

# Maximilian Kowalski

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## Education

### Bachelor of Science in Mechanical Engineering

University of Colorado, Boulder

Boulder, Colorado

Aug 2019 – May 2023

## Technical Skills

**Design/Analysis:** SolidWorks CSWA, SolidWorks Analysis, NX, CREO, Fusion360, 6SigmaET, Mesh Editors, Various PDM Systems

**Programming:** C++, Python, Matlab, Simulink, Arduino, ROS2 Humble, MoveIt2

**Engineering:** GD&T, DFM, DFA, Manufacturing and Assembly Instructions, Systems Engineering, Team Management, First and VEX Competitions

**Manufacturing:** 3-axis manual and CNC milling, CNC router, lathe, TIG/MIG Welding, FDM/SLS/SLA 3D printing, Bandsaw, Drill Press, Hand Tools

## Professional Experience

### Kazvu Labs

Anaheim, California

Electro-Mechanical Engineer

May 2024 – Present

- Co-designed, built, and integrated a novel 1.8 m 7-axis collaborative robotic arm for human-centric tasks for commercial environments
- Owned end-to-end development of three custom actuator sizes utilizing strain-wave gearboxes and 3-phase BLDC motors (~63–298 Nm), including detailed design, part selection and vendor relations, verification testing, manufacturing jigs, drawings with GD&T, and assembly instructions
- Delivered alpha unit in 13 months at ~50% of UR10e BOM cost with +/- .5mm accuracy and 100% workspace coverage
- Integrated a custom friction-pin brake, dual high-resolution absolute encoders, precision bearing preload, and commissioned/tuned COTS motion controllers, including electrical interface design, wire harnessing, and full system-level integration
- Architected and prototyped modular mobile robotic tooling systems with swappable soft goods heads, 2-DOF translation and rotary actuation, attempted IPX7-rated sealed motor, isolated battery-powered electronics, and custom boards for wireless communication and motor control
- Analyzed joint-torque data from recorded robot trajectories to confirm actuator sizing and brake-system reliability, and tested early prototypes with a custom dynamometer to verify design decisions and validate hardware performance
- Contributed to a multimodal structural optimization, analyzing robot permutations through workspace exploration
- Owned setup of SolidWorks 3DEXPERIENCE PDM and a unique part numbering system and the transition to NX with an on-prem deployment

### SV Automotive Engineering

Ontario, California

Engineering Intern, Mechanical Design Engineer

June 2021 - August 2021, November 2023 – May 2024

- Supported 6 custom vehicle builds through part design, collaboration with third-party manufacturers of interior and wire harnessing, independent assembly projects, and parts list generation for the restoration and diagnostics of classic vehicles
- Including designing a 3D-printed electronic enclosure and modeling of two unattainable components for a crashed Porsche 959, full restoration and reassembly of a vintage '67 911S, and disassembly and diagnostics on a totaled BMW X5 identifying critical frame damage
- Completed reconstruction of a scrapped car from a train crash to a SEMA design show finalist with the CSF SEMA 911 project car
- Led the design and fabrication of a twin turbo, Chromoly, Paganì styled exhaust system, and installed a improved 3.4L engine for a Martini Racing-inspired '78 911 to improve performance over 35% to 578 wheel HP.

### Eberspächer VAIREX

Lafayette, Colorado

Manufacturing Engineering Intern

June 2023 – August 2023

- Performed standard work and time studies while on the manufacturing line on an existing assembly process
- Partnered with operators to document cycle times and bottlenecks, and to identify root causes of defects (impeller height variation, stray metal chips, motor stator winding issues), feeding findings into continuous improvement and corrective action efforts.
- Implemented lowcost Lean improvements across the line: standardized preloctited fasteners, reorganized the warehouse using 5S and productfamily slotting, and helped redesign the MRB area with clearer tagging and segregation

### Mercury Systems - Mission Systems Division

Torrance, California

Mechanical Engineering Intern

June 2022 – August 2022

- Developed a comprehensive thermodynamic model of an avionic mission control system and a head-mounted display
- Conducted thermal characterizations utilizing 6SigmaET, leveraging material qualities and thermodynamic equations to ensure optimal performance
- Implemented design enhancements in Creo and SOLIDWORKS managed changes with OnePDM to optimize heat sink thermal efficiency

## Engineering Projects

### Industry Capstone Project: Autonomous Rover for Landfill Methane Monitoring

Design Center Colorado

CAD/Manufacturing Engineer, Mechanical Team Lead

August 2022 - May 2023

- Designed and built an autonomous rocker-bogie rover for landfill surface emission monitoring with a BOM of \$3.1k and exceeded all mobility requirements while collecting SEM data proving automation of testing for the Hannigan Air Quality Lab and Waste Management
- Owned rocker-bogie suspension, skid-steer drivetrain, and managed revision-controlled CAD and GD&T drawings
- Led DFM/DFA fabrication reviews with industry partners, helped perform FEA on critical structures, and coordinated design with electrical team

### Mobile Vision-Guided Projectile-Launching Robot Platform

MCEN 5115 - Mechatronics and Robotics I

Engineering Team Leader

August 2022 - May 2023

- Led a 5-person team building a sub-\$200 autonomous mecanum-drive robot with a modular single-flywheel launcher; sized a projectile shooter using launch-velocity, flywheel geometry and current-draw calculations and packaged electronics in a laser-cut MDF and 3D-printed chassis
- Implemented control architecture of a state-space drive model, finite-state machine for match phases, PD wall-alignment from dual ultrasonics and IMU, OpenCV color tracking on Raspberry Pi 4 and Arduino motor control

### Manufacturability Reports

MCEN 5045 - Design for Manufacturability

Engineering Team Member

January 2023 - May 2023

- Reverse-engineered the Fujifilm Quicksnap Flash 400 Disposable Camera, producing a fully detailed model. Found modifications to combine parts to theoretical part efficiency by 13% and reduced unit cost by \$1.40
- Designed a unique, compact refillable spice dispenser and applied industry-standard DFM/DFA metrics to iterate the design, reducing assembly error-proofing, insertion, and secondary-operation scores by 20% while limiting unit cost increase to 3%.

