Aiqi Zhang

aiqizhang.org | aiqiangela.zhang@mail.utoronto.ca | linkedin.com/aiqi | github.com/aiqiz

Education

University of Toronto **Sept 2022 - May 2026**
BASc in EngSci, Major in Engineering Physics, Minor in Artificial Intelligence *Toronto, Canada*

NOIC academy **Sept 2021 - June 2022**
Secondary School Diploma, Valedictorian student of year 2022 *Markham, Canada*

The Affiliated High School of Peking University **Sept 2016 - June 2021**
Junior Middle School Diploma *Beijing, China*

Experience

Research Trainee - University of Toronto **May 2025 - Sept 2025**
Supervisor: Dr. Debra Wunch *Toronto, Canada*

- Built computer vision pipelines integrating manual phenocam labeling with automated traffic-camera segmentation to derive high-resolution urban vegetation color indices.
- Coupled phenology signals with flux tower observations to model urban carbon dynamics, validated against measurements at Turkey Point.
- Expanded the framework to city-wide scale using traffic cameras and incorporated solar-induced fluorescence data for broader ecosystem monitoring.

Lab Technician - University of Toronto **May 2025 - Ongoing**
Supervisor: Dr. Ania Harlick *Toronto, Canada*

- Advanced research on the domino chain effect by developing experimental methods for full-motion capture and presented a poster at Women+ in Physics Canada 2025 Csonference, showcasing a novel framework for analyzing domino wave dynamics.
- Authored a comprehensive lab manual and setup a digital holography apparatus, enhancing hands-on learning for the undergraduate advanced physics laboratory course.
- Designed and continued setup of condensed matter physics apparatus to support future undergraduate experimental modules.

Research Intern - Nanyang Technological University **May 2024 - Sept 2024**
Supervisor: Dr. Xiaodong Chen *Singapore*

- Designed and optimized a large battery charging-discharging cycle database framework for battery life prediction, improving data management and analysis efficiency.
- Developed and refined feature extraction models to integrate machine learning with empirical and theoretical frameworks, enabling scientific analysis and interpretable in battery life modeling.
- Investigated and addressed the end-of-life definition problem in battery life prediction, conducting preliminary analysis to evaluate machine learning accuracy under varying definitions.

Projects

Domino Chain Effect | *Advanced Physics Laboratory Project* **Sept 2024 - Ongoing**
Supervisor: Dr. Boris Braverman and Dr. Ania Harlick

- Developed a stereo 3D reconstruction pipeline for capturing full domino dynamics using high-speed cameras, based on computer vision calibration, triangulation, and coordinate transformation.
- Quantified six-degree-of-freedom chain reaction mechanics through color-marker tracking, revealing significant rotational effects perpendicular to the transmission direction.
- Preparing a paper on the foundational model and classical analysis of domino wave dynamics for publication.

PatchouLink | *Praxis III Engineering Design Project* **Jan 2024 - April 2024**

- Prototyped an IoT system for real-time patchouli plant cultivation monitoring, enabling seamless data communication from in-ground sensors to the user interface.
- Led design and implement on the full-stack web platform for real-time cultivation monitoring, after receiving long-range Arduino sensor data to an SQL database, where it is decoded, stored, analyzed, and visualized using a Python-Django framework.

Satellite Image Segmentation | *Final Project of Deep Learning Course* **Feb 2024 - April 2024**

- Led efforts on develop and implement autoencoder-based deep learning model for satellite image segmentation, significantly improving accuracy over the baseline model.
- Designed and optimized data processing pipelines, including dataset augmentation, RGB normalization, and loss function computation for multi-class segmentation.
- Engineered and trained the model using PyTorch, leveraging encoder-decoder architectures inspired by U-Net and ResNet, and fine-tuned hyperparameters for optimal performance.

OpenSOS Emergency Response AI Agent | *2023 NewHacks Hackathon* **Oct 2023**
1st place in Smart Cities category

- Developed an automated emergency response agent that interacts with callers, extracts critical information, and relays data to first responders.
- Led implement on voice recognition and LLM-powered analysis using Python libraries, GPT-3.5 API, and prompt engineering for accurate crisis assessment.
- Integrated with AWS services, including Amazon Connect and Lambda, to enhance system scalability and reliability.

Betta-Trap | *Praxis II Engineering Design Project* **Jan 2023 - April 2023**

- Designed and prototyped a high-efficiency, all-weather storm drain filter to prevent microplastic entry into the Great Lakes, enhancing overflow prevention and ease of maintenance.
- Led design and CAD modeling for a double-liner system with an overflow mechanism and an automated maintenance alert, improving user and maintenance accessibility.

Conference Presentations

Zhang, A., Braverman, B., and Harlick, A.: Computer Vision for Domino Chain Dynamics, Women+ in Physics Canada, Toronto, ON, July 2025 (poster).

Scholarships and Honors

Samuel Beatty Physics Conference Travel Award, July 2025
Physics Summer Student Program Fellowship, May 2025

Technical Skills

Programming: Python, C/C++, Matlab, SQL, R, HTML, JavaScript, CSS, Verilog, LaTex
Hardware and CAD Design: Arduino, Raspberry Pi, Fusion360, Solidworks
Photography and Video Editing: Final Cut Pro, Adobe Photoshop, Adobe Lightroom, Adobe After Effects
Language: English, Mandarin

Relevant Coursework

Physics: Atmospheric Physics, Computational Physics, Advanced Classical Mechanics, Thermal Physics, Fluid Mechanics, Electromagnetism, Statistical Mechanics, Quantum Mechanics, Physics of the Earth, Advanced Physics Laboratory

Electrical and Computer Engineering: Data Modeling Prediction and Control, Introduction of Machine Learning, Deep Learning, Fundamental Algorithm, Data Structure, Electronics, Digital and Computer Systems, Electromagnetic Fields

Mathematics: Complex Analysis, Ordinary Differential Equations, Vector Calculus, Probability and Statistics, Linear Algebra, Calculus I, Calculus II.

Other Engineering Course: Praxis I&II&III (Engineering Design Course), Structural Engineering, Molecules and Materials, Biomedical Engineering, Engineering and Society, Economic Analysis and Decision Making.

Design Team / Extracurricular

UTSM Urban Concept Aero-structural Team **Sept 2023 – May 2024**

Team Member *University of Toronto*

- Contributed to the prototype and CAD design of the outer shell for the first version of a Hydrogen Fuel Cell vehicle.

Natural Observation Team **Sept 2016 – Present**

Team Member *Wings of Nature - Natural Observation Club*

- Served as a tutor during a field trip for insect observation in the Gaoligong national natural conservation area, in July, 2023.
- Joined eight field trips to multiple national natural conservation area in China.