

# Mayanka Medhe

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## RESEARCH INTERESTS

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

## EDUCATION

<b>University of Tokyo</b> <i>Masters from School of Information Science &amp; Technology</i> Thesis: Multimodal understanding of videos using eye gaze and natural language Guide: Prof. Yoichi Sato in collaboration with RIKEN CBS	Japan 2020 - 2022
<b>Indian Institute Of Technology, Bombay</b> <i>BTech. with Honors in Computer Science and Engineering</i> Thesis: Multi-agent path planning using reinforcement learning Guide: Prof. Leena Vachhani	India 2016 - 2020
<b>Simon Fraser University</b> <i>Semester Exchange majoring in Computing Science</i>	Canada Spring 2019

## RESEARCH EXPERIENCE

<b>Multimodal understanding of videos using eye gaze and natural language</b> <i>Graduate Thesis / Guide: Prof. Yoichi Sato</i> <i>Gaze-guided dense video captioning and multimodal dataset for egocentric attention understanding</i> ○ 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	University of Tokyo Autumn 2020 - Spring 2022
<b>Multi-Agent Path Planning and Collision Avoidance using Reinforcement Learning</b> <i>Undergraduate Thesis / Guide: Prof. Leena Vachhani</i> <i>Developed a path planning algorithm with collision detection &amp; avoidance techniques</i> ○ 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	IIT Bombay Autumn 2019 - Spring 2020
<b>Playing ATARI games using Deep Learning Transformers</b> <a href="#">[REPORT]</a> <a href="#">[CODE]</a> <i>Guide: Prof. Shivaram Kalyanakrishnan</i> <i>Utilized transformers with deep neural networks for reinforcement learning tasks</i> ○ 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	IIT Bombay Autumn 2019

## PROFESSIONAL EXPERIENCE

<b>Honda R&amp;D</b> <i>Research Engineer, Perception &amp; Interaction Team</i> <i>Embodied multimodal AI and human-robot interaction for autonomous micro-mobility</i> ○ 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	Tokyo, Japan 2022 - Current
<i>Real-time perception &amp; spatial intelligence for user identification and navigation</i> ○ 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

*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

Wako, Japan

Summer 2018

*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

IIT Bombay

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

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)