

Nathaniel Shawe

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PROJECTS

NNLearner - Python, NumPy, FastAPI, React.js

- Built a full-stack machine learning platform that lets users design, train, and evaluate **neural networks** from first principles, paired with **original technical documentation** explaining the underlying math.
- Implemented a custom neural network engine in **pure NumPy** (no ML libraries), including forward propagation, backpropagation, and **gradient-based optimization**.
- Supports 8+ configurable training parameters, including activations, loss functions, optimizers, initialization strategies, dropout, batch sizing, and LR scheduling.
- Designed a **FastAPI backend** to manage configurable training pipelines and model evaluation.
- Developed a **React frontend** for interactive configuration and post-training visualizations (loss and accuracy).

OmniSec (In Progress) | Python, SQL, FastAPI, NetworkX, PySide6

- Building a **modular, event-driven** cyber conflict simulator modeling red-team vs blue-team behavior across realistic networked infrastructure.
 - Implemented a core pub/sub EventBus architecture to **decouple** actions, alerts, and system state updates.
 - Designed a TimeManager using a min-heap (heapq) capable of scheduling and processing **1,000+ asynchronous events per simulation minute**.
 - Built the core network topology using **NetworkX graph structures** to model assets, edges, and vulnerabilities with rich metadata.
 - Enabled efficient infrastructure analysis with **$O(\log N)$** complexity for critical operations such as event scheduling, path traversal, and neighborhood analysis.
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SKILLS

Languages: Python, JavaScript

Frameworks & Tools: FastAPI, React, Git, NetworkX

Core Skills: Full-Stack Development, API Design, Event-Driven Architecture, System Architecture, Automation

Additional: Prompt Engineering, Technical Documentation

EDUCATION

University of Wisconsin–Madison, Madison, WI

Bachelor of Science, *Major in Computer Science*

Bachelor of Science, *Major in Data Science*

Expected May 2029

CERTIFICATIONS

SoloLearn - Python Developer Certification