

XANDER SCANNELL

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Portfolio: xanderscannell.com

Summary

Action-oriented mechanical engineering student and problem solver who doesn't wait for perfect conditions to get started. Equally at home with a torque wrench or a terminal, and comfortable using AI as a power tool, not a crutch, to move from question to working solution quickly. Passionate about automotive and looking to contribute wherever the work is hardest.

Education

University of Michigan-Dearborn

Expected Spring 2027

Bachelor of Science in Mechanical Engineering

Scholarships: Destination Blue Scholarship, Michigan Achievement Scholarship

Relevant Coursework: Design and Analysis of Machine Elements, Modeling and Analysis of Dynamic Systems, Control Systems Analysis and Design, Manufacturing Processes

Engineering Experience

Dearborn Electric Racing (FSAE Electric)

Aug 2026 – Present

Mechanical Team Member, Brakes & Driver Interface

- Took ownership of a yoke-style steering wheel design in SolidWorks, balancing the team's weight and cost budgets against front-hoop clearance, driver sightlines, and thumb reach; showed an oval profile gains no hoop clearance at full lock, so shaped the wheel for dash visibility and set a 20–25 mm hub offset to balance sightlines against reach.
- Designed the wheel's attachment to the quick-release hub to meet FSAE critical-fastener and positive-locking rules (T.8.2/T.8.3), anticipating a 2027 rule change by specifying safety-wired, drilled-head socket head cap screws.
- Took ownership of a sealed digital dash enclosure (5" display, custom ESP32-S3 board) that must package behind the steering wheel; sealed it with a bonded polycarbonate lens, a Gore vent, and a single Deutsch DT penetration, and used a parametric section model to show a soldered display module cuts pod depth 22% (34 mm to 26.5 mm).
- Took the initiative to write the team's SolidWorks setup guide, used by about 10 new mechanical members.
- Volunteered to overhaul the team website, normally the business team's responsibility; set up a Discord-based change-request process so any member can request updates, and continue to maintain the site.

M-TRACE: Vehicle-Mounted Road Condition Monitor | [Devpost](#) | [GitHub](#)

Oct 2026

2nd Place Overall of 50 projects, Hack Dearborn 5 (161 participants), **built solo** vs. teams of up to 4

- Planned and delivered a complete product alone within a \$100 hardware budget, with every judged part built in the 24-hour window: hardware, firmware, data pipeline, prediction models, a dashboard, and an AI agent.
- Planned around the rule that only work done during the event is judged: beforehand, logged 179 miles over 11 drives with a barebones ESP32/IMU logger using a phone for GPS, so the 24 hours went to building.
- Designed around the customer's real constraint: under Michigan law, a road agency is presumed to know about a defect after 30 days, so the system matches readings to regional road segments, confirms each pothole across repeat passes (158 confirmed), and gives it a 30-day repair clock.
- Made the logger fully standalone by adding its own GPS and an SD card, needing WiFi only to upload (ESP32, BNO085 IMU at 100 Hz, GPS at 5 Hz); its firmware computes speed-normalized RMS vertical acceleration per 50 m of road and detects pothole impacts on-board, matching the offline analysis on all 799.
- Validated every model on held-out data against a simple baseline: roughness calibrated to Michigan's 1–10 PASER ratings estimates grades within one point on 67% of held-out road sections (vs. a 56% baseline), beating a 15-feature regression and IBM's Granite TSPulse; a gradient-boosting deterioration forecast (scikit-learn) backtested on 2020–2024 ratings flagged road miles 2.4× more likely to fall to poor condition (51% vs. 21%).
- Added an IBM watsonx agent that answers only through the system's own API, and an LLM-written weekly brief that is automatically rejected and rewritten if it cites any number not in the computed data.

Applied AI

AI-Assisted Engineering Workflow

2026 – Present

- Converted the 2026 FSAE rulebook (1,800+ rules) into a structured knowledge base for LLM-assisted compliance checks, tracing steering wheel and dash design decisions to specific rule IDs.
- Run AI coding agents as unattended build loops gated by written specs, automated self-tests, and a rule that every number in generated text must trace to computed data; anything not verifiable automatically is flagged for hands-on testing instead of being marked done.
- Built and host an MCP server for UM-Dearborn's enterprise event scheduling software, giving Claude tools to search events, find open rooms, and pull each event's setup requirements.
- Published [Claude Cortex](#), an open-source plugin for Claude Code and GitHub Copilot that gives AI assistants persistent project context, enforceable coding guidelines, and structured code reviews.

Claude Home: Self-Hosted AI Smart Display | [GitHub](#)

Oct 2026 – Present

- Building a voice assistant to replace a Google Home and Nest Hub on the Claude Agent SDK, split between a Raspberry Pi satellite (on-device wake word and speech detection, touchscreen UI) and a PC host (speech-to-text, Claude, local speech synthesis) over WebSockets.
- Connected Claude to Home Assistant through MCP for voice control of lights, climate, cameras, and media, logging every AI-initiated action for review.
- Instrumented per-stage latency and measured a 3.1 s median from end of speech to first audio over 77 real conversations against a 2 s target, tracing most of the delay to the model's first sentence.

Hands-On Automotive Experience

- **Fuel Tuning:** Retuned a 2005 Suzuki GSX-R600 after muffler removal, installing an aftermarket ECU tuner to correct air/fuel ratios across the RPM and throttle-position map, which the stock fuel injection could not adjust.
- **Powertrain Repair:** Replaced worn components on a 150,000-mile 2001 Chevrolet Corvette, including the harmonic balancer, clutch, and clutch master and slave cylinders.
- **Paint & Body Restoration:** Co-restored a 1977 Chevrolet Camaro, stripping the body to bare metal, then filling, priming, painting, and polishing it.

Leadership & Work Experience

University Unions & Events, University of Michigan-Dearborn

Dec 2023 – Present

Building Manager

- Lead the 6-person operations crew at the Renick University Center, directing room layouts, seating, and AV setups through overlapping turnovers on peak days of 16+ events.
- Entrusted by professional staff with scheduling the 6-person building manager team around class availability and a 20-hour weekly cap; developing a Python tool that generates multiple balanced schedule options.
- Carry a large share of student hiring: interview Operations candidates independently and give recommendations the supervisor weighs in final decisions; wrote a 16-question guide and evaluated 8 candidates on an 8-criterion rubric.
- Designed a half-day orientation for new Operations hires, including an AV troubleshooting drill with planted faults.
- Took the initiative to build a shift-handoff system now required for every building manager: responses log to Google Sheets, an Apps Script formats a report for the next shift, and a webhook posts a summary to team chat.
- Built a [schedule visualizer](#) that ingests exports (PDF or Excel) from the university's event scheduling software or pulls from it directly, rendering each day's events as an interactive Gantt chart with room and resource details.

Technical Skills

- **CAD:** SolidWorks, Autodesk Fusion 360
- **Analysis & Simulation:** MATLAB, Simulink, LabVIEW, PSpice
- **Fabrication:** Metal cutting, bending, drilling, and grinding; laser cutting; 3D printing
- **Electronics:** Custom PCB design, soldering, embedded sensor integration (ESP32)
- **Programming:** Python (NumPy, pandas, SciPy, Matplotlib), C++ (embedded, ESP32), Kotlin (Android), Rust, JavaScript/TypeScript
- **AI/ML:** Claude Agent SDK, LLM tool integration (MCP), scikit-learn (gradient boosting), RAG pipelines