Alexander Lavrenenko

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Education

University of Massachusetts Amherst – Bachelor of Science in Computer Science   September 2021 - December 2024
    GPA: 3.8 / 4.0

Skills

Languages:	**Python, C++,** Java, Kotlin, JavaScript, **SQL**
Frameworks:	**PyTorch, TensorFlow,** NumPy, **SciPy,** Flask, **CUDA,** PyCUDA, **OpenCV,** Android SDK
Tools:	**Git,** Azure Functions, **Docker,** Linux
Other:	**GPU Acceleration,** Multithreading, **ML,** Deep Learning, RL, NLP, Ray Tracing, Agile, UI Design

Experience

Portal XR – Co-founder and Lead Software Engineer   May 2022 – Present
- Created **XR** glasses with 5x size reduction over existing designs, significantly expanding the field of view
- Built high-performance optimization frameworks using **GPU acceleration, CUDA,** and robust code structures
- Ran real-time ray tracing with **PyCUDA, OpenCV,** and custom algorithms to overcome geometric complexities
- Employed **NumPy** and **SciPy** (e.g., **SLSQP**) routines to optimize critical ray paths and refine optical hardware configurations
- Deployed deep reinforcement learning (**SAC**) with **Gym** to automate optical component selection and alignment processes
- Used Pytest and GTest to catch, diagnose, and fix over 30 major bugs across optimization pipelines

Microsoft – Software Engineer Intern   January 2022 - February 2022
- Integrated speech recognition, **NLP,** and **TTS** through RESTful endpoints and **WebSocket streaming protocols**
- Improved user engagement by 40% by implementing cloud storage and third-party API integrations using Python
- Used **Python** and **JavaScript** to develop **full-stack** code to support media and file uploading

Projects

Selfie Segmentation Library   GitHub, JitPack
Tech Stack: Java, OpenCV, Mediapipe, Android, Bazel
- Published an **Android library** on JitPack, enabling real-time **selfie segmentation** for mobile users
- Optimized **Mediapipe kernels** with **GPU acceleration,** boosting segmentation speeds by 6x under various conditions
- Implemented flexible background replacement (image, video, color) with minimal overhead and high accuracy
- Documented straightforward Gradle setup and usage instructions, facilitating quick developer adoption
- Incorporated robust **error handling** and logging to ensure smooth runtime performance and overall stability

SkinSafe   GitHub
Tech Stack: Java, Python, TensorFlow, Android Studio
- Built a **CNN**-driven skin disease detection app, surpassing **1,000+ downloads** on the Google Play Store
- Trained a custom **TensorFlow** model to classify six common skin diseases with over 90% accuracy
- Utilized Room database to store user data locally, enabling swift retrieval of key health statistics
- Developed a **dynamic UI** following **Material Design** principles, enhancing user engagement and clarity
- Introduced advanced **analytics** to track skin health trends, offering personalized feedback for each user

3D Browser Engine   GitHub
Tech Stack: JavaScript, WebGL, GLSL, HTML, CSS
- Developed a **WebGL**-based 3D engine powered by **GLSL shaders** for dynamic scene rendering in real time
- Leveraged distance functions to handle planes, spheres, and fractals with precise geometric calculations
- Implemented user **camera controls** for seamless **navigation** across 3D space
- Optimized **shader performance** by over 40% with advanced lighting and shading, achieving consistent frame rates
- Enabled configurable material properties (mirror, glass, matte) for realistic and interactive visuals

Research

Improving Recommendation System Serendipity Through Lexicase Selection   ArXiv
- Reduced homophily in **recommendation engines** by proposing a new advanced serendipity metric to detect echo chambers
- Utilized **lexicase selection** to boost diversity in recommendation lists while preserving hit-rate accuracy
- Designed methodology based on **cluster analysis** to validate improvement in personalization and coverage
- Secured **1st place** in **UofT AI ProjectX** 2022, winning a $40,000 prize pool