# Jacqueline Seal

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## EDUCATION

**University of Toronto**                                                                                          Sep 2020 – May 2024
*HBSc Computer Science and Bioinformatics & Computational Biology (GPA: 4.00/4.00)*              *Toronto, CA*
- Awards: Full-Ride National Scholarship, Dean's List Scholar, University of Toronto In-Course Scholarship
- Clubs: Biomedical Engineering Design Team (UTBIOME), ProjectX Machine Learning Team, UofTrees

## RESEARCH EXPERIENCE

**ProjectX Researcher – Genetics Stream**                                                                  Sep 2021 - present
*University of Toronto Artificial Intelligence Group*                                                              *Toronto, CA*
- Designing and implementing a novel Transformer architecture using PyTorch to predict Hi-C chromatin contact maps from DNA sequence data and enable efficient *in silico* prediction of 3D genome folding

**Statistics Research Opportunity Program Student**                                                     May 2021 – Sep 2021
*Medical Imaging Data (MiDATA) Lab, University of Toronto*                                                    *Toronto, CA*
- Identified clinical presentation and patient history predictors of articular bleeding in patients with hemophilia
- Developed a Python simulation pipeline to simulate and validate a dataset of predictive clinical features
- Demonstrated that incorporating simulated clinical features into an existing EfficientNet-B4 CNN architecture boosted the model's predictive ability to distinguish between joints with and without articular bleeding

**Bioinformatics Research Assistant**                                                                         Jul 2019 – Aug 2019
*Neuromodulation Focused Ultrasound (NeuroFUS) Lab, University of Calgary*                                  *Calgary, CA*
- Conducted a literature review exploring signal onset delay estimation techniques for transcranial ultrasound
- Leveraged Jupyter Notebooks and Python to fine-tune a multivariate regression model for predicting signal delay
- Achieved an 80% increase in prediction accuracy compared to traditional cross-correlation techniques
- Presented findings to researchers and entrepreneurs at Calgary's HYRS Symposium

**National Big Data Challenge Researcher and Finalist**                                                  Sep 2018 – Feb 2019
*STEM Fellowship*                                                                                                         *Calgary, CA*
- Implemented various regression and time series forecasting models in R and WEKA to analyze environmental and social catalysts of tuberculosis transmission and predict tuberculosis outbreaks
- Co-authored a paper that was featured in the STEM Fellowship Journal
- Selected as one of 14 national finalists and invited to present findings at Calgary's SAS Analytics headquarters
- Awarded the League of Innovators Innovation and Acceleration Award for "most entrepreneurial project."

## PROJECTS

**Synthetic Skin Lesion Data Generation (UTBIOME Project)** | *TensorFlow, Jupyter Notebooks*
- Developing a GAN in TensorFlow to generate synthetic skin lesion data for diverse skin pigmentation
- Evaluating whether this synthetic data can improve the performance of a binary CNN classifier model in detecting lesions on darker skin tones and mitigating racial bias in computer-aided diagnosis

**STEM Fellowship Website** | *JavaScript, HTML/CSS, WordPress, Google AdWords API*
- Led a team of web developers to implement new website features, including a user-friendly contest registration form, a volunteer database, a blog post gallery, and streamlined conversions tracking.
- Spearheaded an initiative to redesign outdated pages and optimize the site's speed and performance

**XY-Plotter "DrawBot" (@harold.the.drawbot)** | *C++, Arduino, Blender, Tinkercad*
- Designed robot components and circuitry schematics from scratch in Blender and Tinkercad
- Authored a C++ script for drawing custom patterns and designs with the XY-plotter robot

***Voices* App** | *Swift, Xcode, Firebase*
- Developed an iOS app using Swift and Firebase to facilitate communication between politicians and the public
- Surveyed 80 Members of Parliament, and pitched app to local investors and three Calgary city councillors
- Selected as an international Technovation semi-finalist and one of the top 13 teams in Canada.

## Volunteer Experience

**Data Entry Research Assistant** · Jul 2020 - May 2021

*Foothills Medical Centre* · *Calgary, CA*

- Analysed patient medical charts and entered data for NEWTON-CABG, a multi-centre, randomized trial investigating evolocumab's efficacy as a post-operative treatment for vein graft recipients

**Technovation Ambassador** · Sep 2019 - May 2021

*Technovation Girls* · *Calgary & Toronto, CA*

- Co-hosted three coding and entrepreneurship workshops for a cohort of 90 girls participating in Technovation
- Designed promotional brochures and eye-catching social media posts for coding workshops using Canva

## Selected Scholarships & Awards

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| **University of Toronto Scholar**, University of Toronto In-Course Scholarship Program | Aug 2021 |
| **Ronald J C McQueen Scholarship**, Senate of Victoria University | Aug 2021 |
| **Governor General's Academic Medal**, Webber Academy, on behalf of the Governor General of Canada | Jun 2020 |
| **Schulich Leader Scholarship (Declined)**, McGill University | May 2020 |
| **Schulich Leader Scholarship (Declined)**, University of British Columbia | Apr 2020 |
| **Full-Ride National Scholarship**, University of Toronto | Mar 2020 |
| **President's Centenary Citation (Declined)**, University of Alberta | Feb 2020 |
| **Loran Scholarship Semi-Finalist**, Loran Scholars Foundation | Nov 2019 |
| **Innovation and Acceleration Award**, League of Innovators | Jan 2019 |
| **National Finalist - High School Big Data Challenge**, STEM Fellowship | Jan 2019 |
| **International Semi-Finalist - Technovation Challenge**, Technovation Girls | Jun 2018 |

## Training & Certifications

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| **TCPS 2 CORE Certificate**, Government of Canada Panel on Research Ethics | Nov 2021 |
| **Biosafety Laboratory Training**, University of Calgary | July 2019 |
| **WHMIS 2015 Training**, University of Calgary | July 2019 |
| **Level 4 Diploma**, HSK Chinese Proficiency Exam | Apr 2019 |

## Technical Skills

**Languages**: Python, Java, C++, R, Julia, Swift, JavaScript, HTML/CSS
**Developer Tools**: Git, QT Creator, PyCharm, IntelliJ, Jupyter Notebook, RStudio, Xcode, WEKA, LaTeX
**Libraries**: Pandas, NumPy, Matplotlib, SciPy, TensorFlow, Scikit-learn, Statsmodels, Plotly, Seaborn

## Interests

Precision medicine, computational genomics, protein engineering, cancer therapeutics, sustainable design, hiking, kayaking