

Karl Keshavarzi

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EDUCATION

University of Waterloo <i>Bachelor of Applied Science, Computer Engineering</i>	Waterloo, ON Sep. 2025 – Present
<ul style="list-style-type: none">• GPA: 3.9/4.0 — Term Distinction Academic Class Representative• Co-authoring official ECE 105 (Physics) course textbook with Dr. Jamie Forrest.	

EXPERIENCE

Embedded Software Developer <i>Waterloo Aerial Robotics Group — Design Team Member</i>	Sep. 2025 – Present Waterloo, ON
<ul style="list-style-type: none">• Developed SPI driver for ADC, enabling reliable 10-bit sensor 50Hz sampling for real-time control loops.• Implemented low-latency I2C driver for barometric sensors, enabling real-time altitude computation.	
Undergraduate Research Assistant <i>University of Waterloo — Integrated Quantum Optoelectronics Lab (IQOL)</i>	Jan. 2026 – Present Waterloo, ON
<ul style="list-style-type: none">• Accelerated validation cycles by designing automated tests and data collection for novel solar cell prototypes.• Contributing to peer-reviewed research on microwave optomagnetics through optical induction of superconductors.	
Founder & Technical Lead <i>KesTech Systems — Self Employed</i>	Apr. 2020 – Nov. 2025 Vancouver, BC
<ul style="list-style-type: none">• Generated \$40,000+ in revenue with 25% profit margin by building and optimizing 60+ custom PC systems.• Prevented post-delivery failure through stress-testing protocols including thermal, memory, and storage validation.	

PROJECTS

Computational Electromagnetics Solver C/C++, Python, OpenMP, Plotly, NumPy, Pandas	
<ul style="list-style-type: none">• Engineered parallelized 3D FDTD Maxwell Solver, achieving 60× speedup on 125K-cell grids using OpenMP.• Reduced RAM access latency by 35% with cache-efficient flattened storage and RAII-based memory management.• Validated numerical accuracy via 98%+ energy conservation by enforcing stability constraints and analytical tests.• Implemented binary I/O and decreased overhead by 80% for field snapshots, enabling simulation visualizations.	
N-Body Gravitational Simulator C/C++, Python, OpenMP, NumPy, Pandas, VPython	
<ul style="list-style-type: none">• Developed OpenMP parallelized physics engine for orbital mechanics, reaching 12x speedup for 1,000+ bodies.• Maintained 99.998% energy conservation over 100+ simulated years with 2nd-order Velocity Verlet integration.• Validated simulation accuracy against NASA JPL Horizons data, achieving sub-5% deviation for celestial bodies.• Built a real-time 3D visualization pipeline with VPython, rendering interactive trajectories at 60+ FPS.	
Electromagnetic Propulsion System C/C++, Python, Arduino	
<ul style="list-style-type: none">• Designed 3-stage propulsion system with 200+ turn 16AWG coils via 200V/9,400µF (200J) capacitor bank.• Developing microcontroller-based gate timing to sequence stages and manage 180 A+ inrush currents.• Prototyping custom Altium PCB design to optimize multi-stage timing and achieve 100+ km/h terminal velocity.	
ExoDiscover Python, Flask, React, Three.js, HTML/CSS	
<ul style="list-style-type: none">• Built a full-stack web platform to identify and visualize potential exoplanets using machine-learning models.• Delivered dynamic React/Three.js interface rendering 3D data visuals of 20,000+ exoplanets at 60FPS.• Presented the final system to judges and placed top 4 overall (150 participants) within a 48-hour competition.	

TECHNICAL SKILLS

Languages: C/C++, Python, Java, JavaScript, HTML/CSS, LaTeX, Verilog

Frameworks/Libraries: OpenMP, NumPy, Pandas, Plotly, VPython, React, Flask, Three.js

Tools: Linux, Git, VS Code, Bash, Altium, Oscilloscopes, Logic Analyzers, COMSOL, Multimeters

Embedded: SPI, I2C, CAN, UART, Arduino, STM32CubeIDE