# Tony Xu

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## Education

### University of British Columbia
Year 4, graduating May 2022
*BASc Electrical-Biomedical Engineering, Minor in Physics*
Cumulative GPA: 3.9/4.0

- **Awards:** Jim and Helen Hill Memorial Service Award in Electrical Engineering (February 2020), Trek Excellence Scholarship for top 5% standing in faculty (September 2018, 2019, 2021), NSERC Undergraduate Student Research Award (July 2019)

## Skills

**Languages:** *Python, C, SQL, MATLAB, JavaScript, TypeScript*
**Deep Learning:** *PyTorch, Keras/TensorFlow, scikit-learn, Pandas*

## Experiences

### Software Development Engineering Intern
June 2021 - August 2021
*Amazon Canada*
Vancouver, BC

- Designed and built an operational dashboard to **consolidate** and **securely manage** team workflows and system performance
- Created and deployed solution using **AWS Services** including: Lambda Step Functions, CDK, DynamoDB, S3, CloudFront
- Created an authenticated UI using **React/TypeScript**, infrastructure code using **AWS CDK in TypeScript**, and implemented security measures using **AWS Cognito** to properly secure access of confidential data

### Machine Learning Engineering Intern
May 2020 - January 2021
*Flex Artificial Intelligence Inc.*
Vancouver, BC (Remote)

- Developed an end to end patented **computer vision pipeline** to detect fine-grained form errors in real world exercise videos, such as raising toes during deadlift, to provide insight on a user's exercise performance
- Researched and implemented cutting-edge approaches to **3D video data**, including: 3D pose detection, spatio-temporal attention, self-supervised temporal alignment, 3D deformable convolutions, and triplet models for anomaly detection
- **Improved frame-level error classification accuracy by 17.3%** with fully completed pipeline

### Summer Research Student
May 2019 - August 2019
*Sunnybrook Research Instituite - Physical Sciences*
Toronto, ON

- Used deep learning and computer vision techniques to analyse digitized breast cancer whole-slide images for cancer detection and classification with **PyTorch**
- Achieved **91% accuracy** on slide-level segmentation task by innovating cancer detection pipeline, model **obtained 3rd place** on 470-participant breast histology competition: BreastPathQ

### Machine Learning Technical Lead and Electrical Designer
October 2018 - Present
*UBC Biomedical Engineering Student Team (BEST)*
Vancouver, BC

- Led the Multifaceted Innovations in NeuroTechnology (MINT) ML subteam to create a data-acquisition pipeline and factored convolution model in **PyTorch** to analyse EEG inputs for a user-centric **EEG controlled home automation** application

## Publications

- Ciga, O., **Xu, T.**, Nofech-Mozes, S. et al. Overcoming the limitations of patch-based learning to detect cancer in whole slide images. Sci Rep 11, 8894 (2021). https://doi.org/10.1038/s41598-021-88494-z
- Ciga, O., **Xu, T.** & Martel, A. Self supervised contrastive learning for digital histopathology. arXiv preprint arXiv:2011.13971 (2020).

## Project Highlights

### Neureka 2020 - EEG Seizure Detection
github.com/Tonyxu74/eeg-seizure-detection
April 2020 - May 2020

- **4th place** on Neureka 2020 Epilepsy Challenge: an international competition on EEG seizure classification
- Implemented classifier with pretrained ResNet to determine seizure start and end in scalp EEG data using **PyTorch**
- Created full preprocessing pipeline using signal processing with a Short Time Fourier Transform to convert signal to a denoised heatmap of frequency versus time for model input

### Famous Author Natural Language Generation
github.com/Tonyxu74/famous-author-nlg
March 2020 - May 2020

- Final project for EE4497 - Pattern Recognition in Machine Learning course during exchange at NTU on investigating increasingly complex language models on generating a text in the style of a famous historical author
- Implemented Markov Chains, RNN, and LSTM in **PyTorch**, fine-tuned on pretrained GPT-2