Omkar Ashok Chittar

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Education

University of Maryland, College Park — College Park , MD
Master of Engineering in Robotics — 3.96 CGPA — *Aug. 2022 – May 2024*

Savitribai Phule Pune University — Pune, India
Bachelor of Engineering in Mechanical — *July 2014 – June 2018*

Technical Skills

Languages: Python, C/C++, MATLAB, SQL, R
Developer Tools: Git, Docker, GCP, VS Code, Linux, ROS, OpenVINO, ONNX, Carla, Colab, AWS, Kubernetes
Libraries: PyTorch3D, pandas, NumPy, Matplotlib, PyTorch, Tensorflow, Keras, Scikit, OpenCV, PCL, PIL, OpenGL
Computer Vision Applications: 3D reconstruction, multi-view geometry, SfM/SLAM, Generative models, Object Detection & Tracking, Semantic Segmentation, Inpainting, Depth Estimation, Point Cloud processing, Pose Estimation

Work Experience

Computer Vision Engineer — June 2019 – June 2022
Sakar Robotics — *Pune, India*

- Developed a Detection-based Tracking approach (YOLO + DeepSORT) to detect and identify vehicles. Implemented an optical flow algorithm to get the directional vectors of consecutive frames
- Led enhancement of localization and navigation systems, integrating Normal Distribution Transform for localization and GPS/IMU fusion with Kalman filters, boosting mapping accuracy by 20% and efficiency by 50%
- Optimized model latency and throughput on Intel platforms using OpenVINO model optimization toolkit. Performed lossless model quantization and achieved a 20x improvement in inference speed
- Incorporated the trained model in PyTorch into C++ using libtorch using C++ and CMake
- Researched on odometry pipeline for precise localization as well as active switching between the sensors
- Implemented Siamese neural network for face recognition utilizing tensorflow and One-Shot Learning

Project Intern — Jan. 2018 – Jan. 2019
DRDO — *Pune, India*

- Developed an active exoskeleton for assisting humans while lifting heavy loads, achieving 95% gait anomaly detection accuracy with PoseNet and LSTM networks, enhancing load support by 30%

Leadership Experience

Recruitment & Retention Manager at DOTS Oversaw recruitment, significantly boosting team size & diversity. Implemented retention strategies & coordinated training programs, enhaning staff satisfaction & skills.
Proprietor at SAI Classes Founded SAI Classes, growing it to serve 100 students annually. Led 10 instructors, enhancing teaching quality and initiated key partnerships for community engagement.

Publications

Chittar. O. A., Dr. Barve. S. B. (2022). Waist-Supportive Exoskeletons: Systems and Materials. Materials Today: Proceedings. 57. 10.1016/j.matpr.2022.02.455 (Link)
Chittar. O. A., Dr. Barve. S. B. & Kanthale. V. (2022). Experimental investigations on waist supportive passive exoskeleton to improve human comfort. Materials Today: Proceedings. 10.1016/j.matpr.2022.09.086 (Link)

Projects

Point Cloud Classification and Segmentation | *PyTorch3D, Python* — GitHub

- Implemented PointNET architecture for classification amongst three classes and segmentation of different parts of the point clouds, achieving 97% accuracy for classification and 90% for segmentation

Super pixel generation using SLIC and Image Segmentation | *PyTorch, VGG16* — GitHub

- Performed image segmentation using superpixels generated with SLIC algorithm, resulting in 95% accuracy

Simultaneous Localization and Mapping | *Particle Filter, SLAM* GitHub

- Integrated the orientation and odometry information from IMU and 2D LIDAR scans to build occupancy grid map of environment by updating the log odds while simultaneously performing particle filter based localization

Structure from Motion | *SfM* GitHub

- Reconstructed a 3D scene and estimated poses from a given set of images and feature correspondences

Neural Radiance Fields | *NeRF* GitHub

- Synthesized novel views of intricate 3D scenes using only a sparse set of input views

Robotic Arm Control with Reinforcement Learning | *DDPG* GitHub

- Guided a robotic arm in a pick-and-place task using the DDPG algorithm in panda gym environment

Object Detection and Tracking for Autonomous Driving | *Python, TensorFlow, PyTorch* GitHub

- Engineered a system by integrating U-Net architecture for precise pixel-level semantic segmentation and employing YOLOv8 for object detection, achieving segmentation training accuracy of 98.02% & validation accuracy of 97.78%

Simultaneous Localization and Mapping | *Particle Filter* GitHub

- Integrated the orientation and odometry information from IMU and 2D LIDAR scans to build occupancy grid map of environment by updating the log odds while simultaneously performing particle filter based localization

Robot Path Planning | *Python* GitHub

- Implemented BFS, DFS, Dijkstra, A*, RRT, RRT* and bi-RRT for holonomic and non-holonomic robots

LQG and LQR Control for a Gantry Crane with two suspended masses | *MATLAB* GitHub

- Designed LQG and LQR control by linearizing the dynamic model of a crane carrying 2 suspended masses to minimize the oscillations & control effort. Employed Kalman filter to account for Gaussian noise in the sensor measurements