

Jastej Sandhu

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Portfolio: <https://jastejsandhu.com> | LinkedIn: www.linkedin.com/in/jastejsandhu

Available: Fall 2026 – Summer 2027 (consecutive co-op terms available)

EDUCATION

Simon Fraser University

BASc, Mechatronic Systems Engineering & BBA, Business Administration (Dual Degree)

Engineering Coursework GPA: 3.67

Dean's Honour Roll: Spring 2025, Summer 2025, Spring 2026

Award — Maxon EC-i 200 W BLDC Servo Motor (~\$850 CAD), awarded by Electromate Inc. at the SFU Engineering Systems Fair for demonstrated knowledge of harmonic drive reduction systems.

Burnaby, BC
2024 - Present

TECHNICAL SKILLS

CAD & Mechanical Design: SolidWorks (parts, assemblies, drawings, GD&T per ASME Y14.5), Fusion 360 generative design, Inventor, DFM, tolerance analysis, FEA (SolidWorks Simulation), SolidWorks Visualize, FDM 3D printing (Bambu Lab P1S, ~70 μ m dimensional calibration)

Actuators & Motion Control: BLDC / brushed / stepper motors, wave drive & cycloidal gearbox design, Field-Oriented Control (FOC), PID tuning, ODrive, CAN / SPI / I2C, dual-encoder & laser-deflection bench testing

Robotics & Controls: inverse kinematics, dynamics (reflected-inertia & torque-density analysis), trajectory / motion planning, state estimation (dead-reckoning odometry), electromechanical integration of sensors & motors

Programming: Python, C, C++, MATLAB, embedded firmware (ESP32, Raspberry Pi)

Electronics & Prototyping: motor driver integration (ODrive, TB6600, TMC5160T), rapid prototyping, bench data capture

Tools: Linux, Git, Blender

EXPERIENCE

Mechanical Engineering Member, Drivetrain — SFU Satellite Design Team (Project Polaris)

May 2026 – Present

Canadian International Rover Challenge (CIRC) entry

- **Drivetrain actuation:** computed required wheel torque across terrain profiles and down-selected motors / gearmotors against durability and thermal constraints.
- **Cross-functional integration:** bridge the mechanical and electrical subteams on actuation decisions, aligning motor and driver selection with power and control requirements.
- **Wheel & steering design:** designing wheel geometry and steering integrated with a four-wheel rocker suspension, optimizing traction and performance within a constrained budget.

PROJECTS

6-Axis Robotic Arm, 1.2 m reach — Independent (In Progress)

SolidWorks · custom actuators · FOC

6-DOF arm with custom actuators, closed-loop FOC, and PC-offloaded inverse kinematics; design and prototype progress documented on portfolio and LinkedIn.

- **Joint architecture:** Maxon EC-i 200 W BLDC (shoulder) and Eaglepower LA8308 (elbow) paired with custom wave-drive and cycloidal reductions; actuator selection driven by torque-density, thermal, and reflected-inertia analysis at each joint.
- **Control architecture:** architecting PC-side inverse kinematics and trajectory planning, with the microcontroller dedicated to low-level closed-loop joint control (FOC with PID position loops).
- **Material strategy:** PETG for preloaded / tolerance-critical parts, PLA+ for stiff non-preloaded structure; ~70 μ m dimensional accuracy validated on Bambu Lab P1S against caliper measurement.

Eccentric Rolling-Element Wave-Drive Gearbox — Independent

Base joint of 6-axis arm

135 mm wave-drive gearbox, 10:1 reduction with 35 mm hollow shaft for coaxial encoder routing; pairs with an input belt stage for ~50:1 effective reduction.

- Measured ~2.3 arcmin total repeatability (± 1.1 arcmin) under reversed-load bench testing on the PLA prototype; final 4041 alloy-steel wave ring now CNC-machined and assembled with no humanly perceptible backlash, numerical characterization in progress (GD&T drawings per ASME Y14.5 passed external vendor engineering review).
- Designed the test methodology from first principles: showed AS5047P encoder noise exceeded true backlash, then switched to laser-deflection measurement for clean signal isolation (video on portfolio).
- Integrated closed-loop FOC via ODrive over CAN bus for repeatability testing: firmware flashing, encoder calibration, reduction-ratio configuration, and homing sequences.

Cycloidal Drive Gearbox — Independent

Alternate gear-topology study

- Two-stage cycloidal reduction with dual 10 mm disks for force balancing and reduced vibration; 3D-printed prototype validated under torque load; modular 8-screw architecture enabling repeated disassembly, re-tensioning, and component swap during iterative testing.

Autonomous Guided Vehicle (AGV) — SFU Class Project

ESP32 · mecanum kinematics

- Sole electronics and firmware lead on a 4-person team: ESP32 + TB6600 mecanum-wheel platform with AccelStepper motion profiles, step-count dead-reckoning state estimation, and Bluetooth teach-and-playback control.