

BILL ZHANG

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INTERNSHIP EXPERIENCE

Queen's University

Jan - June 2025

Hardware-Software R&D Assistant

- Developed a base station integrating five IoT devices with energy harvesting modules and a Raspberry Pi. Integrated Python-based ML algorithm into the framework to study how fluctuating power availability impacts model inference latency, throughput, and accuracy under real-time constraints.
- Implemented control scripts to manage data transmission between IoT devices and the Raspberry Pi, debugging latency issues with tools like Wireshark and perf, and optimizing I/O throughput.
- Designed and validated two network emulation prototypes using NE-ONE network emulator, simulating diverse network topologies and bandwidth constraints to evaluate communication bottlenecks in distributed ML systems. Configured custom protocols and sub-layer validations to quantify performance trade-offs between the server and IoT devices.

Salesforce

May - Sep 2024

ML/AI Specialist

- Implemented a customized ML algorithm using PyTorch with CUDA acceleration, optimizing GPU memory allocation and compute throughput for large-scale customer preference modeling. Improved training and inference efficiency by tuning batch sizes, memory pinning, and kernel-level operations.
- Developed a two-layer digital transformation strategy for a Canadian bank, integrating Salesforce CRM with ML-driven analytics pipelines to deliver personalized financial advice, credit scoring, and product recommendations.
- Identified existing ML pipeline bottlenecks (low data preprocessing, poor model visualization) and proposed optimizations using power management and compute scheduling.

AMOREPACIFIC Corporation

Sep 2023 - Apr 2024

Hardware Design Specialist

- Led development of a smart mirror system integrating hardware and AI, using SolidWorks for mechanical prototyping and OpenCV for real-time computer vision. Designed and tested electronic circuit bundles including microcontrollers, power regulators, and memory drivers, addressing challenges in data throughput and hardware-software synchronization.
- Integrated ML models from TensorFlow into facial detection devices, enabling the devices to predict facial changes. At the same time, we applied RTL simulation and security verification technologies to conduct multiple rounds of quality testing, ensuring that the instruments can run smoothly in different environments and with different customers.

FutureCite

Jan - July 2023

Cloud Engineer

- Migrated the company's physical storage and operating system to Google Cloud to enhance the company's multi-cloud strategy and system resilience through utilizing open-source frameworks such as PyTorch and TensorFlow and integrating cloud computing via Google Vertex AI into the system.
- Led a team on a project related to Federated Learning and latency and bandwidth optimization, designing hardware systems (end-user devices, network simulators, servers) to demonstrate that latency caused by the physical distance between users and servers can be optimized through Federated Learning.

ACADEMIC RESEARCH EXPERIENCE

Connected Intelligence Research Lab at Queen's University

May 2022 - June 2025

Machine Learning & Communication Optimization Research Assistant

- Evaluated bottlenecks in deploying a privacy-oriented machine learning algorithm, Federated Learning, within constrained wireless networks in 5G/6G scenarios.

- Implemented practical Federated Learning algorithms using PyTorch and Flower frameworks. Integrated energy harvesting systems into IoT devices to optimize their performance under communication- and energy-constrained wireless networks.
- Designed two novel device scheduling and power control algorithms that enable the server to dynamically schedule a subset of local devices to participate in each training round.
- Proposed a new framework that combines a communication-efficient Federated Learning model with an over-the-air computation process, ensuring more efficient and scalable local device scheduling.

Fiber System and Communication Sensing Lab at Queen's University

Jan – Aug 2023

Machine Learning Research Assistant

- Three proofs of concept simulation frameworks are designed to prove that the physical distance between local devices and central server can significantly impact the model transmission latency and model training accuracy.
- Surveyed on different multimedia data transmission performance under 5G and 6G scenarios and how Federated Learning can be applied to optimize the transmission process to be more energy efficient and time efficient.
- Surveyed and evaluated on multiple base Federated Learning frameworks that consider latency and cost optimization, examined their weaknesses and limitations and overcame these challenges by using cloud computing technologies.

ADDITIONAL EXPERIENCE

SparQ Studio at Queen's University

May 2022 - June 2024

3D printing supervisor

- Provided bi-weekly tutorials on 3D printing technology, 3D scanners, and soldering stations to new members. Supervised their activities and provided necessary guidance to maximize efficiency and ensure safety.
- Assisted the Makerspace Director in repairing machines such as laser cutters and power drills. Proposed two initiatives on robotic automation and robotic transfer systems between different fabrication stations within the studio.

School of English at Queen's University

Sep 2022 - Sep 2025

Student Life Program Monitor

- Consulted with multiple international students to help teams develop more comprehensive education strategies. Provided professional guidance on both academic and living concerns and offered different advice based on individuals' needs.
- Organized and coordinated a variety of academic and social activities for students to support their language development and cultural integration. Acted as a connection bridge between students and faculty, helping to address concerns and foster a supportive learning environment.

Queen's University

Sep 2021 - Aug 2023

First-year International Representative in Engineering

- Hosted monthly workshops on complex academic topics, specifically focusing on engineering communication and writing. Invited upper-year students to share problem-solving techniques.
- Collected feedback on difficult courses and presented concerns to faculty. Pushed for additional TA support and review sessions to assist international students to overcome language barriers.

PUBLICATIONS

(To be Published) A. Ramezannaderi, B. Zhang and N. Lu, "Learning on the Air: Semi-Asynchronous Federated Learning via Over-the-Air Computation", 2026 International Conference on Computer Communications (INFOCOMM), Tokyo, Japan, 2026.

B. Zhang, "Scheduling and Power Control in Sustainable Federated Learning over Wireless Networks", QSpace Library, Kingston, Canada, 2025, URL: <https://hdl.handle.net/1974/33471>.

B. Zhang, E. Dalal and N. Lu, "Stochastic Device Scheduling and Power Control in Federated Learning with Energy Harvesting," 2025 International Conference on Communications (ICCS), Montreal, Canada, 2025.

B. Zhang and N. Lu, "Joint Power Control and Device Scheduling in Federated Learning with Energy Harvesting," 2024 6th International Conference on Communications, Signal Processing, and their Applications (ICCSPA), Istanbul, Turkiye, 2024, pp. 1-6, doi: 10.1109/ICCSPA61559.2024.10794352.

EDUCATION

Queen's University, Canada

May 2023 -Nov 2024

M.A.Sc. Electrical and Computer Engineering

- Overall GPA: 4.3/4.3
- Research Direction: Federated Learning, Communication Networks, Communication Optimization, Green Energy Design

Queen's University, Canada

Sep 2019 – June 2023

B.A.Sc. Electrical Engineering

- Overall GPA: 3.65/4.3
- Award: Three times Dean's Scholar Awards (2020-2023), Charles Allan Thompson Award (2022), Queen's University Excellence Scholarship (2019)

PROJECTS

Next-Gen Robotic Gripper for Human-Robot Interactions

Sep 2022 – Apr 2023

- Led the team in hardware implementation and fabricated three prototypes of a feasible robotic gripper using three software tools: Cura, Fusion 360, and Blender. Evaluated the differences in physical movements, compatibility with the existing Panda robotic arm, and assembly complexity.
- Conducted extensive research on suitable 3D printing filament materials to enable the gripper to handle solid-state materials such as quartz and magnetite. Integrated OpenCV into the finalized prototype, allowing the gripper to perform dodging operations when it detects potentially harmful objects.

AI-agent Personal Career Chatbot

April – July 2025

- Designed and deployed a personalized AI chatbot agent capable of communicating with audiences on my behalf, referencing content from my LinkedIn profile and personal website. I also integrated RAG to ground chatbot to ensure accuracy and consistency of career-related information.
- Engineered conversation safety and guardrails to prevent off-topic or unprofessional responses, maintaining chatbot reliability and trustworthiness. Through push notification function, this chatbot would be able to ask for contact information from audiences who are interested in further discussion.