YUEZHEN (LILY) DONG

(647)-282-0624 ⋄ y43dong@uwaterloo.ca ⋄ https://tinyurl.com/lilyd-portfolio

RELEVANT SKILLS

Languages	Python, Java, SQL, C/C++, JavaScript, HTML/CSS, LaTeX
Frameworks	Scrum, Agile, React, ThreeJS, NextJS, Arduino, Pygame, Flask, OOP
Developer Tools	Git, Subversion, Linux, OpenCV, OpenGL, VSCode, Android Studio, Eclipse, IntelliJ

EDUCATION

University of Waterloo - Faculty of Engineering Expected Graduation MAY 2029

BASc in Electrical Engineering – President's Scholarship of Distinction $2000 *Waterloo, ON, CAN*

ACHIEVEMENTS

IBDP Graduate CaYPT (Canadian Young Physicists' Tournament) National Champion IYPT (International Young Physicists' Tournament) Bronze Medalist FIRST Robotics Provincial Semi-Finalist

RESEARCH EXPERIENCE

Grätzel Cell JUL 2023 - JUL 2024

Python Matplotlib, COMSOL Multiphysics, Multimeter, Lux Meter

- Constructed and optimized a **dye-sensitized solar cell** using titanium dioxide and iodine electrolyte to study the mechanisms of **photovoltaic energy conversion**.
- Evaluated the influence of **electrolyte concentration**, glass conductivity, TiO_2 layer thickness, and temperature on cell efficiency through electrochemical analysis and precise measurements using **multimeters** and **lux meters**.
- Employed **MATLAB** for data modeling and simulations to assess the impact of parameter variations on electron transport and photocurrent, validating experimental results with theoretical predictions.

Faraday Waves JUL 2023 - JUL 2024

MATLAB, ImageJ, Tracker, Python, Matplotlib

- Investigated **Faraday waves** and oscillating droplets, examining surface waves and instabilities in vertically oscillating systems.
- Analyzed surface and **gravity-capillary waves** using **ImageJ** and **Tracker** to study the effects of frequency, amplitude, and viscosity on wave patterns.
- Simulated droplet dynamics in **MATLAB** and processed data using **Python** and **Matplotlib** to quantify variations and validate theoretical predictions.

Magnetostriction SEP 2022 - JUL 2023

MATLAB, ImageJ, Tracker, Python, Matplotlib

- Investigated the impact of external **magnetic fields** on magnetization and magnetostriction in various materials, focusing on **ferromagnetic, paramagnetic**, and **diamagnetic** properties.
- Measured **B-H curves** using a custom-built coil and H-bridge circuit to control magnetic fields, with real-time data captured by a **Hall effect sensor** to analyze magnetic saturation and hysteresis effects.
- Quantified magnetostriction in ferrite rods using a **strain gauge** and **Wheatstone Bridge** setup, capturing precise dimensional changes under varying magnetic fields.

Saffman–Taylor Instability of Miscible Fluids JUL 2022 - JUL 2023

ImageJ, Tracker, MATLAB, Python, Matplotlib

- Conducted research, data analysis, and experiments on three-stage Marangoni flow and **Saffman–Taylor instability**, focusing on fluid dynamics and fractal patterns.
- Analyzed fractal dimensions and geometry using **ImageJ** and **Tracker** to develop a systematic theory on the role of viscosity in Saffman–Taylor instability.
- Simulated fluid behavior with **MATLAB** and processed data using **Python** and **Matplotlib** to quantify viscosity changes in paint samples with different concentrations.

Acoustic Analysis of Airflow-Induced Sound in Perforated Rotating Disks JUL 2022 - JUL 2023

MATLAB, ImageJ, Tracker, Python, Matplotlib

- Investigated the sound phenomena of airflow interacting with a **rotating disk with holes**, analyzing how sound characteristics change with parameters like flow rate, rotational speed, and hole configuration.

- Developed experimental setups using a **motor speed controller**, air compressor, and microphone to capture sound data, with real-time analysis and visualization conducted in **MATLAB** and **Python**.
- Quantified relationships between **sound intensity**, frequency, and disk parameters, using theoretical models to validate experimental observations and identify key parameter impacts.

Pulsating Heat Tube in a Condensing-Heating-Condensing (CHC) System JUL 2022 - JUL 2023
Arduino, EasyEDA, OnShape, Python, JSON, OpenCV, Tracker, MatPlotLib

- Researched thermodynamics and fluid dynamics of pulsating heat tubes to analyze **two-phase heat transfer efficiency**.
- Designed and implemented a heat tube system with **Arduino** and **analog electronics** for precise control and measurement.
- Developed a Python-based tool using **OpenCV Object Detection** to extract and analyze thermocouple data from 8 channels for real-time monitoring.
- Simulated vapor motion within the heat tube using Python, achieving a **96% match** between simulations and experimental results.

Marangoni Flow and Rayleigh-Taylor Instability in Evaporating Fluids JUL 2021 - JUL 2022
Arduino, EasyEDA, ImageJ, Tracker, MatPlotLib, Comsol Multiphysics, MATLAB

- Investigated Marangoni flow and Rayleigh-Taylor instability by analyzing fluid dynamics at interfaces to study **droplet behavior** in experiments.
- Designed and implemented a droplet release system using **Arduino** and **3D-printed components** to enhance precision and reproducibility in experiments.
- Developed and optimized an interferometry analysis system with **OpenCV** for high-resolution tension measurement and analysis.
- Performed dynamic simulations using MATLAB and Comsol, achieving **93% accuracy** to verify experimental results with simulations.

WORK EXPERIENCE

Junior Web Developer Coop JAN 2025 - APR 2025
Java, Spring Boot, Maven, Apache POI, Git *AGF Investments*

- Developed a **Java-based** ScoreCard application, featuring robust file archiving, large XLSX handling via **Apache POI streaming**, data validation/transformation, and a flexible properties-based configuration system.
- Developed a **PegaRecon** app that ingests large XLSX files via **Apache POI streaming**, applies date/time filtering and **duplicate-skip** logic, archives input, and outputs consolidated Excel/CSV reports—fully configurable, automated email distributions, and maintained under **Maven/Git** with **Spring Boot**.
- Developed automated **Pega** test cases verifying front-end **UI** interactions, ensuring robust coverage and reliability.

Lab Teaching Assistant OCT 2023 – MAR 2024
Tracker, Comsol Multiphysics, Instrumentation and Prototyping Tools *SciTechnia*

- Instructed 20+ high school students on using lab instruments, including **oscilloscopes**, **multimeters**, and **3D printers**, to enhance practical skills in electronics and physics.
- Designed and constructed **PCBs**, integrating analog and digital components for educational demonstrations and experiments.
- Guided students in simulation modeling with **Comsol Multiphysics** and data analysis using **Tracker**, bridging theoretical concepts with hands-on applications.

Technology Mentor OCT 2020 - AUG 2024
iOS, iPadOS, macOS, Windows, Linux *CyberSeniors*

- Guided **100+ seniors** to proficiency in using various operating systems, completing the program in **one month**.
- Taught essential skills for setting up software accounts, configuring devices, and utilizing applications for daily tasks.

Website Developer DEC 2020 - DEC 2023
Java, HTML/CSS, Javascript, Blender, Git *Beyond the Wards/Kindness Catalogue*

- Built a dynamic website using **Java** for backend and **HTML/CSS, JavaScript** for frontend, ensuring **responsive design** and smooth user interaction.
- Created and integrated **3D models** with **Blender** and JavaScript, while managing project versions with **Git**.