Matthew Steil

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EDUCATION

Texas A&M University B.S. Interdisciplinary Engineering — Solar Power Systems Aug 2022 – May 2026

GPA: 3.90

Coursework: MEEN 739 Solar Energy Engineering, ECEN 467 Harnessing Solar Energy,
ECEN 438 Honors Power Electronics, ECEN 340 Electric Energy Conversion, MEEN 406 Energy Management

EXPERIENCE

American Housing Company | Manufacturing Engineering Intern Austin, TX | May 2025 – Jul 2025

- Designed manufacturing process for prefabricated steel-frame/MgO floor cassettes across multiple production stations; engineered fixtures, drill jigs, CNC workholding, and metal cutting processes
- Led adhesive selection program testing 3 adhesives across 5 surface combinations via lap shear tests on UTM per ASTM D5656; selected HB X602 (7-min cure), eliminating mechanical fasteners from cassette assembly
- Integrated 30ft × 12ft hydraulic press (~3,000-ton capacity) with 40 cylinders and 4 HPUs for full-area adhesive curing of composite sandwich panels

Carba Inc | Mechanical Engineering Intern Eden Prairie, MN | May 2024 – Jul 2024

- Designed and fabricated trailer-mounted test stand for pyrolysis gas burner characterization; firebrick/ceramic construction rated to 1400°C
- Engineered peripheral systems for screw conveyor biochar reactor: 800°C firebox with firebrick/stainless steel construction, dual burners, automated fuel/exhaust/flare/temp control system with cascade failsafes
- Identified tar condensation and clogging as primary failure mode; authored 6-page technical analysis evaluating 21 exhaust treatment methods across thermal, catalytic, filtration, and inertial categories

Mach Industries | Mechanical Engineering Intern Austin, TX | Dec 2023 – Jan 2024

- Designed 3 mechanical ordnance ejection systems (spring plunger, torsion spring, bungee) for high-speed UAV weapons bay where cavity flow at 100+ knots prevents gravity release; purely mechanical constraint (no pneumatic/hydraulic/pyrotechnic)
- Modeled in SolidWorks and iterated to working 3D-printed prototypes for each design; delivered formal design review with trade-off analysis recommending novel ejectable payload bay cartridge
- Designed aluminum extrusion rolling frame with rotating axis for multi-station composite layup, streamlining part handling and reducing production time; fabricated release mechanism components on waterjet

Starforge Makerspace | Co-Founder College Station, TX | Nov 2022 – Jan 2026

- Co-founded and incorporated independent nonprofit makerspace; negotiated lease, secured $30k in donations, procured fabrication equipment, and launched within one semester
- Scaled to 100–150 members and reached break-even within one year; designed two-tier governance structure (stewardship + operational boards) for long-term institutional continuity

PROJECTS

Two-Axis Solar Tracker | Electrical & Firmware Lead | Capstone, Spring 2026

- Architected electrical and firmware systems for dual-axis Fresnel lens solar concentrator for thermal materials processing; designed sun-based calibration strategy eliminating magnetometer dependency, using GPS + solar position algorithm + accelerometer tilt correction to map encoder readings to global coordinates
- Designed 6-channel quad photodiode sun sensor PCB in KiCad: K857PE → MCP609 TIA → ADS1115 16-bit ADCs with anti-alias filtering; two-stage sensing—coarse ratiometric (1 deg), fine pinhole (0.1 deg target)
- Designed 4 additional PCBs: power distribution, encoder breakouts, ESP32-CAM interface
- Built first working autonomous prototype: dual-MCU firmware (ESP32 WROOM + ESP32-CAM over UART) with closed-loop PD position control, encoder-corrected stepping, and on-camera centroid computation (18x latency reduction); automated gain tuning achieving 1.2s settling with zero overshoot

Solar + Battery + Generator Cost Optimizer | Simulation Lead | MEEN 739, Fall 2025

- Framed the central design question for hybrid microgrids: given a facility's capital-to-energy ratio, what mix of solar overbuild, battery, and gas generation minimizes delivered $/MWh
- Built deterministic 30-min dispatch simulation across a full year of NREL satellite irradiance data for arbitrary locations
- Identified three distinct cost regimes as a function of required uptime: solar-only at low utilization, solar+battery at moderate utilization, and solar+battery+generator at high utilization—where the optimizer trades marginal battery overbuild against generator fuel cost for tail reliability events
- Evaluated 3 facility types (pumping station, electrolysis plant, data center) across Chile, Texas, and Germany; microgrid undercut local grid pricing in 8 of 9 cases, with the sole exception being the highest-uptime load in the lowest-cost electricity market (Texas data centers at $101 vs $65.7/MWh grid)

TECHNICAL SKILLS

CAD/PCB: SolidWorks, KiCad | **Programming:** Python (NumPy, SciPy), Embedded C/C++, Git | **Firmware:** ESP32, PlatformIO, I2C, UART | **Testing:** UTM Operation, ASTM Standards