

# Joseph Demarest

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## Skills

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**Languages:** Python, C/C++, SQL (MySQL), JavaScript, HTML/CSS

**Frameworks:** Qt, PyQt, React, Node.js, Flask, Express

**Libraries:** Matplotlib, NumPy, SciPy, Pandas, PyQtgraph, Plotly, OpenCV

**Developer Tools:** Git, Docker, VS Code, Visual Studio, Eclipse, OpenRouter, Proxmox, Kubernetes

**Operating Systems:** Windows, Linux (Debian, Arch, CentOS), macOS, FreeBSD

**Other Software:** SolidWorks, FreeCAD, Blender, KiCad

## Experience

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**Junior Software & Electronics Engineer**, Vyir Inc – New York, NY Dec 2022 – Dec 2024

- Architected a Python-based full-stack application for optical R&D experiments, integrating live-view data visualization (Matplotlib, OpenCV) and statistical analysis (NumPy, Pandas), reducing manual analysis time from 3 hours to <5 minutes per experiment.
- Designed and deployed 10+ custom PCBs with embedded C++ firmware (Arduino, ESP32), enabling real-time sensor data acquisition and eliminating \$150K+ annual outsourcing costs for prototyping.
- Engineered a beam-profiling system with multi-camera compatibility, automated sample measurement, and cloud-synced PostgreSQL databases, accelerating R&D sample throughput by 100x and enabling traceability for 10,000+ experiments.
- Designed a unified experiment configuration system that standardized metadata schemas, experiment and sample parameters across 10+ optical test benches, reducing manual data entry errors by 90% and ensuring consistency for 500+ weekly experiments.

**Undergraduate Teaching Assistant**, CUNY – New York, NY Sep 2022– Dec 2022

- Graded 200+ Python programming assignments/exams for introductory CS course, providing detailed feedback to improve student code quality.
- Hosted weekly office hours and moderated class forums, resolving 95% of student queries on algorithms and debugging.

**Computer Science Tutor**, CUNY – New York, NY Sep 2021 – July 2022

- Mentored 30+ students in core CS topics (OOP, data structures) via 1:1 sessions, boosting average grades by ~1.5 letter points.
- Designed tailored Python/Java practice exercises to address knowledge gaps, reducing recurring errors by 60%.

## Projects

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**Sports Alert Engine** | Python, Flask, React, APIs | 2024

- Built a rules-based notification app where users define custom game triggers (e.g., “Alert if Lakers lead by  $\leq 3$  points in last 5 minutes”).
- Designed a natural-language parser to convert user phrases like “WHEN [team] [condition] [metric]” into Python logic with eval() and regex.
- Integrated ESPN API for live scores and sent SMS/email alerts via Twilio, handling 50+ concurrent users during NBA playoffs.
- Added a React frontend with dropdowns for teams/players to simplify rule creation for non-technical users..

**Low-Cost Wireless Imaging System** | C++, OpenCV, React, 3D Printing | 2023

- Developed custom cameras with custom ESP32-based C++ firmware and a Python/React streaming app, cutting hardware costs by 65% vs. commercial solutions.
- Integrated OpenCV for live image analysis and CAD-designed enclosures, enabling remote control via REST APIs over Wi-Fi/Bluetooth.

**Open-Source Based Mechanical Keyboard** | KiCad, QMK, 3D Printing | 2022

- Engineered a programmable keyboard with a custom PCB (KiCad) and QMK firmware.

## Education

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**College of Staten Island**– BS in Computer Science Dec 2023