Charles Chow

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SUMMARY

Machine learning engineer focused on computer vision, real-time inference, and ML systems. Built YOLOv8 vision pipelines, CUDA-accelerated preprocessing, fraud detection models, reinforcement learning environments, and telemetry systems with measurable gains in latency, throughput, and model quality.

SKILLS

Languages	Python, C++, SQL, Go, TypeScript, JavaScript
Machine Learning	PyTorch, TensorFlow, scikit-learn, imbalanced-learn, Stable-Baselines3, Gymnasium
Computer Vision	OpenCV, YOLOv8, perspective transforms, RANSAC, real-time video processing
Acceleration / Data	CUDA, Numba CUDA, cuML, NumPy, Pandas, Jupyter
ML Systems / Backend	PostgreSQL, Redis, REST APIs, WebSockets, Docker, AWS, Linux, Git
Visualization	Streamlit, Plotly, Matplotlib, Socket.IO

RELEVANT EXPERIENCE

Software Engineer Intern, NeuroLeap 05/2025 – 12/2025

- Built a real-time sensor telemetry pipeline with Node.js, WebSockets, and PostgreSQL to ingest 1.2M records/hour across 8 channels, enabling ML/data teams to analyze 500+ hours of time-series test data.
- Designed embedded C firmware on Nordic nRF52840 for 20 Hz multi-channel BLE streaming, producing structured sensor data for validation, algorithm development, and QA workflows across 5+ engineers.
- Collaborated with hardware and ML teams to define sensor payload formats, review data quality issues, and create integration guides that reduced onboarding time by 40%.
- Reduced PostgreSQL p95 query latency from 420 ms to 110 ms and improved ingestion throughput 2.8x through indexing, query planning, and connection management.

Software Engineer Intern, Infinite Option 05/2024 – 08/2024

- Reduced recurring production incidents by 32% and lowered MTTR from 45 to 18 minutes by standardizing Joi validation middleware across API endpoints.
- Implemented RBAC, JWT authentication, refresh token rotation, and Redis-backed session invalidation for a Node.js API supporting 2K daily logins.

SELECT PROJECTS

Traffic Monitoring System — Python, OpenCV, YOLOv8, CUDA, NumPy

- Built a real-time edge vision pipeline for vehicle detection, lane tracking, perspective warping, FPS overlays, and processed video output.
- Implemented lane detection using bird's-eye transforms, color masking, sliding-window search, RANSAC curve fitting, and temporal smoothing.
- Accelerated 1080p lane preprocessing with Numba CUDA, reducing latency from 27.9 ms to 10.4 ms and increasing throughput from 35.8 FPS to 96.5 FPS.

Credit Card Fraud Detection — Python, XGBoost, scikit-learn, cuML, SMOTE, Streamlit

- Built a fraud detection pipeline for 284,807 transactions with a 0.17% fraud rate, comparing 16 model and class-imbalance strategy combinations using leakage-safe evaluation.
- Trained an XGBoost classifier with SMOTE-based resampling, reaching 0.879 PR-AUC, 0.985 ROC-AUC, and 0.89 F1 on a held-out test set.
- Detected 85 fraud cases with 22 false positives and built a Streamlit app to compare fraud probabilities, saved models, and feature importance in real time.

Reinforcement Learning Robot Navigation Simulator — Python, Stable-Baselines3, Gymnasium, Node.js

- Built a 2D robot navigation environment with obstacle sensors, hazard flags, reward shaping, recurrent PPO training, and multi-seed robustness evaluation.
- Streamed rewards, success rates, collision rates, and trajectories from Python training callbacks to an Express/Socket.IO dashboard.
- Achieved 96.94% deterministic success, 1.55% collision rate overall, and 95.64% success with 30 obstacles.

EDUCATION

Purdue University | M.S. Electrical and Computer Engineering — In Progress

Northeastern University | M.S. Computer Science — May 2026

The Ohio State University | B.S. Mechanical Engineering — Dec 2020