SANJAR NORMURADOV

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WORK EXPERIENCE

Research Engineer **Agile Robots SE**

Generalist Robotic Foundation Models Team *July 2025 – Present (7 mo.)*

- Modeling: Explore & test novelties in VLA (esp. Action Expert) performance improvement including action-chunk smoothing (RTC, train-RTC, VLASH, A2C2), cross-embodiment pre-training (HiMoE, X-VLA), and SOTA models (pi0 / GR00T-series, smolVLA, FLOWER) based on Diffusion Transformers and Flow Matching;
- Application: Adjusted the data collection and Reactive Diffusion Policy inference framework to use Thor robot arm with DH gripper (og. Flexiv Rizon & Grav), SRI force-torque sensor (og. GelSight mini & built-in FT-sensor), Intel Realsense D405 (og. 435) and spacemouse (og. Meta Quest3) in multi-processing fashion built on top of ROS2 middleware; Use–case: industrial high-voltage plug pick & insertion tasks as PoC.

Industrial Precision Assembly Team *Jul 2024 – Jul 2025 (1 y.)*

- Planning & Control: Integrated KOMO (k-order Markov Path Optimization) and Robotic Control Interface & Manipulation Planning Library (framework to formulate and solve constrained optimization problems) in C++/Python to be compatible with Agile Robots' Thor manipulators driven by Diana API; Developed additional feature (linear Cartesian motion) based on off-the-shelf objective formulation and skew-symmetric matrix multiplication as an equivalent of vector cross-product; Tested the framework for industrial plug insertion task;
- Perception: Explored learning-based correspondence matching methods (SuperGlue, COTR, LoFTR) to develop proprietary pose estimator based on M3T (multi-body/modality/camera tracking algorithm); Evaluated different existing hand-eye calibration methods (dual/double quaternions, two-stage rotation matrix & translation vector, axis-angle representation of rotation) and recent closed-form two-stage method on gripper pose refinement task.

Graduate Research Assistant **UW & Amazon Science Hub ↵**

Robotic Manipulation in Densely Packed Containers *Jan 2023 – Jun 2024 (1 y. 6 m.)*

- Synthetic Data Generation: Utilized Scanned Objects from Google Research and NViSII to enhance synthetic imagery datasets, simulating diverse backgrounds and object arrangements.
- Improved the average precision of the ViT-based STOW framework for Warehouse Picking Robots on the expanded 140K-image dataset: 0.424 to 0.646 overall, and 0.336 to 0.573 for stacked bins.
- Simulation: Enhanced simulation environment precision and robustness by revising URDF/Xacro/XML files and creating a single source for all pod models, thereby expanding the system's versatility.
- Motion Planning: Optimized pod positioning relative to the robot workstation by automating test-run procedures and refining control and MoveIt parameters, such as collision checking frequency and discretization.
- Reachability Test: Reduced UR16e reachability failures from 20/1600 to 1/1600 via modifications above.

Graduate Teaching Assistant **Electrical & Computer Engineering Department UW**

"Software Engineering for Embedded Applications" *Dec 2023 – Mar 2024 (4 mo.)*

- Revised course materials on C++ fundamentals such as data structures, Abstract Data Types, STL containers, and State Machines using Docker containers, Google Test unit testing environment, and Doxygen API documentation.

"The Self-Driving Car: Intro to AI for Mobile Robots" *Sep 2023 – Dec 2023 (4 mo.)*

- Guided students in implementing Autonomous Vehicle stack on NVIDIA Jetson Nano-based MuSHR rally car.
- Prepared course materials on Probabilistic Robotics fundamentals such as Control (PID/MPC), State Estimation (PF/EKF), Path Planning (Dijkstra/PRM/RRT/RRT*/A*), Perception (Pinhole/Stereo/Depth Camera, CNNs).
- Developed a Raspberry Pi based mechatronic gate featuring an ultrasound distance sensor, 16x2 LCD for IP and distance display, a servo, and a buzzer to create a ROS service-managed obstacle for the course's final race.

EDUCATION

University of Washington (UW) **Seattle, WA**

M.S. in Electrical and Computer Engineering, Robotics (GPA: 3.6) *Oct 2022 – June 2024*

- Activities: UW + Amazon Science Hub; Robotic and State Estimation Lab; Sensor System Lab.
- Courses: Self-Driving Cars; AI-Robotics; Deep / Machine Learning; SWE for Embedded Applications.

SKILLS

VLM / VLA | CV / DL | Non-linear Optimization | RL | Motion Planning | Localization | Control
Python | C++ | PyTorch | Git | Docker | ROS | RViz | Gazebo | MoveIt | Pybullet | MuJoCo | CAD | 3D printing