

# MATTHEW CHEN

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## EXPERIENCE

### Digital Logic Intern

Jan. 2025 – May 2025

Intel

Toronto, ON

- Developed simulations, testbenches, and behavioural models for 100Gb/s SerDes transmission used in 2nm silicon
- Used Universal Verification Methodology (UVM) to verify and optimize asynchronous FIFO register behavior with clock domain crossing (CDC)
- Harnessed Verilog/SystemVerilog to describe digital logic, simulated signal behavior with Synopsys Verdi
- Utilized distributed computing platforms to execute macro-simulations and matplotlib to perform data analysis

### Electrical Team Member

Sep. 2024 – Present

Midnight Sun Solar Car Team

Waterloo, ON

- Using Altium Designer and digital logic to develop battery voltage-management PCB, harnessing hysteresis to ensure stable behaviour on competition solar car
- Optimized Battery Management System layout, using FETs to smooth power distribution on next-gen AFE
- Implementing low-pass filter with static components to stabilize voltage read, collaborative hardware development

### Machine Learning Research Intern

Jun. 2023 – Nov. 2023

University of Toronto

Toronto, ON

- Worked with PhD candidate under Dean of Electrical and Computer Engineering on "*Binary Convolutional Auto-Encoders for Transmission Protective Relays Anomaly Detection*"
- Researched Bayesian optimization algorithms in Python, convolutional neural networks (CNNs), and the potential for cyber attackers to maliciously penetrate and disrupt transmission protective relays (TPRs)
- Examined ML algorithms, conducted literature review, edited paper, investigated power grid architecture

## PUBLICATIONS AND PROJECTS

### 🌀 Neuromorphic Computing for Smart Cities | Jupyter, PyTorch, NumPy, Git/GitHub

Aug. 2024

Non-Trivial Foundation

- Proposed framework on the benefits of implementing neuromorphic computing in IoT applications and smart cities; conducted literature review
- Created and evaluated power consumption, efficiency, and performance of Spiking Neural Networks (SNNs) and Artificial Neural Networks (ANNs), generated visualizations in Matplotlib
- Drafted and prepared pitch presentation; finalist for \$40,000+ prize, advised by Yoshua Bengio, "Godfather of AI"

### Electromagnetic Levitation Platform | C++, Arduino, CAD, EasyEDA, Blender

- Designed digital schematic in EasyEDA, created and verified 3D-printable levitation mount
- Programmed a PID control algorithm in C++ to stabilize system with self-correction and the Hall Effect
- Implemented PWM to control electromagnet strength across multiple discrete arrays

### MacroPad | C, Python, KiCad, Fusion360, Git/GitHub

- Designed digital logic and layout in KiCad, selected components for custom keyboard PCB
- Modeled a laser-cut case in Fusion360, prepared multiple subcomponents for 3D printing and assembly
- Programmed custom firmware for the XIAO microcontroller in C, using QMK compilation for key mapping

## CERTIFICATIONS AND TECHNICAL SKILLS

**Languages/Libraries:** Verilog/SystemVerilog, Python, C++, JavaScript, NumPy, Matplotlib, PyTorch

**Tools:** Git/GitHub, Altium, Synopsys Verdi, Unix/Linux, Jupyter, Confluence/Jira, Fusion

**Key Skills:** Digital Design (Verilog/SystemVerilog), Analog Design (Altium/KiCAD), Software Development

**Assets:** Canadian Citizen, Driver's Licence G2, WHIMIS-trained, Rapid Learner

## EDUCATION

### University of Waterloo

Sept. 2024 – Apr. 2029

Candidate for B.A.Sc. in Electrical Engineering

Waterloo, ON

**GPA:** 3.91/4.0 **Scholarships:** Intel, Presidential, and Non-Trivial