YUE FEI (she / her) *Communication Systems & Digital Design & Computer Architecture*

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EDUCATION

University of Toronto   *Sep. 2022 – Jun. 2024*
Master of Engineering, Electrical & Computer Engineering
- **MEng Thesis (Individual): Pilot Training – Angle of Arrival and Channel Estimation in 5G Network** [Code]
- Compared **Linear Minimum Mean Square Error (LMMSE)** approach and **Matrix-Pencil Method (MPM)** for uplink channel estimation in **multicell MIMO-OFDM systems** with four distributed units (DUs) arranged in a square of radius 100 m, using a 3GPP-compliant MATLAB model.
- Showed that with **pilot training** in time or frequency domain, MPM yields higher angle-of-arrival accuracy than DFT-based and MMSE methods with limited antennas.
- Supervisor: Prof. Raviraj Adve

University of Toronto   *Sep. 2017 – Jun. 2022*
Bachelor of Applied Science, Electrical Engineering
- **Capstone Project (Teamwork): CNN NPU Overlay (MobileNetV1) on Intel Stratix 10 NX**
- Collaborated to replace the original matrix–vector unit of the Microsoft Brainwave NPU on Intel Stratix 10 NX with a **custom convolution unit (scheduler + tiles + accumulator)**, achieving **4.3×** speedup and **76.6 GOP/s** on MobileNetV1 inference.
- Collaborate to develop a **VLIW-based Python compiler** and **ISA simulator** to translate Keras models into NPU instructions, managing memory allocation and cycle-accurate performance verification.
- Designed a **pipelined accumulator** enabling 330 MHz operation; implemented three-stage **reduction-tree addition** and **opcode-based accumulation modes**, verified correct synchronization and 450 MHz Fmax in Quartus.
- Supervisors: Prof. Vaughn Betz, Andrew Boutros

PUBLICATIONS | PEER-REVIEWED CONFERENCES

1. Arash Ahmadian, Louis S.P. Liu, **Yue Fei**, Konstantinos N. Plataniotis, Mahdi S. Hosseini. *Pseudo-Inverted Bottleneck Convolution for DARTS Search Space*. IEEE INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING (ICASSP), 2023.
2. Abnash Bassi, **Yue Fei**, Gilead Posluns, Mark C. Jeffrey. *Optimized Priority Scheduling for Faster Scalable Belief Propagation*. PROBABILISTIC GRAPHICAL MODELS (PGM), *[In Submission]*, 2026.

EXPERIENCE

MediumAI · Freelance   *Jan. 2026 – Present*
Software Development Engineer — Hybrid, Toronto, Canada
- Build API integrations for a voice LLM–powered medical scribe agent, enabling secure multilingual clinical documentation.

iQIYI.com · Internship   *Oct. 2025 – Dec. 2025*
Data Analyst — Remote, Beijing, China
- Combined three-arm A/B testing with causal forests and decision-tree rules for deployable personalization, lifting renewal rates from **37%** to **54.06%.**

Qualcomm Canada · Permanent Full-time   *Jun. 2024 – Jul. 2025*
RFIC Design Verification Engineer — Onsite, Markham, Canada
- Verified UWB receiver path(analog front end); improved UWB receiver bootup by reducing LNA charging delay **90%** (20 ns→2 ns); Verified WLAN CP-PLL synthesizer across 500+ channels using UVM, ensuring coverage over 2G/5G bands.
- Developed GRU-based multi-head model for analog gain line-up optimization and an MLP for VCO capacitance prediction, replacing manual tuning across 1000+ frequency targets.

University of Toronto – WIRLab · Contract Part-time   *Jul. 2021 – Sep. 2021*
Research Assistant — Remote, Toronto, Canada
- Explored **RNN-based Transformer models** and **Attention mechanisms** for NLP tasks.[Code]
- Applied **PCA-based embedding visualization**—as used in **GloVe**—to project high-dimensional embeddings into **2D/3D space** using **Python (NumPy, Matplotlib)**, enabling intuitive inspection of semantic clusters.

Alphawave Semi · Internship   *May 2020 – Jun. 2021*
SerDes Digital Verification Engineer — Remote, Toronto, Canada
- Built UVM testbenches for SerDes subsystems (clocking, datapath, SRAM), expanding coverage to 50+ scenarios; Scaled Jenkins CI/CD regression from 4 to 60+ projects, enabling **15×** throughput growth.

Awards and Certificates

- Edward S. Rogers Sr. Department Betz Entrance Scholarship ($5,000) *2017*
- Certificate in Engineering Business *Jun. 2022*

Invited Talks

Qualcomm Panel Discussion: *Demystifying Machine Learning* — QWomen San Diego *Mar. 2025*
Talk: From Channels to States — Machine Learning in the Language of Communication and Control

Selected Academic Projects

COMPUTER ARCHITECTURE & SYSTEMS

Parallel Beamforming & Cache-Coherence *Jan. 2024 – May. 2024*

- Accelerated medical imaging by **7×** ($17\,\text{s} \rightarrow 2.5\,\text{s}$) via **16-thread data-parallel** ultrasound beamforming with Intel SIMD intrinsics and memory optimizations (`restrict`); validated correctness (RMS error $< 10^{-16}$) and scalability (1–16 threads). [Code]
- Designed and verified a **3-hop directory cache-coherence protocol** (MSI/MESI) in Murϕ, optimizing with an **Exclusive (E)** state to eliminate unnecessary bus transactions. [Code]

Computer Architecture Coursework (Team of 2) *Sep. 2021 – Dec. 2021*

- Modeled **data hazard detection** in a modified **MIPS 6-stage pipelined CPU**, validating correctness via explicit stall-cycle annotation.
- Designed a **perceptron-based branch predictor,** combining local branch history with long global history to reduce MPKI under tight storage constraints.
- Implemented **Tomasulo out-of-order execution** with register renaming and dynamic scheduling, and an **MSI directory-based cache-coherence protocol.**
- Implemented a **Bouquet L1 data prefetcher** using IPCP, DPT, and a global history buffer (GHB) with confidence-based arbitration.
  - Evaluated feasibility using CACTI, showing ∼**24%** area overhead and parallel access within $< 1\,\text{ns}$ latency.

ERROR-CORRECTING CODES & GRAPHICAL INFERENCE

Graph-Based Error-Correcting Codes *Sep. 2023 – Dec. 2023*

- Implemented **LDPC**, fountain/LT, and **Polar encoders/decoders** over the binary-erasure channel, developing custom simulators in Julia and MATLAB. [Code]

Error Control Coding: Convolutional & BCH Codes *Jan. 2023 – May. 2023*

- Implemented **convolutional encoders** with **Viterbi decoding** and **binary BCH encoders/decoders** over $GF(2^m)$ using custom trellis structures in MATLAB.

INFORMATION THEORY & SEMANTIC COMMUNICATIONS

Sampling-Based Semantic Source Coding (One-Shot Information Theory) *Jan. 2023 – May. 2023*

- Implemented **Poisson functional representation**, **rejection sampling**, **importance sampling**, and hybrid Poisson + dithered quantization for 6G semantic source coding in MATLAB. [Code]

WIRELESS COMMUNICATIONS & SIGNAL PROCESSING

LTE Signal Processing *Jan. 2022 – Apr. 2022*

- Processed captured LTE signals for **time/frequency synchronization, OFDM demodulation,** and **channel equalization;** resampled $40\,\text{MHz}$ RF data to the $30.72\,\text{MHz}$ LTE rate and validated **PSS/SSS** detection.