Ojas Ajitkumar Mandlecha

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EDUCATION

University of Pennsylvania | Master of Science in Robotics *Aug 2022-May 2024*
GPA: 3.85 / 4.0

- Courses: Computer Vision, Machine Learning, Deep Learning, Perception, Path & Motion Planning, Localization & Mapping

Vishwakarma Institute of Technology | Bachelor of Technology in Mechanical Engineering *Aug 2018-Jun 2022*
GPA: 8.94 / 10

- Courses: Mechatronics & Industrial Robotics, Kinematics & Mechanism, Controls & Object Oriented Programming.

EXPERIENCE

Urban Transportation Associates | Cincinnati, Ohio *Jun 2023-Aug 2023*
Algorithms Intern

- Deployed a pipeline for object detection of bikes. Implemented YOLO-v3 model and optimized it by handling real-time interference. MAP achieved: 0.71
- Integrated 3D stereo camera and GPS sensor data and enhanced passenger counting and location tracking to an accuracy of 97% through camera calibration, noise reduction, and cloud integration.

Patson Machines Pvt. Ltd. | Pune, India *Aug 2021-Jan 2022*
Research & Development Intern

- Developed a "Full Form Gauge" and achieved accuracy to within 5 microns while reducing manufacturing costs by 40%.
- Worked on 'paper punching assembly' and reduced assembly weight by 25% and punching cycle time by 53%

The Robotics Forum | VIT, Pune, India *Sept 2019-Aug 2021*
Technical Lead

- Developed a robotic shooting mechanism. Implemented object detection & distance estimation algorithms, control systems.
- Performed ML-driven data analysis of dynamic parameters for enhancing trajectory prediction.
- Conceptualized, designed, analyzed and implemented mechanisms to build robots. Led cross-functional teams to represent the university in various competitions.

ACADEMIC PROJECTS

Autonomous VIO-based Quadrotor | *VIO, Sensor Fusion, Path Planning, Python* *Jan 2023-Mar 2023*

- Implemented Dijkstra and A* algorithms to compute a collision-free trajectory in a 3D environment and developed a nonlinear geometric controller to stabilize the quadrotor.
- Built an Error State Kalman Filter (ESKF) for pose estimation of the quadrotor using IMU and stereo pair sensors.

Robotic Gripper Arm | *Robotic Manipulation, Motion planning, Python* *Nov 2022-Dec 2022*

- Developed a software algorithm for a robotic Franka Emika Panda Arm using forward and inverse kinematics, object detection and identification (AprilTags), pose estimation and obstacle avoidance to stack static and dynamic blocks.
- Tested the algorithm in simulation environment (Gazebo) as well as on the Franka Emika Panda.

SfM using Geometric Deep Learning | *Deep Learning, Computer Vision, Python* *Apr 2023-Present*

- Used multi-stage deep neural network to compute the 3D coordinates and the camera poses using the matched feature points to reconstruct 3D structure by minimizing hinge and reprojection loss.
- Incorporated permutation-equivariant neural network to handle complex, unordered data and compared the results with traditional Structure from Motion computer vision approach.

Applying Filters based on Human Emotion | *Computer Vision, Deep Learning, Python* *Sept 2022-Dec 2022*

- Trained a deep neural network model (CNN) for real-time emotion recognition in PyTorch. Performed Image processing on FER-2013 dataset and trained the model to perform Image classification based on emotions.
- Developed an algorithm to perform face detection using OpenCV and apply filters to the detected face based on emotions.

3D Reconstruction From Multi-View Images | *Computer Vision, Python* *Nov 2022-Dec 2022*

- Performed SIFT for feature matching and used RANSAC for robust camera pose estimation.
- Computed a 3D point cloud from images using Structure from Motion and Bundle adjustment.

Others

- Stock market price prediction using LSTM model | *Deep learning, PyTorch, Python*
- Wall Climbing Robot | *PID Controller, FEA, C++*
- Security System using RFID & Temperature Sensing with Sanitizer Dispenser | *IoT, C++*
- Canny Edge Detection • Laplacian Blending • Homography Estimation • Image Morphing • Poisson Image Editing

SKILLS

Programming Languages: Python, C, C++, MATLAB
Frameworks & Libraries: PyTorch, ROS, Gazebo, Pandas, Keras, TensorFlow, NLTK, NumPy, OpenCV, matplotlib, Sklearn
Developer Tools & Technologies: Linux, Git, VS Code, CUDA

CO-CURRICULAR ACTIVITIES

AIR-17 (Final stage), DD ROBOCON, National Level, India *Sept 2019-Aug 2021*

Winner, SAE Modeling and Animation, National Level, SAE India. *Jul 2020*