

Thomas Kleinknecht

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EDUCATION

University of Waterloo Waterloo, ON
Bachelor of Applied Science in Management Engineering 2025
Dean's Honours, Computing Option

- GPA: 89.50/100 (3.90/4.00)
- Relevant Courses: Machine Learning, Stochastic Decision Making, Simulation, Numerical Optimization, Search Engines

ACADEMIC AWARDS & SCHOLARSHIPS

Management Engineering Design Award (Capstone Project) April 2025
University of Waterloo

Management Engineering Dean's Honours List (3x Recipient) Sep. 2024, Jan. 2024, Sep. 2022
University of Waterloo

Undergraduate Student Research Award (USRA) Sep. 2024
Natural Sciences and Engineering Research Council of Canada (NSERC)

U SPORTS Academic All-Canadian (2x Recipient) May 2021, May 2022
U SPORTS (Canadian University Sports)

University of Waterloo President's Scholarship Sep. 2020 – Apr. 2021
University of Waterloo

RESEARCH EXPERIENCE

Undergraduate Student Researcher – Numerical Optimization Waterloo, ON
University of Waterloo Sep. 2024 – Present

- Received Natural Sciences and Engineering Research Council of Canada Undergraduate Student Research Award to continue machine learning optimization research under Professor Saeed Ghadimi.
- Applying optimization algorithms targeting loss minima flatness to a range of machine learning models and datasets, including support-vector machines, logistic regression, and linear regression models.
- Initiating a new project focused on optimizing pre-surgical appointment scheduling at St. Mary's Hospital, applying numerical optimization techniques to improve resource utilization and reduce wait times.

Undergraduate Research Assistantship – Deep Learning Optimization Waterloo, ON
University of Waterloo Apr. 2024 – Aug. 2024

- Conducted research on optimization methods for training artificial neural networks under the guidance of Professor Saeed Ghadimi.
- Implemented novel optimization algorithms in PyTorch to research potential improvements in model generalization by targeting loss minima flatness through the norm of the gradient of the loss function.

- Utilized SLURM to manage experiments on our research GPU cluster, training convolutional neural networks to compare optimizer performance on image classification tasks across the CIFAR-10 and CIFAR-100 datasets.

Project Analyst & Visiting Researcher

Hamilton, ON

St. Joseph's Healthcare Hamilton & Research Institute

Jan. 2024 – Apr. 2024

- Built an SQL research database which consolidates and anonymizes health record data for research on the impact of health information interoperability on patient outcomes.
- Implemented Ontario-wide integration of electronic health records across 70+ hospitals and 470+ long-term care homes with [Project AMPLIFI](#).
- Programmed a robust reporting tool to identify discrepancies in hospital transfer charges resulting in over \$5000 in savings.

TEACHING EXPERIENCE

High School Mathematics Tutor

Sep. 2024 – Feb. 2025

- 1-on-1 in-person tutoring sessions with students in Math 10, Math 11, and Advanced Functions 12.
- Planned and executed sessions 1-2 hours in length, composed of lessons, examples, and active work-through of problems with students.

WORKSHOPS AND TRAINING

Health AI Systems Thinking for Equity (HASTE) Workshop

Toronto, ON

T-CAIREM (AI in Medicine) - University of Toronto

Oct. 2024

- Participated in an in-person workshop led by Dr. Leo Celi (MIT Critical Data), focusing on collaborative policy development of healthcare AI systems between healthcare providers and researchers.
- Analyzed the use of large-language models for primary care, and presented our group's proposed regulations to ensure transparency, accountability, and fairness to the conference attendees.

PROJECTS

Spiking Neural Network for Brain Electrode Signal Decoding

Sep. 2024 - Present

- Developing a Spiking Neural Network to translate neural activity from motor areas of the brain into muscle control commands, using implanted electrode data from Macaques.
- Project is aimed at advancing prosthetic control and efficient brain-computer interface implementations.

Clinical Clarity: AI-Powered Tool for Clinical Communication Training

May 2024 - Present

- Fourth Year Capstone Project for Management Engineering
- Engineering an AI-powered hybrid chatbot to simulate patient interactions, providing medical students with structured practice for clinical communication skill development and exam preparation.
- Integrating real-time, personalized feedback on speech delivery, jargon use, and response accuracy based on clinical training scenarios.

Liver Transplantation Decision Support Tool

Aug. 2024

- Constructed a Markov Decision Process (MDP) model to optimize liver transplant decisions based on MELD (Model for End-Stage Liver Disease) scores, incorporating both living and deceased-donor options.

- Employed a policy iteration algorithm to determine optimal transplant policies, accounting for life expectancy, donor availability, and transplant risks to improve organ allocation and patient outcomes.

Simulation Model of Ambulance Diversion and Emergency Department Flow

Dec. 2023

- Designed and built an ARENA simulation model for San Francisco General Hospital's Emergency Department to optimize patient flow, resource allocation, and reduce ambulance diversions.
- Analyzed bottlenecks and tested various capacity increases in critical zones, leading to recommendations for bed additions and changes in patient routing to improve resource utilization and patient wait times.

LA Times Search Engine

Dec. 2023

- Built a BM25 based search engine in Java which queries a corpus of ~100 000 LA Times to return relevant articles in ~0.1 seconds, including query-biased snippets for each article.
- Conducted relevance assessments and statistical evaluations using precision, nDCG, and other effectiveness measures.

Movie Title Classifier

Apr. 2023

- Implemented Naïve Bayes and Logistic Regression models using Scikit-Learn to predict a movie's genre based on its title.
- Used LangDetect and Natural Language Toolkit to remove non-English titles, remove stop words, stem, and tokenize.

Road Runner

Apr. 2023

- Built a running social media platform to share and view friends' progress in JavaScript using React, MaterialUI, and Node.js.

TECHNICAL SKILLS

Programming Languages: Python, SQL, Java, JavaScript, R, VBA, ARENA

Frameworks and Libraries: Pandas, Numpy, PyTorch, Matplotlib, Scikit-Learn, Gurobi, SQL Server, MySQL, Power BI, React, Node.js, Next.js, Flask

Healthcare Technologies: EPIC, Oracle Health (Cerner), MEDITECH, PointClickCare

PROFESSIONAL EXPERIENCE

Project Coordinator

Toronto, ON

Finastra

Sep. 2022 – Dec. 2022

- Produced agile dashboards and reports, driving record-high compliance across four development teams in October 2022.
- Coordinated cross-functional team availability, implementation plans, and facilitated release which impacted 10K+ clients.

Business Analyst

Toronto, ON

BDO LIXAR

Jan. 2022 – Apr. 2022

- Conducted user research to shape product specifications and wireframes for an accounting resourcing SaaS product.
- Developed a novel testing framework to ensure the stability of an application deployed to over 6500 active users.

Technical Implementation

Toronto, ON

Front Rush

May 2021 – Aug. 2021

- Wrote SQL queries and VBA macros to meet ad-hoc customer data requests, achieving a 9.4/10 average satisfaction.
- Built and executed unit tests to ensure successful launches of new interconnected web and mobile applications.

EXTRACURRICULARS

Waterloo Warriors Varsity Football

Sep. 2020 – May 2022

- 2021 & 2022 Academic All-Canadian (National Student-Athlete Honor Roll).