Asadbek Xodjayev

Tashkent, Uzbekistan · asadbekxodjayev@webster.edu · +998 99 487 8460
github.com/asadbekXodjayev · xodjayev.uz · linkedin.com/in/asadbek-xodjayev

Research Interests

Memorization versus generalization in small language models; evaluation methodology for mathematical reasoning; efficient training of language models under tight compute budgets.

Education

Webster University, St. Louis, Missouri, USA (HLC-accredited) 2023 – May 2027 (expected)
B.S. in Computer Science and B.A. in Economics (dual degree). Tashkent campus; all instruction and assessment in English.

- Cumulative GPA 3.51 / 4.00 (100 credits); Computer Science courses 3.62 / 4.00.
- Relevant coursework: Data Structures I and II; Principles of Programming Languages; Computer Architecture; Operating Systems; Computer and Information Security; Discrete Mathematics; Mathematics for Computer Science; Statistics; Database Concepts (in progress); Calculus I (Spring 2027).

Research Experience

MathGen: memorization versus generalization in a transformer trained from scratch 2026 – present
Independent research project

- Implemented and trained from random initialization a 34M-parameter decoder-only transformer (8 layers, $d = 512$; pre-norm RMSNorm, rotary position embeddings, SwiGLU, tied embeddings) with a hand-written BPE tokenizer, on synthetic mathematics from 23 problem generators (arithmetic, equations, 2×2 matrices, derivatives, integrals, limits), on a single 4 GB laptop GPU.
- Wrote an independent symbolic verifier that re-derives each answer from the question text, so model outputs are graded without trusting the model or the generator.
- Audited my own results: 48.8% of validation samples were exact copies of training samples, so the reported ~80% accuracy measured memorization rather than generalization; an apparent tokenizer improvement was within noise ($p = 0.53$).
- In progress: a pre-registered controlled follow-up at ~5M parameters with hash-based splits, held-out value blocks, out-of-distribution operands, and tokenizer and architecture ablations. Pilot (5 seeds): 92.0% on unseen in-range problems but 0.3% with one-digit-longer operands. Code: github.com/asadbekXodjayev/math-v.

Open-Source Contributions (merged)

NVIDIA Megatron-LM — PR #5445 Jul 2026
Fixed infinite recursion in the abstract tokenizer's special-token-ID property aliases, in NVIDIA's framework for training large transformer models.

NVIDIA SkillSpector — PR #166, PR #167 Jun 2026
Added two detections to a security scanner for AI-agent skills: reflective `exec` calls through `getattr()` literals in the behavioral AST analysis, and hidden instructions encoded in Unicode Tag-block characters ("ASCII smuggling").

Selected Projects

- **Chess engine** (code): alpha-beta search with iterative deepening, a transposition table and quiescence search, served through FastAPI to a React interface.
- **Handwritten-digit recognizer** (code): convolutional network trained on MNIST in PyTorch, served through FastAPI to a React drawing canvas.
- **Dijkstra shortest-path visualizers** (C++/CLI, C#/.NET 8, Python): the same algorithm implemented in three languages, including a binary-heap priority queue.

- **Production logistics platforms** (sarbon.me, centraltrademarket.com): frontend development of freight dispatch web platforms in React and TypeScript.

Teaching Experience

Instructor, IT-Academy, Tashkent — Mar 2023 – Aug 2025

- Taught HTML, CSS, JavaScript and React fundamentals; designed curricula and hands-on coding exercises.
- Mentored junior developers through weekly code reviews and wrote onboarding documentation.

Professional Experience

IT Manager Assistant, InterContinental Tashkent — 2026

- Supported staff and guests with IT issues, and kept the hotel network and guest Wi-Fi running.
- Worked with the property-management (PMS) and point-of-sale systems; set up and maintained computers, printers and other devices.

Frontend Developer (part-time and contract), Tashkent — 2025 – 2026
Faraday; Bepro; Intersoft Tech; IT Genious

- Built and maintained React and TypeScript interfaces for business and logistics web applications in team settings.
- Built a reusable component library, integrated REST APIs, and migrated three legacy projects to the Vite build system.

Skills

Machine learning	PyTorch; implementing and training transformers from scratch (tokenization, AdamW, learning-rate schedules, mixed precision); scikit-learn
Programming	Python, C++, C#, TypeScript / JavaScript
Tools	Git, Linux, FastAPI, React
Languages	Uzbek (native); Russian (B2); English (degree taught and assessed entirely in English)