HUMAYUN AKHTAR

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SKILLS

Robotics & Autonomy: Sensor Fusion, Multi-Sensor Calibration, Perception, SLAM, Object Detection, Motion Planning
Programming: **C++** (Google Test, Google Benchmark, CMake), **Python** (OpenCV, PCL, Open3D)
Robotics Software Development: ROS2, Gazebo, Rviz, CUDA, CARLA, Linux
Software Development & Deployment: CI/CD, AWS, Docker/Kubernetes, Git/Jira, Agile, Test-Driven Development

WORK EXPERIENCE

Prime Robotics Inc. *(Denver, Colorado)* | Perception Robotics Engineer *Aug 2024 – Present*

Vision System for Tall Pallet System

- Developed a **real-time 3D vision** pipeline leveraging RGB-D sensing and spatial clustering to segment and localize pallet layers in complex, multi-skew stacking configurations.
- Applied advanced **point cloud filtering** for robust segmentation and temporal tracking across uniform, irregular, and occluded pallet arrangements.

Pose Graph SLAM for Warehouse Robot

- Designed a Multi-modal **pose-graph SLAM** pipeline with adaptive scan matching and keyframe selection, boosting localization accuracy by 70% and producing high-fidelity local maps in cluttered, GPS-denied environment.
- Applied loop-closure optimization with keyframe sparsification, graph pruning, and marginalization, accelerating drift correction, reducing optimization time 40%, and enabling stable long-horizon continuous mapping.
- Developed perception modules for sub-5 mm pallet-base localization and autonomous charger-docking detection.

Pyatra Droids *(Houston, Texas)* | Perception Software Engineer *Oct 2023 – July 2024*

Autonomous Patient Intake Bot for Clinics

- Engineered a modular **visual-inertial SLAM** pipeline using Bundle Adjustment, **factor graph optimization** (GTSAM), and IMU fusion, achieving reliable navigation in cluttered, low-light environments.
- Enhanced keyframe-based loop closure and **map optimization**, reducing cumulative VO drift and increasing long-duration mapping accuracy.
- Leveraged SLAM-generated 3D maps for sub-decimeter localization in real-world navigation.

VectorNav Technologies *(Dallas, Texas)* | Navigation Software Engineer *May 2023 – Oct 2023*

- Designed and developed the **ROS2** Driver for the VN Inertial Navigation Sensors as a C++ plugin for the SDK.
- Created a **probabilistic filtering**–based navigation algorithm, improving pose estimation and AHRS performance by 17% in varied dynamic conditions
- Optimized SDK architecture and algorithms, implementing robust **unit tests** and a mock framework to enhance data processing and communication efficiency.
- Established a **CI/CD** node for SDK testing and performance benchmarking in a Docker container environment.

Unmanned Systems LAB (TAMU, College Station) | Research Assistant *Nov 2022 – May 2023*

- Developed perception algorithm for pedestrian and cyclist detection in autonomous golfcart using CARLA.
- Calibrated and fused GPS, IMU, LiDAR, and camera data, improving localization accuracy in forklift navigation.

EDUCATION

Texas A&M University | Master of Science in Mechanical Engineering *Aug 2022 – Aug 2024*

GPA – 4.0/4.0 | *Graduate Fellowship* & *Continued Graduate Fellowship*

Relevant Courses: Machine Learning, Robotic Perception, Computer Vision, Reinforcement Learning

Punjab Engineering College | Bachelor of Science in Mechanical Engineering *Aug 2017 – May 2021*

GPA – 9.58/10 | *Rank: 1/120* (Gold Medallist)

PROJECTS

CNN classification Model Comparison on CIFAR-10 | Python, PyTorch, CUDA *Oct 2022 – Nov 2022*

- Built and optimized a CNN with resolution enhancement, augmentation, and GPU-accelerated training.
- Performed comparative benchmarking, hyperparameter tuning and computational efficiency for deployment.