Shashank Sharma

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Experience

Lucid Motors Newark, CA
Senior Software Engineer Maps and Navigation ADAS/AD *Nov 2023 – Present*
- Working on Advanced driver-assistance system (ADAS) and Autonomous Driving (AD) software for Lucid vehicles.
- Developing navigation pipeline using data from GNSS and IMU sensors.
- Developing sd-map and hd-map pipelines to improve ADAS features like Highway Assist.
- Supporting software validation, for Lucid Air Sedan and Gravity SUV, using hardware-in-loop and prototype vehicle testing.

Dematic, Kion Mobile Automation Holland, MI
Machine Learning Engineer (Perception, Localization, and Mapping) *Sept 2020 – Oct 2023*
- Developed on-board software for autonomous vehicles(AGVs) in warehouse environments.
- Improved accuracy and robustness of the reflector and line extraction algorithm leading to sub-centimeter accuracy.
- Improved speed of feature-based association algorithm by 50%, leading to a 30% faster localization pipeline.
- Tackled technical debt in the mapping codebase by reducing complexity, simplifying API, and decoupling tightly connected units. Improved mapping API calls latency by creating caching threads. Also, improved the FastSLAM algorithm implementation.
- Implemented and integrated obstacle detection (human/ forklift) and pallet detection algorithms using 3D camera data.
- Certified SAFe (Scaled Agile Framework) Practitioner and trained to use Scrum, Kanban, and XP in an Agile environment.

Stony Brook University Stony Brook, NY
Research Assistant *May 2017 – Aug 2020*
- Proposed machine learning and algebraic algorithms for simulation and synthesis of complex single-degree-of-freedom robotic systems, and published multiple articles in journals by the American Society of Mechanical Engineers.
- Created MotionGen, a web-based mechanism design framework. Uses MEAN (MongoDB, Express.js, Angular.js, Node.js) stack to create a RESTful web service based on MVC architecture. iOS and Android apps created using Apache Cordova framework.

Education

Stony Brook University Stony Brook, NY
Ph.D., Mechanical (Concentration: Design and Robotics, Minor: Applied Mathematics), GPA 3.95 *Aug 2015 – Aug 2020*
- **Relevant Courses:** Robotics, Advanced Dynamics, Vibration and Control, Kinematic Analysis and Synthesis, Applied Stress Analysis, Product Design Optimization, Geometric Modeling, Analysis of Algorithms

Relevant Projects

Robotics Software Engineer Nanodegree Program Udacity
C++, Python, ROS, Gazebo, AMCL, gmapping, RTABMap *Apr 2021 – Apr 2022*
- Simulated Automated Guided vehicles (AGVs) and Autonomous Mobile Robots (AMRs) in a warehouse environment.
- Mapped a virtual environment, by manually moving an AGV and creating an occupancy grid map. The AGV only had a 2D lidar sensor on it. Localized an AMR using the same map while controlling it manually or autonomously using path planning. Simulated a complete pick-and-drop operation. ROS packages like gmapping, AMCL, and move_base were used.
- Used SLAM to manually move an AMR through a virtual environment and create a loop-closed 3D graph map using RTAB-Map. The AMR used a 3D camera and a 2D lidar sensor to create the map for localization.

Self Driving Car Engineer Nanodegree Program Udacity
Python, Jupyter, OpenCV, TensorFlow, Keras, C++, ROS *Mar 2019 – Mar 2020*
- Created a robust image processing pipeline to detect highway lanes in dashcam live-feed. The car's position within lane and lane curvature was calculated using bird's eye view (BEV) and polynomial fitting. LeNet-inspired convolution neural network was also developed to detect and classify 40+ kinds of traffic signs.
- Used a 2D particle filter with GPS, sensor data, and landmark map for sparse localization. Also localized using an extended Kalman filter which fused LIDAR and RADAR sensor data.
- Autonomously drove on a virtual highway with other cars using a Finite State Machine based trajectory planner.
- Implemented a PID controller to maneuver a vehicle around a virtual track using steering, throttle, and brake.
- Used Robot Operation System (ROS) framework to robustly integrate Perception, Localization, Planning, and Control.

Technical Proficiency

- **Programming Languages :** C++, Python, Javascript, Matlab, Mathematica, Delphi
- **Robotics software :** Keras, Tensorflow, PyTorch, ROS, Gazebo, Rviz, Anaconda, Jupyter, OpenCV, Scikit, Pandas
- **Tools :** Git, Virtual box, LTTng, Perf, Valgrind

Selected Publications

- Sharma S., Purwar A.; **A Machine Learning Approach to Solve the Alt–Burmester Problem for Synthesis of Defect-Free Spatial Mechanisms.** ASME J. Computing and Information Science in Engineering; doi:10.1115/1.4051913
- Sharma S., Purwar A.; **Path Synthesis of Defect-Free Spatial 5-SS Mechanisms Using Machine Learning.**, ASME IDETC-CIE2020; doi:10.1115/DETC2020-22731
- Sharma S., Purwar A.; **Unified Motion Synthesis of Spatial Seven-Bar Platform Mechanisms and Planar-Four Bar Mechanisms.**, ASME IDETC-CIE2020; doi:10.1115/DETC2020-22718
- Sharma S., Purwar A., Ge Q.J.; **Motion Synthesis Approach to Solving Alt-Burmester Problem by Exploiting Fourier Descriptor Relationship Between Path and Orientation.**, ASME J. Mechanisms Robotics; doi:10.1115/1.4042054
- Sharma S., Purwar A., Ge Q.J.; **An Optimal Parametrization Scheme for Path Generation Using Fourier Descriptors for Four-Bar Mechanism Synthesis.**, ASME J. Computing and Information Science in Engineering; doi:10.1115/1.4041566