Elise Vergos

linkedin.com/in/elisevergos | elisevergos.com/engineering
Orlando, FL | Willing to relocate to New York City

MECHANICAL ENGINEER: MECHANISM DESIGN AND PHYSICAL PROTOTYPING

Mechanical engineer with an M.Eng. in mechatronics and hands-on experience taking ideas from CAD through fabrication, assembly, and testing. Designed and built electro-mechanical prototypes for 13 hardware startups, advised founders on tolerancing and manufacturability, and ran prototyping workshops and design critiques. Independently designed a sheet metal electrostatic precipitator and designed a WAZER settling tank now manufactured. Projects combine original mechanisms, embedded controls, and human interaction.

TECHNICAL SKILLS

CAD and mechanical design: Fusion 360, Autodesk Inventor, Fusion CAM; mechanism design, sheet metal products and enclosures, tolerancing, design for manufacture and assembly, material and component selection.

Physical prototyping: SLA/FDM printing, laser cutting, waterjet, CNC/manual machining, custom tooling on a manual mill, prototype assembly, bring-up, and debug; PCB milling and design, KiCad PCB layout, soldering.

Engineering analysis and test: Physics-based MATLAB simulations, multidisciplinary design optimization (SQP, Normal Boundary Intersection, DOE), sensitivity analysis, test protocols with defined variables and pass criteria, automated test system design, DASYLab data acquisition, operational data and life cycle analysis.

Integration and documentation: Requirements definition and change tracking, subsystem interface definition, electro-mechanical root cause debugging, testing protocols, service bulletins and field procedures, Six Sigma 5S lab and workflow design.

Embedded systems and software: C/C++ (Raspberry Pi Pico SDK, Arduino), Python, MATLAB, DASYLab, Excel VBA; PID control, PWM, stepper commutation, encoders, ADC, digital filtering, I2C/SPI/UART and GPIO; oscilloscopes, multimeters, bench power supplies; gantry motion and G-code generation.

PROFESSIONAL EXPERIENCE

Technical Excellence Engineer **Oct 2025 – Present**
Siemens Energy, Large Gas Turbine Services *Orlando, FL*

- Oversaw component testing at a supplier site and wrote the service bulletins that turned the findings into field procedures.
- Sit on cross-functional task forces resolving active fleet technical issues, working with design engineering, supply chain, and field service to reach root cause and an executable fix.
- Ran a photographic condition assessment across the worldwide fleet against operating history. The supporting life cycle analysis led to an approved extension of a component's life expectancy.
- Analyzed operational data on two turbine systems, reconciling incompletely logged runtime records to quantify true hours per operating mode and to compare competing supplier nozzle designs.
- Co-built an Excel/VBA simulation of fleet part flow covering unit assignment, low-risk service life, removal timing, repair lead time, and repair and operational fallout. Used to find where the supply and demand plan over-orders or under-orders parts.

Learning Studios Engineer **May 2025 – Aug 2025**
Mechanical and Aerospace Labs, Cornell University (part-time) *Ithaca, NY*

- Redesigned the M.Eng. electrical and mechanical engineering lab and its operating processes using Six Sigma 5S, covering layout, tool and component storage, and station standards.
- **Instructional Design Studio Intern (May 2022 – Aug 2022):** helped build Cornell Engineering's Forklift Learning Studio with Toyota Material Handling. Disassembled forklifts using impact wrenches and gantry cranes, made custom tools on a manual mill, and documented hydraulic and torque converter flow for teaching use.

Hardware Engineer **May 2023 – May 2025**
Rev: Ithaca Startup Works *Ithaca, NY*

- **Manufacturing Hardware Engineer (Aug 2024 – May 2025):** helped direct the prototyping workflow for hardware projects across 13 startups, delivering three prototypes a month.
- Designed and built electro-mechanical prototypes from sketch to working hardware: CAD, component and vendor selection, laser cutting, waterjet, SLA and FDM printing, PCB milling, then assembly, bring-up, and debug.
- Independently designed a complete sheet metal electrostatic precipitator.
- Designed a bell siphon filtration system and a film tube sealing mechanism.
- Advised founders on tolerancing, manufacturability, material specification, and component selection.
- Wrote and ran testing protocols for baseline function, efficiency, and waterproofing, with defined variables and pass criteria.
- Wrote MATLAB simulations to validate prototypes against the governing physics. Three designs exceeded efficiency targets by at least 30%.
- **Prototyping Hardware Engineer (May 2023 – May 2024):** ran hands-on workshops and design critiques for 15+ founders on shop prototyping technique and Fusion 360.

Product Development Engineering Intern **May 2024 – Aug 2024**
WAZER Waterjet, desktop waterjet cutting systems *Yonkers, NY*

- Designed a settling tank and led its testing through to a production-ready design, now manufactured, that reduced debris in water outflow. Also specified and built interface and workflow improvements in the WAZER CAM software.
- Designed and fabricated an automated long-term testing system of pumps, tubing, and sensors, with data acquisition in DASYLab capturing pump pressure and waterjet speed and power. Wrote the processing scripts and daily dashboards.
- Ran a material classification study to validate a proposed component change and found a critical flaw in the initial design, which reduced cutting time.
- Architected material testing and turned the results into a product change: a revised G-code generation algorithm that compensates for abrasive stream lag around curves.

Teaching Assistant, Fluid Mechanics and Mechanical Synthesis **Aug 2023 – Dec 2024**
Sibley School of Mechanical and Aerospace Engineering, Cornell University *Ithaca, NY*

- Ran five weekly lab sessions for 100+ students and led 25 teams through system dissection and analysis projects.

SELECTED MECHANISM AND INTERACTION DESIGN PROJECTS

Flip-Card Rhythm Sequencer (M.Eng. Thesis) **2025**

- Designed a motorized electro-mechanical instrument combining Raspberry Pi Pico C firmware, a 3D-printed mechanism, stepper drive, and a one-way bearing used as a clutch so human input can override motor torque without disengaging the drive.
- Debugged two integration failures: an encoder fault that came down to missing pull-up resistors rather than firmware, and a torque conflict between encoder detent, stepper holding torque, and the one-way bearing that caused missed steps and positional drift. Re-architected input sensing to a filtered potentiometer.
- Validated step timing to $\pm$3% over 30 cycles and characterized acoustic output against a reference.
- Wrote the firmware: interrupt-driven quadrature encoder decoding with a state transition lookup table, four-phase stepper commutation through masked GPIO writes, 500 Hz ADC sampling with a digital low-pass filter, and a velocity-triggered motor state machine with inactivity timeout and 32-bit timer overflow handling.

Haptic Pong, Two-Controller Force-Feedback System (team project) **2024**

- Co-designed a display-less two-player game on two identical controllers using motorized slide potentiometers for force guidance and vibration motors for collision cues, in laser-cut acrylic enclosures.
- Defined the I2C master and follower protocol carrying ball state between boards, wrote a force-valley guidance algorithm with interpolation smoothing to remove torque discontinuities, and ran a 12-participant study on performance and perceived difficulty with and without visuals.

One-Degree-of-Freedom PID Helicopter, Closed-Loop Motion Control **2024**

- Built and controlled a fan-driven lever arm on a hinge, estimating arm angle with a complementary filter over accelerometer and gyroscope data from an onboard IMU over I2C, with gyroscope bias correction.
- Wrote the PID controller and a serial interface for live target angle and Kp/Ki/Kd tuning, plus real-time VGA plots of measured angle against motor duty cycle for evaluating controller behavior while tuning.

MOLLUSCA Autonomous Surface Vehicle, Multidisciplinary Design Optimization **2025**

- Split a microplastic-recovery vehicle into five interfacing subsystems (geometry, stability, speed, plastic recovery, power) and defined the coupling variables passed between them.
- Used design of experiments to seed a gradient-based SQP optimization, ran sensitivity analysis that identified plate width, operating time, and RPM as the dominant drivers, then used Normal Boundary Intersection to trade recovery performance against battery and solar array size.

Mindful Distancing, Posture-Adaptive Robot Path Planning (team project) **2024**

- Integrated three Python subsystems for a shared human-robot workspace: MoveNet pose estimation, a Hidden Markov Model classifying worker activity into four states, and an adapted Vector Field Histogram planner. Evaluated in a simulated workshop study on perceived safety, trust, and task disruption.

EDUCATION

Cornell University, M.Eng. Mechanical Engineering **Aug 2024 – May 2025**
GPA 3.94 / 4.00 *Ithaca, NY*

- Coursework: Design and Control of Haptic Systems, Human-Robot Interaction, Digital System Design of Microcontrollers, Multidisciplinary Design Optimization, Advanced Topics in Additive Metal Manufacturing, Robot Perception, Technology in Music Performance.

Cornell University, B.S. Mechanical Engineering **Aug 2020 – May 2024**

- Coursework: Advanced Product Design, Interaction Design Studio, Mechatronics, System Dynamics, Polymer Mechanics, Internet of Things, Fluid Mechanics, Thermodynamics.