Mayanka Medhe

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RESEARCH INTERESTS

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

EDUCATION

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

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

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   Wako, Japan
Research Engineer, Vision Team   *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   Tokyo, Japan
Research Engineer, Sensing & Perception Team   *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   Tokyo, Japan
Robotics Engineer, AI Team   *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)