

# Mayanka Medhe

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## RESEARCH INTERESTS

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Vision-Language Models, Egocentric Vision, Human-Robot Interaction, Scene Understanding

## EDUCATION

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### University of Tokyo

Japan

*Masters from School of Information Science & Technology*

2020 - 2022

Thesis: Multimodal understanding of videos using eye gaze and natural language

Guide: [Prof. Yoichi Sato](#) in collaboration with **RIKEN CBS**

### Indian Institute Of Technology, Bombay

India

*BTech. with Honors in Computer Science and Engineering*

2016 - 2020

Thesis: Multi-agent path planning using reinforcement learning

Guide: [Prof. Leena Vachhani](#)

### Simon Fraser University

Canada

*Semester Exchange majoring in Computing Science*

Spring 2019

## RESEARCH EXPERIENCE

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### Multimodal understanding of videos using eye gaze and natural language

University of Tokyo

*Graduate Thesis / Guide: [Prof. Yoichi Sato](#)*

Autumn 2020 - Spring 2022

*Gaze-guided dense video captioning and multimodal dataset for egocentric attention understanding*

- Created a dataset of the natural description given by the annotator while continuously monitoring their gaze
- Built model that grounds natural language to gaze-indicated regions in videos for attention-aware captioning
- Tackled tasks like dense grounded captioning, visual grounding, and voice-driven navigation using our dataset

### Multi-Agent Path Planning and Collision Avoidance using Reinforcement Learning

IIT Bombay

*Undergraduate Thesis / Guide: [Prof. Leena Vachhani](#)*

Autumn 2019 - Spring 2020

*Developed a path planning algorithm with collision detection & avoidance techniques*

- Implemented a CNN-encoded DDQN policy for adaptive multi-agent path planning in dynamic settings
- Designed a variance-aware spherical safety zone for robust collision avoidance under velocity uncertainty
- Validated the framework in Gazebo with moving and stationary obstacles demonstrating reliable navigation

### Playing ATARI games using Deep Learning Transformers [\[REPORT\]](#)[\[CODE\]](#)

IIT Bombay

Guide: [Prof. Shivaram Kalyanakrishnan](#)

Autumn 2019

*Utilized transformers with deep neural networks for reinforcement learning tasks*

- Proposed transformer based model for the task of training agents to play ATARI games using deep RL
- Utilized multi-head attention to encode temporal dependencies and extract richer state representations
- Evaluated RL performance under partial observability using DQN, DQN+LSTM, and transformer policies
- Found recurrent policies generalize better under hidden-state uncertainty than attention-only models

## PROFESSIONAL EXPERIENCE

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### Honda R&D

Tokyo, Japan

*Research Engineer, Perception & Interaction Team*

2022 - Current

*Embodied multimodal AI and human-robot interaction for autonomous micro-mobility*

- Led smartwatch-robot interaction system enabling vision-language based control in real-world environments
- Built secure ROS-websocket communication and intent recognition for robust voice-driven operation
- Deployed system in public [proof-of-concept \(PoC\)](#) with 1000+ users handling varied real-world conditions

*Real-time perception & spatial intelligence for user identification and navigation*

- Developed fine-grained pedestrian attribute recognition for user-aware autonomous mobility
- Optimized object detection performance on edge hardware, increasing robustness during real-world operation
- Building a Spatial RAG module enabling geospatial scene retrieval from vague natural language queries

## Honda Research Institute

Research Engineer, Vision Team

Wako, Japan

Summer 2018

*Multi-resolution 3D mapping using Dynamic Level of Detail for the bipedal robot ASIMO*

- Constructed indoor 3D volumetric maps from SLAM point clouds, integrating ORB-SLAM2 for efficient mapping
- Optimized map reconstruction using feature-based feedback for efficient multi-resolution world modeling

## Tier IV

Research Engineer, Sensing & Perception Team

Tokyo, Japan

Spring - Autumn 2021

*Object detection evaluation metric design in self driving cars*

- Designed and implemented object detection performance evaluation scheme in different weather conditions
- Implemented ROS-based module to detect false positive and false negative readings in object detection

## Qibitech

Robotics Engineer, AI Team

Tokyo, Japan

Spring 2022

*Highly autonomous remote control service (HATS) for efficient operation of robots*

- Developed sub-modules for path planning of autonomous robots through teleoperation in a dynamic environment
- Created tests for localization and modification of cost map modules on various robots using Docker

## PUBLICATIONS & PATENT

- **Mayanka Medhe**, Naoki Hosomi. "User Localization in Camera Space using Combined User and Surrounding Object Information". JP Patent filed: Status Pending, 2025.
- **Mayanka Medhe**, Anirudh Reddy Kondapally, Kentaro Yamada, Hitomi Yanaka. "Improving Reasoning for Outdoor Navigation using Commonsense Knowledge Insertion". In: Society of Instrument and Control Engineers Annual Conference (SICE), 2023.
- Uddeshya Upadhyay\*, Nikunj Shah\*, Sucheta Ravikanti\*, **Mayanka Medhe\***. "Transformer Based Reinforcement Learning For Games". In: arXiv, 2019.

\* work involved equal contribution from authors

## COURSEWORK

Visual Computing	Computer Vision, Computer Graphics, Physics based animation
Machine Learning	Foundations of Intelligent and Learning Agents, NLP, Deep Learning
Miscellaneous	Advanced Topics in Mobile Robotics, Brain Science, Cognition & Emotion

## TECHNICAL SKILLS

Programming	C++, C, Java, Python, Bash, SQL
Development	iOS, Android, HTML, CSS, Bootstrap, JavaScript, Django, PHP
Software & Platform	ROS2, Docker, OpenCV, OpenGL, Jenkins, Blender, Unity, Qt, Matlab, Git

## ACHIEVEMENTS

- Received **Director's Award** at Honda R&D for outstanding work on Cikoma and Wapochi projects (2025)
- Achieved **perfect GPA of 4.0/4.0** and selected as the graduate school representative at University of Tokyo (2022)
- Recipient of university recommended **Monbukagakusho (MEXT) scholarship** at University of Tokyo (2020-2022)
- Ranked **All India Rank 3** in National Science Talent Search Examination (2016)

## COMPETITION

### Design Engineer

*Team Shunya- Pioneer for building zero energy house in India*

IIT Bombay

2017 - 2018

- Only team from India to be selected for **Solar Decathlon China 2018** winning Best Participation Award
- Designed an Automated Hybrid Solar Convection Oven which uses Solar Hot Air Generator to cook food

## EXTRACURRICULAR

- **Moderator:** Guided the winning team in the first Online Research Hackathon conducted by UTokyo (2021)
- **Freelance Instructor:** Conducted interactive coding and robotics workshops for kids aged 5-14 (2021-2022)
- **Volunteer:** Organized empowerment and English speaking programs at high schools across Japan (2021-2022)
- **Institute Student Mentor:** Assisted freshmen with academic and holistic endeavours (2019-2020)
- **Department Student Mentor:** Helped sophomores transition to department curriculum (2019-2020)