Nicolas Vasilescu

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Education

Duke University, Pratt School of Engineering — Durham, NC
B.S.E. Electrical & Computer Engineering; B.S. Computer Science — GPA: 3.8 — *Expected May 2028*

Professional Experience

Dirac — New York, NY
Software Engineering Intern — *May 2026 – Present*
- Redesigned design-for-manufacturability engine, achieving a **25× speedup** while improving geometric accuracy.
- Engineered core engine, simulation, and control systems for a flagship robotics assembly and manufacturing platform
- Rebuilt the C++ pipeline in Rust and developed a custom computational-geometry library based on published algorithms, enabling application-specific precision and performance optimizations.
- Prototyped and benchmarked GPU and hybrid CPU–GPU execution strategies for accelerating geometry-intensive workloads.

Duke University, General Robotics Lab — Durham, NC
Robotics Researcher — *Aug. 2025 – Present*
- Designed and fabricated an **8-servo quadruped** with a matched MuJoCo/Gymnasium model, 27-dimensional observation space, and tunable gait system for sim-to-real experiments.
- Instrumented the robot with per-leg contact microphones and built calibration, multichannel acquisition, RMS analysis, and synchronized video overlays to characterize foot–ground contact.

Duke University, High Energy Physics Group — Durham, NC
Research Assistant — *Sept. 2024 – May 2025*
- Developed C++/ROOT data-processing pipelines on Linux clusters to analyze detector outputs and improve throughput for large-scale datasets.

Selected Projects

StepDrop: Accelerated Diffusion Inference | *Python, PyTorch, Diffusion Models* — *Fall 2025*
- Developed a retraining-free, importance-weighted timestep scheduler for a ∼2M-parameter CIFAR-10 U-Net, with stochastic and target-NFE samplers plus automated FID/IS benchmarking.
- Improved FID from **77.20 to 76.05** at 50 NFE; at 25 NFE, achieved FID 77.61—within **0.41 points** of DDIM-50—while halving compute from 59 to 29.5 GFLOPs and increasing throughput from 57.9 to **96.8 images/s**.

Sentinel Vision Platform | *Verilog, FPGA, Python, YOLO* — *Spring 2026*
- Designed a five-stage, 32-bit MIPS-style FPGA soft core with full forwarding, load-use hazard detection, and a custom four-register `clamp` instruction; verified ISA and system behavior in simulation.
- Integrated 115200-baud UART, checksummed packets, memory-mapped PWM, watchdog/interlock logic, and a 30 Hz Python vision pipeline on a Nexys A7-100T for closed-loop vision-guided laser tracking.

Aerys Labs: Nutrition & Performance Platform | *React Native, Node.js, PostgreSQL, AWS* — *2026 – Present*
- Architected an offline-first Expo mobile app, React analytics dashboard, Node/Express API, and AWS Aurora PostgreSQL data layer with Supabase JWT authentication and queued SQLite sync.
- Implemented AI-assisted workout and nutrition workflows using AWS Bedrock, Cohere embeddings, pgvector retrieval, and vision-based meal and nutrition-label parsing.

Engineering & Leadership

Duke Motorsports (Formula SAE) — Durham, NC
Electronics Team Lead — *2024 – Present*
- Designed and integrated a **custom steering-wheel PCB** consolidating dashboard controls, accelerator-pedal input, sensor connections, and vehicle monitoring into a serviceable interface; owned signal routing, power distribution, connector selection, and wiring-harness integration.
- Led electrical system fabrication and vehicle bring-up, building **custom wiring looms, sensor modules, motor-driver connections, and safety interlocks**; diagnosed power, continuity, and signal faults using oscilloscopes and multimeters under automotive vibration and thermal constraints.

Duke Catalyst Tech Organization — Durham, NC
Treasurer — *Aug. 2024 – Present*
- Manage budgeting and reimbursement operations for a student technology organization supporting member projects and outreach events.
- Built and deployed a Dockerized FastAPI reimbursement portal with Duke SSO, role-based approvals, receipt uploads, notification integrations, HTTPS/TLS hardening, and auditable payment tracking.

Technical Skills: Rust, C++, C, Python, Verilog, TypeScript, SQL — Linux, Git, Docker, AWS, Vivado, Fusion 360