Luke Salinero

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Education

Carnegie Mellon University Pittsburgh, PA
B.S. Experimental Physics, Minor in Artificial Intelligence — GPA: 3.76/4.00 *Aug. 2021 – May 2025*

- Relevant Coursework: Principles of Imperative Computing, Fundamentals of Programming, Artificial Intelligence: Representation & Problem Solving, Introduction to Deep Learning, Advanced Computational Physics

Experience

Hunt Labs, Carnegie Mellon University Pittsburgh, PA
Research Assistant *May 2023 – May 2025*

- Wrote Python data-acquisition software that logs pressure and temperature from a liquid-nitrogen monitoring rig used in the lab's low-temperature experiments.
- Designed and built a 2D cryogenic actuator operating below 3 K, so samples could be angled in situ to vary the magnetic flux through them.
- Designed and assembled PCB-based RF and microwave filters to suppress high-frequency noise on dilution refrigerator measurement lines.

Projects

Scene-Context — Memory-Backed LLM Pipeline | *Python, FastAPI, JavaScript* May 2026 – Present

- Implemented a multi-stage LLM pipeline with long-term memory that annotates every utterance in full-length prose against stored entity and relationship state, not local context.
- Instrumented every model call with raw output, prompt version, and validation failures, making regressions and unexpected model behavior reproducible.
- Cut LLM cost roughly 10x by building memory in tiers instead of re-reading history per utterance, and measured with an ablation harness whether that memory changes the model's output.

SGEN — Distributed Compute Platform | *Python, FastAPI, PostgreSQL, Keycloak* Dec. 2025 – Apr. 2026

- Built a six-service platform, with one other engineer, running customers' parameterized searches: C(n,k) bitstring enumeration in one parallel GPU pass instead of a sequential CPU sweep.
- Queued multi-minute GPU jobs in Postgres instead of Redis or Celery, so no request holds a connection while work runs.
- Owned authentication and entitlements across all six services: Keycloak (OIDC) API keys exchanged for short-lived JWTs, cached by the Python SDK until expiry and checked at the FastAPI gateway.

Hum to Search — Melody Search Engine | *Python, PyTorch, SQLite, pytest* Jun. 2026 – Present

- Wrote a query-by-humming search engine that matches relative pitch so wrong-key queries still resolve, and raised tempo tolerance from 7 to 14 of 15 sampled speeds.
- Traced low-confidence candidates surviving ranking to the retrieval floor and corrected its acceptance logic.
- Trained a ResNet-18 retrieval encoder with NT-Xent contrastive loss on humming synthesized from MIDI.

Technical Skills

Languages: Python, JavaScript, TypeScript, SQL, C
Backend: FastAPI, PostgreSQL, REST APIs, JWT/OAuth (OIDC), Keycloak
AI / ML: PyTorch, LoRA fine-tuning, Hugging Face, LLM evaluation
Numerical: NumPy, SciPy, librosa, OpenMP, OpenACC
Tools: Git, Docker, pytest, React, Cloudflare