Alexander Skula

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Education

Massachusetts Institute of Technology (MIT) Cambridge, MA

Bachelor of Science in Computer Science, Mathematics, GPA: 5.0/5.0 *Expected May 2027*

- **Relevant Coursework:** Algorithms & Data Structures, Linear Algebra, Probability & Statistics, Differential Equations, Multivariable Calculus

Experience

IBM Cambridge, MA

Machine Learning Engineering Intern *Sept 2025 – Present*

- Architected UI/UX developer tools for Mellea, an open-source Python Machine Learning framework supporting 50+ enterprise applications, streamlining code generation workflows through integrated visualization dashboards
- Engineered secure code execution infrastructure using llm-sandbox with Docker containerization, implementing automated verification pipelines that validate LLM-generated code in isolated environments with resource limits and network isolation

Mantis AI, MIT Computer Science & Artificial Intelligence Lab (CSAIL) Cambridge, MA

Platform Technical Lead, Software Engineer *May 2025 – Present*

- Lead technical architecture for 12-person team building production-scale cognitive cartography platform with real-time visualization of high-dimensional embeddings, architecting distributed data pipelines processing 10M+ embeddings daily
- Rebuilt frontend rendering engine using TypeScript, React, and WebGL with custom object pooling and streaming algorithms, reducing memory consumption by 92% for large-scale embedding landscapes (100K+ nodes) while maintaining 60 FPS

Research

Independent Research New Haven, CT

Computational Number Theory & Graph Theory (Under Review) *Jan 2024 – Aug 2025*

- Authored computational number theory paper classifying 2-near perfect numbers into six proven cases; engineered high-performance C++ algorithm using optimized Sieve of Eratosthenes with parallelization, reducing search space by 99.4% and verifying results for integers up to 10^{12}
- Developed scalable graph analysis algorithm in Python processing 1.2M+ configurations with 95% reduction in redundant calculations through dynamic programming, proving novel results for PSPACE-complete complexity class

Projects

wBlock | *Swift, SwiftUI* | GitHub

- Engineered Safari content blocker supporting 750,000+ filter rules by implementing custom Safari Content Blocker API optimizations and rule compilation pipeline, achieving 80-95% memory reduction compared to JavaScript-based alternatives like uBlock Origin
- Architected element zapper and userscript injection system enabling one-click permanent content removal and custom feature injection, leveraging Safari App/Web Extensions frameworks with per-site whitelisting and advanced logging
- Achieved 30k+ downloads from App Store in first month with 100% 5-star App Store ratings

HandMaestro | *JavaScript, TensorFlow, MediaPipe*

- Built real-time ASL recognition system achieving 89% classification accuracy across 26 letters with sub-50ms inference latency, implementing Computer Vision pipeline processing 30 FPS video streams with custom CNN architecture

Technical Skills

Languages: Python, C++, Java, JavaScript/TypeScript, Swift, SQL, R, MATLAB, Rust, Bash

ML/AI & Quantitative: TensorFlow, PyTorch, NumPy, pandas, scikit-learn, Deep Learning, NLP, Computer Vision, Statistical Modeling, Time Series Analysis, Monte Carlo Methods, Stochastic Calculus, Financial Modeling, Backtesting, Algorithmic Trading

Tools & Frameworks: React, Node.js, Django, SwiftUI, Docker, Kubernetes, Git, AWS, GCP, PostgreSQL, MongoDB