

# Kelan Liu

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## Work Experience

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### ClassLink

Jan 2024 – Present

#### Software Engineer

- Architected and implemented a serverless translation management system supporting localization across multiple product front ends; delivered a department-wide presentation on problem context, architecture, and system design (**Python, TypeScript, AWS Lambda, S3**)
- Collaborated **cross-functionally** with the Authentication team to deliver features for Microsoft Entra and Google Directory integrations, contributing directly to adjacent team codebases
- Wrote performant Python code running on **AWS Lambda** to support internal pull-request pipelines and event-driven automation workflows
- Optimized critical **SQL** queries, reducing database query costs by up to **68% (MySQL, Redis)**
- Maintained and developed backend APIs for existing and new products using **Node.js** and **TypeScript**, deployed on **Amazon EC2**
- Built a resilient request library with retry logic and exponential backoff, reducing socket hangups and server-side errors
- Identified and patched a privilege-escalation vulnerability caused by misconfigured **AWS SES IAM** permissions

### Waymo, Google

Sept 2021 – Jan 2022

#### Software Engineer, Machine Learning, Research Intern

- Contributed to a real-time autonomous driving simulation platform through kinematics modeling and cloud visualization integration (**C++, Python**)
- Partnered with Simulation and UI teams to refine scenario realism and optimize user interaction workflows, improving fidelity across kinematics modeling, visualization, and driving UI
- Built an operator-facing driving UI and a **data collection pipeline** for simulation workflows (**Angular, RxJS, TypeScript, gRPC/Protobuf**)
- Optimized end-to-end latency to **under 200ms** by implementing **D3.js**-based visualization tools for monitoring rendering and mapping plugin performance
- Significantly improved intern permission pitfalls, implementing intern-friendly scripts for existing software infrastructure

### Intuidex

May 2021 – Aug 2021

#### Software Engineer Intern

- Ported and optimized video-processing and **ML** algorithms for embedded **GPU** systems using **CUDA, Docker, and Python**
- Implemented and optimized real-time motion detection algorithms supporting a **YOLO**-based license plate detection pipeline (**OpenCV**)
- Reduced object detection and classification training runtime by **4 minutes** on a large training dataset of thousands of vehicles

## Projects

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### Instant Object Tracking | Python, React, Flask, PyTorch, OpenCV

- Developed a web app and API to process and analyze video input, providing a processed video output with bounding boxes, classifications, and class probabilities over HTTP, using **Flask** in the back-end and **React** in the front-end
- Utilized **YOLOv5** and **SORT** algorithms for real-time object tracking and detection, significantly enhancing the efficiency and accuracy of video analysis (**PyTorch, OpenCV**)
- Implemented **multithreading** and job queueing for parallel video processing, to effectively handle multiple requests

### GramIt (AWS Game Builder Challenge) | AWS Serverless, React Native, XState, TypeScript, Python

- Developed GramIt, an online multiplayer game combining social interaction and creative image selection (**React Native, AWS**)
- Backend built with **AWS Step Functions, Lambda, and API Gateway WebSockets** for real-time game state management
- Integrated **XState** for frontend state management, aligning it with AWS Step Functions to ensure seamless game flow
- Deployed the game on **AWS Amplify** and utilized **Amazon Q** for optimizing Step Function orchestration, enhancing system efficiency

## Education

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### University of Texas at Austin

Master of Science in Computer Science, Concentration in Machine Learning & Artificial Intelligence

### Lehigh University

Bachelor of Science in Computer Science, Minor in Japanese Language and Literature

Coursework: Data Structures, Software Engineering, Algorithms, AI, Databases, Systems, Computer Architecture, System Design, OS

## Technical Skills

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**Languages:** Python, TypeScript/JavaScript, SQL, HTML, CSS

**Tools:** Docker, DevOps, Git, Jira, REST, GCP, AWS, PostgreSQL, MySQL, Redis, gRPC, Protobuf, Linux, Postman

**Frameworks/Libraries:** React, Angular, Flask, Node, RxJS, D3.js, NumPy, Pandas, Matplotlib, Django, PyTorch, OpenCV, SK-learn

**Certifications:** AWS Certified Developer