**JACK LONGWELL**

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## EDUCATION

**Master of Engineering - Electrical and Computer Engineering**          September 2023 – September 2024
*Concentration in artificial intelligence*

Toronto Metropolitan University/Ryerson, Toronto, ON

● 4.11 cumulative GPA
● Courses of instruction include: Deep Learning, Advanced Database Engineering, Neural Information Processing Retrieval, Secure Machine Learning, Intelligent Systems, Neural Networks

**Honours Bachelor of Science - Mathematics and Statistics**          September 2018 – June 2023
*Minor in Economics*

McMaster University, Hamilton, ON

● 3.6 GPA in final two years, met standards for McMaster dean's list 2021, 2022
● Courses of instruction include: Data Science, Computational Methods of Inference, Stochastic Processes, Bayesian Statistics, Time Series, Mathematical Modeling, Multivariate Analysis

## SKILLS

● **Coding stack**: Python (PyTorch, TensorFlow, OpenCV, SciPy/Scikit-learn, Pandas, Flask), R (Tidyverse, Torch, Caret, Shiny), MATLAB, SAS, Stata, Visual Basic, SQL, SPARQL, HTML, CSS, JavaScript, AWS, Git
● **Full stack experience:** creating fully deployable deep learning clinical decision support systems
● **Machine learning:** model and computer vision implementation, webapp creation and deployment, statistical analysis and modeling, theoretical mathematics, information theory, data presentation
● **Cluster computing:** Experience with cluster computing/HPCC, bash, and slurm

## WORK/RESEARCH EXPERIENCE

**GRADUATE RESEARCHER**                                                        September 2023 - Present
Toronto Metropolitan University/Ryerson, Toronto, ON                                        (Part-Time)

  **Machine Learning**
  o  Exploring novel question answering algorithms with large language models at the DATALAB
  o  Leveraging retrieval augmented generation (RAG) with knowledge graphs and SPARQL
  o  Increasing trustworthiness and mitigating hallucinations in artificial intelligence models

**RESEARCHER**                                                                January 2023 - Present
Princess Margaret Cancer Centre, Toronto, ON                                        (Contract full/part-time)

  **Machine Learning**
  o  Validated popular publicly usable large language models in highly specialized fields
  o  Developing a deep learning network to recommend medication orders to oncologists

  **Data Science**
  o  Collecting, cleaning and validating provincial cancer registries for further research use

**RESEARCHER**                                            May 2022 - Present
St. Michael's Hospital, Toronto, ON                        (Contract full/part-time)
*Funding: Keenan Research Summer Student ($5,220 bursary)*

**Machine Learning:**
- o  Trained algorithm to segment and quantify subretinal fluid in clinically-acquired scans
- o  Fine-tuned and implemented a GPT-based chatbot in a Telegram group used by over 700 MDs
- o  Automated patient data extraction by creating an optical character recognition algorithm

**Data science:**
- o  Created a database to track medical trial enrollment and store sensitive patient information
- o  Formed relationships with large medical technology companies and integrated new-age software to extract high quality patient images for further study and research

**Statistical analysis:**
- o  Validated a novel diagnostic test for retinal metamorphopsia

**PREDICTIVE MODELLING COLLABORATOR**                      April 2022 – January 2023
St. Michael's Hospital, Toronto, ON                        (Part-Time)

**Machine Learning:**
- o  Worked alongside a multidisciplinary team of MDs and postdoctoral fellows to identify clinical stopgaps in ophthalmology that can be streamlined with clinical decision support tools
- o  Trained and implemented a vision transformer deep learning model to predict diagnoses for certain eye diseases using clinical image data. Implemented model achieved 94% accuracy

**Data science:**
- o  Sorted through large hospital databases to form curated, fully encompassing training, testing and validation sets for machine learning purposes

**Full-Stack Development:**
- o  Utilizing Flask, designed back and front end and hosted on Heroku for global accessibility

**PAPERS AND CONFERENCES**

[Validation of M-CHARTS for Quantitative Assessment of Metamorphopsia Following Rhegmatogenous Retinal Detachment Repair](): published in Retina, 2024

[OCTess: An Optical Character Recognition Algorithm for Automated Data Extraction of Spectral Domain Optical Coherence Tomography Reports](): published in Retina, 2023

[Large language models encode medical oncology knowledge: Performance on the ASCO and ESMO examination questions](): presented at American Society of Clinical Oncology Quality Symposium, 2023

[Segmentation and volume calculation for subretinal fluid using OCT images, OpenCV, and scikit-learn](): presented at Vit Buckle Society, 2023

**ADDITIONAL INTERESTS**

- ● Watching, coaching, analyzing and playing sports
- ● Rubik's Cubes and brain teasers