

Eric Goossen

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Education

University of Washington, Seattle, Computer Engineering BS (Jun 2028 expected), GPA: 3.88

Technical Skills

Languages: C++, Python, Rust | **Tools:** ROS2, Isaac Sim, MuJoCo, Pinocchio, Docker, Git, Linux

Robotics: Kinematics & Dynamics, Motion Planning, Impedance Control, LQR, Kalman Filtering, SLAM

Hardware: Jetson Orin/Thor, Franka, OpenArm, CAN-FD, LiDAR, ESP32, oscilloscope

Experience

Undergraduate Research Intern – *UW Human Centered Robotics Lab* (Apr 2026 – Present)

- Co-authored research testing whether human feedback helps LLM-written robot code beat vision-language-action models
- Showed human feedback lifts Code-as-Policies 1.75x over base VLAs, solving tasks VLAs failed completely
- Sole author of the paper's open-source VLA eval framework, deploying chunked actions to a Franka via DROID
- Built one policy interface over WebSocket, ZMQ, and HTTP so any VLA can be evaluated with no custom code
- Benchmarked $\pi 0$, $\pi 0.5$, GR00T N1.7, and MolmoAct2 on 12 real-world manipulation tasks with automated logging
- Built Oculus teleop demo collection for each task, then fine-tuned $\pi 0$, $\pi 0.5$, and MolmoAct2 on the demos

Undergraduate Research Intern – *UW Personal Robotics Lab* (Oct 2025 – Present)

- Worked on 4-person undergrad team building the software stack for an NVIDIA-granted bimanual holonomic robot
- Own base navigation, localization, and arm control, built in MuJoCo and Gazebo, then deployed to hardware
- Robot navigates point to point autonomously; both arms move in 3D under autonomous and teleop control
- Extended MuJoCo planner to dual-arm with cross-arm collision checking, 125Hz retiming, and parallel execution
- Fixed and upstreamed open-source inverse kinematics solver bug, from failing to 50/50 on library test cases
- Prototyped three impedance controllers; shipped 500Hz gravity comp (Pinocchio RNEA) feeding motor controllers
- Built sim-to-real tuning pipeline (~ 5 mm accuracy) and 8-stage operator-gated hardware validation suite
- Integrated ROS2 Nav2 with LiDAR SLAM for autonomous navigation in unknown, dynamic environments
- Built WebXR/Meta Quest teleop from scratch for sim and real hardware with Cartesian speed limits

Control Systems Programmer - *Advanced Robotics at UW* (Oct 2025 – Present)

- Implemented Kalman-filter odometry for sensor fusion, with data-driven tuning on physical competition robots
- Led path-tracking rewrite on embedded RTOS, replacing pure pursuit with LQR that models robot dynamics
- Built sensor-agnostic mocap pipeline to characterize lidar-inertial localization, from guided data collection to fitting
- Fit Gauss-Markov error model validated by Monte Carlo on held-out data: 5.1 cm horizontal, 0.6 cm vertical, $<0.5^\circ$

Student Advocate - *Swerve Robotics* (Jan 2024 – Aug 2025)

- Led campaign to raise \$50,000+ for a Botswana robotics advocacy trip; built curriculum and taught 50+ students
- Presented on Botswana national TV; worked with U.S. Embassy to lobby ministers for reduced STEM kit tariffs

Projects

Achilles – *Rigid-Body Simulator* (2026 – Present)

- Developing C++ rigid-body simulator that batches robot instances across SIMD lanes to speed up RL training
- Cut dynamics from $O(n^3)$ to $O(n)$ with an Articulated Body Algorithm engine, validated to $1e-4$ rad
- Replaced Eigen with custom xsimd spatial algebra and a depth-sorted layout that keeps tree dynamics SIMD-safe
- Cut max energy error by over half using substepped Euler, Verlet, and implicit midpoint integrators
- Architected compile-time, data-oriented engine so new algorithms need no engine changes; CI enforces death tests
- Building branchless SIMD broad-phase collision that tests each body against a full lane group, packing hits into bitmasks
- Unified spheres, capsules, and boxes as one sphere-swept-box shape, with MuJoCo-style margins and parent/child filtering
- 1.65M robot-steps/s single-threaded ($4\times$ via batching), $2\times$ MuJoCo's per-robot rate, matching its dynamics to $\sim 1e-8$ error

Live View – *Computer Vision Pre-Processing* (2024 – 2025)

- Converted camera frames into braille-pixel representations engineered to fit FTC bitmap rules
- Applied image dithering and color encoding to compress frames while staying within FTC bandwidth restrictions

SKIDADDLE – *Trajectory Planning Library* (2023 – 2025)

- Published real-time Bézier path traversal library for FTC, with a derived optimal-path and convergence model

Publications

"A Few Words Go a Long Way," D. Chen, A. R. Jain, **E. Goossen**, E. Romig, M. Murray, N. Walker, M. Cakmak
(in preparation for *IEEE RA-L*), 2026.