TEJAL BEDMUTHA

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EDUCATION

Veermata Jijabai Technological Institute (VJTI), *Mumbai, India.* Aug. 2019 – Jul. 2023
Bachelor of Textile Technology and Manufacturing (GPA- 3.95/4) Mumbai, India

- Ranked first in the program.

TECHNICAL SKILLS

OS	: Windows, Linux, ROS (Meta-OS)
Languages	: C++, Python, C, Embedded-C, MATLAB, Javascript, HTML/CSS
Databases	: Shell Scripting, MySQL
Technologies/Frameworks	: OpenCV, Scikit-Learn, Numpy, Git
Software	: Gazebo, Coppeliasim, Simulink, MATLAB, MS Excel

PUBLICATIONS

- ***Comparative Analysis and Novel Algorithm Development for Offline UAV Clustering*** | Tejal Bedmutha , Jatin Salve | (Submitted)
- ***Comparative study of in-situ polymerization by polyaniline on different fabrics for development of conductive fibres*** | Tejal Bedmutha, Jivita Gorad, Ritik Nawgire, Aditya Jadhav | (under review)

WORK EXPERIENCE

MIKO.AI July 2023 - April 2024
Robotics Engineer Mumbai, India

- **Lead the development** for an upcoming product, a 1-DOF interactive robot for telemedicine applications by designing the software architecture and implementing various utility functions. Also, managing across different teams for working of the entire robot.
- **Developed and Enhanced** the software architecture for **Miko Mini**, a mobile companion robot, achieving seamless real-time interactions with children through innovative solutions:
  - **Engineered** a dual-detection system using 1D LiDAR, classifying edges and obstacles using a gradient-based algorithm, attaining **99%** accuracy and minimizing false positives to **0.8%**, ensuring improved obstacle navigation.
  - **Developed** the LED control module for the Miko Mini, integrating advanced sensor fusion and system modelling techniques, enhancing interactive responses and user experience.
  - **Tested and validated 500** ToF sensor units in collaboration with the sourcing team, ensuring technical compliance and operational reliability.
- **Automated** the SLAM module pipeline for an upcoming product, streamlining operational workflows and improving navigation accuracy across dynamic environments.

ORANGEWOOD LABS | *ROS, Gazebo, C++, Python, Darknet, Computer Vision.* July 2021 - Oct 2021
Robotics Research Intern. Remote, India

- **Spearheaded** the 3D pose estimation project for a robotic arm, designing an **inverse kinematics** module that formed the basis for trajectory planning in applications such as object picking and placement, screw tightening, and other precision tasks within the manufacturing sector.
- **Improved** object detection accuracy to 96.7% by training models using the Darknet framework, enhancing the robotic arm's trajectory planning efficiency across various tasks.

AIRPIX | *Pixhawk, Ardupilot, Python, Fusion360, C++, CMake* May 2021 - July 2021
Systems Intern. Remote, India

- **Explored and Applied** the No-Permission-No-Takeoff (NPNT) protocol for drones, aligning operations with Indian government standards for UAV-based image capturing and deliveries.
- **Integrated Ardupilot** software on **Pixhawk controllers**, utilizing navigation algorithms from the Eyantra Competition to optimize delivery efficiency and implement online takeoff permission workflows.

RESEARCH EXPERIENCE

Indian Institute of Technology, Bombay | *ROS, Gazebo, C++, Python .* May 2024 - Present
Research Assistant(Project Lead)
Navigation of Autonomous Underwater Vehicle

- **Reviewed** various mapping and path planning algorithms, laying the groundwork for robust navigation in Autonomous Underwater Vehicles (AUVs).
- **Modeled and integrated** SONAR sensor into a simulation environment, leveraging the Octomap library to generate precise octomaps from point clouds with **92%** accuracy, accounting for sensor noise and distortions.

- **Developed and Tested** dynamic mapping functionality to classify static and dynamic obstacles, achieving **90% accuracy**, and enhancing planning efficiency; work is in the process of publication.
- **Deployed** the Software on the vehicle for performance testing.

TEXTILE DEPARTMENT,VJTI | *Tableau,Powerpoint Presentation .* June 2022 - July2023

Comparative analysis of In-situ polymerization by polyaniline on different fabrics and development conductive linen fibres.

- **Investigated** 0-dimensional electronic sensors and their applications alongside exploring conductive finishing techniques for textile materials.
- **Researched and experimented** with various synthesis and polymerization techniques to develop conductive fibres. **Resistivity of the samples was reduced by an order of approx 6.**

MITACS - GRI | *MATLAB, Gazebo, Simulink .* May2022 - Aug 2022

Offline Clustering of Unmanned Aerial Vehicles. Montreal, Canada

- **Conducted a comprehensive literature review** on various evolutionary algorithms for clustering in scheduling-based applications.
- **Devised** an efficient clustering algorithm for UAVs, reducing clustering time by **20 seconds** compared to conventional evolutionary methods, and optimizing pre-takeoff processes for faster deployment.

SRA-VJTI AND STATE ENVIRONMENT DEPARTMENT | *Image processing, Python.* Link to the Repo Oct 2020 - April 2021

Detecting changes in the images captured by the satellite.

- **Developed** an algorithm using K-Means clustering and PCA to detect changes in time-series satellite images, identifying principal components to monitor changes such as vegetation loss.
- **Created analytical visualizations** by plotting graphs to highlight changes over time and **developed** a machine-learning model to assess the potential loss of vegetation, enhancing data interpretation for environmental monitoring.

PROJECTS

Flipkart - GRID | *ROS, GAZEBO, Python, C++, Computer Vision, SLAM* September 2021 - October 2021

Multi robot handling and optimization .

- **Collaborated** on the motion planning of a swarm robotics system, ensuring optimal obstacle detection and avoidance, contributing to the team being ranked among the **top 4** out of 100 teams in the Flipkart Grid Challenge.
- **Developed and tested** a robust navigation algorithm in Python and C++ using ROS, integrating it with Gazebo simulations and real hardware for efficient parcel delivery.

MOB - MANIPULATOR | *ROS, GAZEBO, Python, C++, MoveIt, SLAM* April 2021 - July 2021

modelling of a mobile manipulator capable of performing various dexterous tasks autonomously.

- Worked on the Mobile Base by applying various SLAM algorithms to achieve the desired autonomous navigation.
- Developing a four-wheeled differential drive system from a two-wheeled differential drive system.

Vitarana Drone |*ROS, GAZEBO, Python, C++, Computer Vision.* Link to the Repo Aug 2020 - March 2021

Eyantra Competition - Drones for Disaster Management.

- **Developed** a PID-based control system and designed the planning module along with a gripper mechanism to enhance the delivery efficiency of the drone for disaster relief, contributing to achieving a position in the top 10 among 200+ teams.
- **Trained a Haar Cascade model** with **30% increased accuracy** for automated detection of parcel locations.

SCHOLASTIC ACHIEVEMENTS AND AWARDS

- Awarded for being an all-rounder best student of the batch with a monetary reward of Rs 30k from Bank of Baroda.
- Selected as a Mitacs Globalink Research Intern with a research grant of $9000 CAD -2022.
- Awarded the Alumni Association Scholarship, offered to students with exceptional academics and extra-curricular records.

EXTRA-CURRICULAR

- Participated in State Level Boxing Championship-(2023).
- Gold medalist in 100m race and Runner-up in 10km Mumbai Marathon conducted by Enthusia, VJTI-(2021).
- Silver medalist in School Games National Kickboxing Championship-(2018).
- National football player-(2016-2017).
- Trained Bharatnatyam(Classical dance form) Dancer.
- Actively engaged in community service initiatives, including teaching, fundraising, and volunteering under the Milaap Organization.

SOCIETY MEMBERSHIP

- All India Robotics Association (AIRA): Active participation in conferences and knowledge exchange sessions.
- Society of Robotics and Automation, VJTI: Mentored teams in a research project, delivered lectures on Linear Algebra, Computer Vision basics, and Robotic Manipulations and served as a design head.
- Entrepreneurship cell, VJTI : Served as an Event Manager, overseeing the execution of the Insane Pitchers event.
- Enthusia, VJTI(sports committee): Held the position of Event Manager, responsible for managing badminton and athletics events.