseases in their crops, predict crop yield and estimate a price for their produce. We used image processing techniques and neural networks for implementing these functionalities.[[Link](#)] (2021)
- Developed a simulated self-driving/autonomous car using a Deep Learning model that was trained using Behavioral Cloning to calculate the instantaneous steering angle and validated with three cameras mounted on the car for image capturing and analysis. [[Link](#)] (2020)
- Developed an agent for the control of 20 robotic arms which uses an actor-critic Deep Deterministic Policy Gradient method to help robotic arms navigate in a virtual Unity environment . [[Link](#)] (2020)
- Developed a Model Predictive Controller to implement speed control, parking and obstruction avoidance in an autonomous car. [[Link](#)] (2020)
- Developed a Lane Segmentation module employing Hough Transform to classify road lanes in an input video. [[Link](#)] (2020)

#### ACHIEVEMENTS

- Recipient of the **Robotics Institute Summer Scholarship**, conducted by the Carnegie Mellon University. This program selects 50 students from across the world and provides undergraduate students from over 50 countries with opportunities to participate in a 11-week research immersion.
- Recipient of the **MITACS Globalink Research Internship Award** for the University of Waterloo. It is a competitive initiative for international undergraduates where top-ranked applicants are given the opportunity to participate in a 12-week research internship in a variety of academic disciplines.
- **National Winner** at the pan-India hackathon conducted by The Indian Institute of Technology, Ropar (IIT Ropar) [[Project Link](#)]
- Runners-up in the pan-India hackathon conducted by The Institution of Engineering and Technology Birla Institute of Technology Mesra
- Top 0.5 percentile: Joint Entrance Examination- Unified Engineering Entrance Examination- Attendance of 1 Million Students

#### PROGRAMMING

Python, C/C++, MATLAB, ROS, Java, JavaScript, Octave

**Frameworks:** PyTorch, TensorFlow, Keras, StableBaselines, Scikit, NumPy

#### VOLUNTEER EXPERIENCE

**PRAYAS: The Neighbourhood Project** Core Member and Event-Organizing Lead - [Facebook Page](#)  
Conducted regular STEM classes for underprivileged children along with arranging donation drives to fund their formal education. Also organized blood and food donation camps for the needy.

#### REFERENCES

- Jean Oh (hyaejino@andrew.cmu.edu) - *Associate Research Professor, Carnegie Mellon University*
- Vaskar Raychoudhury (raychov@miamioh.edu) - *Associate Professor, University of Miami*
- Tavpritesh Sethi (tavpriteshsethi@iiitd.ac.in) - *Associate Professor, Indraprastha Institute of Information Technology*