KEVIN SHAH

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SUMMARY

Proactive Robotics Engineering undergraduate with over two years of hands-on experience in ROS 2 development, C++, Python programming, and integrated sensor work. Seeking a Robotics Software Internship.

EDUCATION

Arizona State University, USA May 2026
B.S.E., Robotics Engineering, Minor: Technological Entrepreneurship and Management 3.88 GPA

TECHNICAL SKILLS

Programming: C++, ROS2 (Gazebo), Python, Git, Docker, MATLAB, CARLA,
Programming Tools: Python, Numpy, SciPy, Pandas, PySpark, Jupyter, C++, Git, Docker, CMake, OpenPV, MATLAB
Development Boards: Arduino, PSoC, ESP32, STM32, Microchip PIC, Raspberry Pi

WORK EXPERIENCE

Enovation Controls, Tulsa, OK: May 2025 - August 2025

- Developed and deployed embedded GUI applications across Atlas and S50 displays using OpenPV®, C# and PowerVision®, integrating CAN-based communication protocols for real-time data exchange with systems.
- Prototyped and validated DC-DC buck converters and onboard sensors, ensuring reliable operation across 12V input variance and validating performance with oscilloscopes and thermocouples.
- Diagnosed DV test failures through schematic review and thermal testing; collaborated with hardware teams to resolve embedded firmware anomalies under –40℃ to +80℃ conditions.
- Built Python-based test automation tools to control USB-connected instrumentation, parse firmware logs, and visualize sensor behavior, streamlining lab validation workflows.
- Contributed to flex circuit routing strategies and optimized signal integrity for high-speed digital lines, supporting design improvements for next-gen embedded displays.

C.H.A.R.T. Lab (Center for Human, A.I. and Robot Teaming), Mesa, AZ: April 2023 – September 2024

- Developed a SLAM-enabled autonomous navigation system for a differential-drive robot using ROS2 Navigation Stack and camera-based mapping, achieving 89% map-saving accuracy across a simulated 6-room environment.
- Integrated SLAM and waypoint navigation capabilities using Navigation2 and Gazebo plugins, enabling 50-meter traversal with measurable improvements in path accuracy.
- Configured and controlled a robotic manipulator in ROS2 using a publicly available SolidWorks model, implementing motion planning via ros2_control and MoveIt2 with a 98% task execution success rate.
- Added voice command functionality in a pick and place manipulator by integrating the Alexa Developer Console with ROS2 nodes, enabling hands-free object retrieval with an average system response time of 1.8 seconds.

Senate Vice President, USG (Undergraduate Student Government), Mesa, AZ: September 2022 – April 2023

- Managed a $50,000 budget, optimizing resource allocation for student organizations.
- Conducted cost evaluations, funding projections, and budget tracking, optimizing financial resource allocation.
- Led the Appropriations Committee, conducting weekly financial reviews, ensuring equitable and efficient funding for over 20 student organizations.

Interkiln, Gujarat, India: January 2022 - August 2022

- Benchmarked eight detector/descriptors (SIFT-SIFT, ORB-BRIEF) in OpenCV; demonstrated LiDAR-based TTC had 30% lower variance than camera-only.
- Ported C control loops to a PSoC microcontroller, achieving 0.5 cm positional accuracy for a small robotic manipulator via inverse kinematics.

PROJECTS

Advanced Lidar Perception Pipeline for Real-Time Obstacle Detection January 2025 - May 2025

- Engineered a full obstacle detection pipeline using raw Lidar PCD files with custom filtering, plane segmentation, Euclidean clustering, and bounding box generation, achieving real-time frame-wise object detection at 10+ FPS.

- Implemented voxel grid downsampling and region-based ROI filters, reducing point cloud data size by up to 85% without compromising obstacle fidelity.
- Designed from-scratch RANSAC and KD-Tree-based Euclidean clustering algorithms to segment road and dynamic obstacles, enabling clear separation and ID of nearby vehicles and objects.
- Developed a PCD streaming architecture using Boost filesystem to continuously visualize and process sequences of 100+ Lidar frames, simulating autonomous vehicle Lidar feeds in urban scenes.
- Proposed and initiated object tracking across frames using proximity-based data association, laying groundwork for multi-frame trajectory estimation and robust dynamic object understanding.

Multi-Modal 3D Object Tracking and Collision Estimation Using Lidar and Vision August 2024 – December 2024

- Developed a multi-sensor tracking system to match 3D objects across video frames using keypoint correspondences, achieving >95% accuracy in object ID consistency across scenes.
- Estimated Time-to-Collision (TTC) using both Lidar and monocular camera data with robust outlier rejection, maintaining TTC error within ±0.5s across multiple real-world driving sequences.
- Benchmarked 8 detector-descriptor combinations (e.g., SIFT-SIFT, ORB-BRIEF), revealing that Lidar-based TTC had 30% lower variance than camera-based estimates; compiled analysis into spreadsheet and visual reports.

Multi-Sensor Object Tracking with Unscented Kalman Filter (UKF) May 2024 - August 2024

- Implemented an Unscented Kalman Filter for fusing Lidar (2D position) and Radar (range, velocity) measurements to track 3+ dynamic vehicles on a simulated 3-lane highway.
- Achieved <0.6 RMSE on velocity and <5.0 RMSE on position (X/Y) estimates across all tracked vehicles using the Constant Turn Rate and Velocity (CTRV) model.
- Enabled accurate real-time prediction and correction cycles per object at every timestep, supporting individual motion models and lane-changing behavior for each target.

FMCW Radar Signal Processing and 2D CFAR Target Detection May 2024 - August 2024

- Designed FMCW radar waveform meeting automotive constraints, computing chirp slope of 2×10^{13} Hz/s, bandwidth and chirp time to ensure target resolution and range accuracy.
- Simulated moving targets and implemented 1D FFT on beat signal to estimate range with ±10m accuracy, validating waveform design and Doppler shift capture.
- Applied 2D FFT and implemented 2D CFAR (Constant False Alarm Rate) on the Range-Doppler Map using optimized training and guard cell windows, achieving robust noise suppression and clear target separation.

Lane Boundary Detection and Obstacle Localization November 2023 - February 2024

- Designed lane boundary detection pipeline using Hough Transform with tuned slope (0.1–0.3) and intercept (20–50 pixels) thresholds for accurate localization.
- Improved obstacle detection by 30% with semantic segmentation filtering, calculating minimum distances to obstacles with ±10 cm depth resolution for collision avoidance.

Python-Based Vehicle Controller for Autonomous Navigation August 2023 – November 2023

- Built longitudinal and lateral control system in CARLA simulator, achieving 0.5m waypoint tracking and <5% speed deviation on a 1 km track.
- Enhanced real-time control stability by reducing steering latency by 10% and ensuring precise throttle and brake modulation under dynamic driving conditions.

Real-Time Multi-Object Tracking with Optimized Deep SORT April 2022 - August 2022

- Integrated YOLOv3 with Deep SORT, optimizing feature extraction to achieve 98% IDF1 accuracy and real-time 30 FPS object tracking.
- Implemented Kalman Filtering and Hungarian Algorithm, enhancing motion prediction and reducing identity switches by 35% for robust multi-object tracking.

YOLOv3 Keras API: High-Speed 2D Object Detection for Autonomous Systems January 2022 – April 2022

- Implemented YOLOv3 in Keras for efficient multi-class detection in autonomous driving.
- Optimized bounding box predictions using Non-Maximum Suppression (NMS), improving detection accuracy and reducing false positives by 25%.
- Engineered a custom inference pipeline leveraging TensorFlow, OpenCV, and GPU acceleration, enabling real-time detection at 30 FPS with 416x416 input resolution.