# Bowen Luo

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## Education

- **University of Chicago** — Chicago, Illinois
  *Master of Science in Computer Science — Data Analytics Specialization* — *Sept 2023 - Dec 2024*
- **University of Waterloo** — Waterloo, Canada
  *Bachelor of Computer Science — Combinatorics & Optimization Minor* — *Sept 2018 - June 2023*

## Skills Summary

- **Tech Stack**: Python, Java, C/C++, React, Angular, Django, SQL, C#, Go, CUDA, Flask, MPI
- **Environments**: AWS, Docker, Kubernetes, HDFS, PostgreSQL, MySQL, GIT
- **Interests**: ML, Graphics, Big Data, HPC, Distributed, Cloud, Networks, Optimization, DBs

## Experience

- **Roe.AI — Software Engineer** — Remote, San Mateo
  *Python, Next.JS, Django, SQL* — *Sept - Dec 2024*
  - **Designed and implemented an agent versioning service**, enabling performance evaluation, configuration state management, and filtering across jobs.
  - Collaborated on the deployment and **full-stack overhaul of the pricing model** (Stripe integration) to align with new marketing strategies and objectives.
  - Performed ongoing feature development, managed release deployments, and handled on-call bug fixes and system maintenance.
- **ZS Associates — Software Engineer** — Chicago, IL
  *ZAIDYN platform — Python, Angular, SQL* — *June - Aug 2024*
  - Researched and prototyped a dashboard using a variety of generative AI models on AWS (Lambda, Bedrock) for **improved zero-shot cross-context text summarization**.
  - Built Angular webpages and pipelines for Pharma data visualization and analysis, **boosting retention and product appeal for new Fortune 500 clients**.
  - Built big-data streaming and distributed computing pipeline on AWS (Kinesis, EMR, Hadoop) with CloudFormation templating for **improved client data ETL**.
- **Arista Networks — Software Engineer** — Vancouver, Canada
  *ALE team — C++, Python* — *Sept - Dec 2022*
  - Developed network switch CLI commands to asynchronously query information on routes in the forwarding tables across VRF instances, **improving routing telemetry data**.
  - **Prototyped efficiencies to adjacency trimming** by consolidating optimizations done on routing tables during next-hop creation and interface-down adjacency review.
  - Built features detecting tight-loops in tasks of ASIC platform agents at runtime.
- **Oracle — Software Developer** — Remote, Canada
  *Netsuite platform — Java, SQL* — *Jan - Apr 2022 & May - Aug 2021*
  - Architected and developed objects and services for a new data storage and manipulation pipeline (UMD), collaborating on the **comprehensive rewrite of the Oracle NetSuite platform**.
  - Built full-stack React/Preact webpages and data pipeline services, researching and implementing UMD record querying for request validation; supporting **continuous feature development of client requests**.
  - Implemented scheduled SQL tasks and contributed to a web-based frontend (UIF, JavaScript).
- **Martello Technologies — Software Developer** — Remote, Canada
  *C#, Elastic Stack* — *Sept - Dec 2020*
  - Upgraded the data consolidation platform backend (ELK, Akka.NET), migrating between major versions of Elasticsearch and **creating new data visualization options**.
- **VirtaMove — Software Developer** — Remote, Canada
  *C++, VirtualBox* — *Jan - Apr 2020*
  - Developed a feature to detect the memory-mapped compiled bitness of Windows binaries, **improving app migration success rates** across Windows OS of varying architectures.
  - **Developed a native file and registry rehosting service** migrating between matching OS, working with kernel interfacing Windows API to query services, registries, and binaries.
- **AMGiNE — Junior Developer** — Toronto, Canada
  *C#, Python* — *May - Aug 2019*
  - Researched and prototyped improvements (GRU, ELMo word embedding, attention layers) to a bidirectional NLP ML model (Keras, Tensorflow), **improving sentiment analysis of emails**.
  - Wrote a custom JSON parser and email tokenizer **enabling training data transfer/generation**.
  - Generated C# classes (T4 text templates) for dynamic JSON parsing.

## Projects

- **Raytracers**
  *C++, Go*
  - **Photorealistic raytracer**: supersampled anti-aliasing, mirror/glossy reflection and refraction, soft shadows, texture and bump mapping, and Phong illumination.
  - **Parallelized raytracer**: BSP parallelism for raytracing, Phong illumination and Gaussian denoising, implemented with a CV-based barrier and lock-free DEQueue for work-stealing between threads.
- **Video Frame Extraction App**
  *Python, Angular, Flask*
  - Prompt-based frame extraction from videos using Hugging Face and OCR algorithms with UI.
  - Conventional approach with BLIP and GPT2 models for image captioning. Sentence embeddings and cosine similarity for prompt matching.
  - CLIP model for contrastive approach with combined frame and prompt embeddings.
- **Machine Learning Models**
  *Python, Java*
  - Semi-supervised image classification model on MNIST using K-means and KNN for cluster labeling.
  - Perceptron-based neural networks demonstrating evolutionary and back-prop algorithms.
- **Autochess Data Analysis**
  *Python*
  - Data analysis on the Teamfight Tactics auto-battler (RiotAPI, Pandas, FastAPI) to extract relevant gameplay trends and strategies from matches between current top players.
- **Connect**
  *Hack the North 2019 — Java, Android Studio*
  - Service to send/receive NDEF messages using near-field communication. Prototyped sending images and PDFs as URI.

## Clubs

- **WATonomous** University of Waterloo
  *Path Planning Subteam* *2019*
  - Collaborated on and maintained the path-finding and path-correction PID algorithm (Matlab) for the autonomous vehicle.

## Relevant Coursework

- **University of Chicago**
  - **MPCS 53111 ML**: PCA & SVD. Clustering. Bayes. Boosting.
  - **MPCS 53113 NLP**: Embeddings. RNNs & LSTMs. Attention & transformers.
  - **MPCS 53113 GenAI**: GANs. Fine-tuning. Graph & vector RAGs
- **University of Waterloo**
  - **CS488 Computer Graphics**: OpenGL. Raytracing & rasterization. Scene object hierarchy.
  - **CS480 Machine Learning**: SVMs & regression. Convolution. GANs.
  - **CS486 Artificial Intelligence**: DTs. RL. States & Markov Chains.
  - **CS484 Computer Vision**: Panorama. Epipolar geometry & stereo. Viterbi & semantic segmentation.