Charles Hale

New York, NY
charles@charleshale.com
charleshale.com · github.com/ch4542

EDUCATION

Trevor Day School · New York, NY — Class of 2027

Coursework: Advanced Statistics, Calculus, Advanced Chemistry

PROJECTS

AYNIB · Cofounder, with Peyton Satsky — Aug 2025 – present

- Building, with Peyton Satsky, a spiking neural network in C++23 (about 13,000 lines, 150+ commits) where every neuron is identical and learns with five local rules, without backpropagation.
- Designed two-compartment neurons (basal feedforward, apical feedback) whose inhibitory plasticity produces predictive coding without computing it explicitly.
- Proposed the PE → PRP bridge, which couples prediction error to synaptic consolidation as an intrinsic reward signal.
- Ran 1,200+ parameter-sweep experiments on MNIST and cats vs. dogs, with held-out test sets.

MTG Arena learning bot · Builder — Sep 2026 – present

- Built a bot that plays Magic: The Gathering Arena from the game log and screen; 2,678 real games and 102 versions in six weeks, 169–15 against Arena's built-in AI.
- Wrote a Python rules engine and simulator (249 cards from rules text) that runs the live bot's code and matched 5,125 of 5,125 real decisions; 500,000+ simulated games.
- Trained a decision-tree judge on rollout labels (+4.1 points simulated) and tuned decks with paired simulation and sequential live tests (+7 wins per 100 expected).

ReVyval · Builder — Spring 2026 – present

- Self-hosted computer agent: a vision model reads browser screenshots and acts through the operating system, running on a Mac mini and an HP Z840.
- Built a screenshot benchmark for open vision models; a coordinate-units fix took one model from 0% to 18%, and one grounding model plus a zoom tool (36.7%) beat a split reasoner/grounder (15%).
- Graded 2,387 agent steps across 92 tasks against screenshots and built a 246-example training set with a held-out split.

Stale Orders · Independent research — Feb 2026

- Wrote an async collector that captured 184,000 Kalshi order-book snapshots over five days, polling every 30 s near expiry.
- Found wrong-side bids persisting to expiry, including 381 in tennis markets within 30 s of close.

Steal A Car · Game designer and developer — Nov 2026

- Designed and shipped a driving game on Roblox, written in Luau.

ACTIVITIES

Varsity indoor track · Trevor Day School — 2025

NYCAL champions, boys varsity indoor track (2025)

SKILLS

Languages	C++23, Python, JavaScript, Luau
Tools	CMake, Docker, Linux, Git
Machine learning	Spiking networks, local learning rules, vision-language models, benchmarks and evaluation
Neuroscience	STDP, dendritic computation, predictive coding, homeostasis