

EDUCATION

- **University of California, Berkeley** Berkeley, USA
PhD Student, Department of Electrical Engineering and Computer Science *Aug 2021 - Present*
- **University of Toronto** Toronto, Canada
Masters in Computer Science *Jan 2019 – May 2020*
- **University of Waterloo** Waterloo, Canada
Bachelors of Science, Honours Science, Bioinformatics Option *Sept 2014 – May 2018*

RESEARCH EXPERIENCE

- **UC Berkeley/Berkeley AI Research** Berkeley, USA
PhD Student *July 2021 – Present*
 - **Biological sequence design:** Developing methods for modelling and exploring protein fitness landscapes for ML-guided biological design.
- **Insitro** South San Francisco, USA
Machine Learning Engineer III *July 2020 – July 2021*
 - **Image-based profiling:** Engineering biologically interpretable representations of microscopy imaging phenotypes for drug discovery.
 - **Molecular design:** Supporting ML-guided molecular design through new representation methods and chemoinformatics analyses.
- **University of Toronto/Vector Institute** Toronto, Canada
Masters Student — Advisors: Alan Moses and Marzyeh Ghassemi *Jan 2019 – May 2020*
 - **Representation learning for proteins:** Developed a parameter-efficient representation for proteins using contrastive mutual information maximization (*MLCB 2020*).
 - **Generalizability to distribution shifts:** Benchmarked self-supervised computer vision methods in a microscopy image dataset with covariate shift to highlight generalization failures in machine learning (*NeurIPS 2019*).
 - **Medical note NLP, algorithmic fairness:** Quantitative and qualitative evaluation of bias in contextual word embeddings of clinical notes; fairness definitions for multi-group settings (*Spotlight, ACM CHIL 2020*).
- **Stanford University** Stanford, USA
Visiting Student — Advisor: Anshul Kundaje *Sept 2019 – Jan 2020*
 - **Regulatory genomics:** Using domain adaptation methods to enable transcription factor binding prediction when evaluating on holdout cell lines.
- **Harvard Medical School/Boston Children's Hospital** Boston, USA
Research Intern — Advisor: Piotr Sliz *Jun 2018 – Jan 2019*
 - **Exome variant prioritization:** Understanding genotype-phenotype relationships in childhood epilepsy. Interpreted important model features to seek novel disease-associated variants from whole exome (WES) data.
- **University of Waterloo** Waterloo, Canada
Undergraduate Thesis Student — Advisor: Andrew Doxey *Sept 2017 – May 2018*
 - **Chromatin accessibility:** Prediction of accessible chromatin regions for femur growth regulation. Reconstructed convolutional filters as a position-weighted matrix (PWM) with statistical matches in JASPAR, a database of known motifs.
- **École polytechnique fédérale de Lausanne** Lausanne, Switzerland
Research Intern — Advisor: Dr. Matteo Dal Parero *Jun 2017 - Sept 2017*
 - **Molecular dynamics:** Used molecular dynamics (MD) and GROMACS to simulate enzyme-membrane mechanisms of NDM-1, an enzyme which confers antibiotic resistance.

PREPRINTS AND PUBLICATIONS

- S Kolli, **AX Lu**, X Geng, A Kumar, S Levine. Data-Driven Optimization for Protein Design: Workflows, Algorithms and Metrics. *ICLR 2022 Workshop on Machine Learning for Drug Discovery workshop (MLDD)*.
- AX Lu, **AX Lu**, I Pritianac, T Zarin, JD Forman-Kay, AM Moses. Discovering molecular features of intrinsically disordered regions by using evolution for contrastive learning. *bioRxiv*
- C Dallago, K Schütze, M Heinzinger, T Olenyi, M Littmann, **AX Lu**, KK Yang, S Min, S Yoon, JT Morton, B Rost. Using protein sequence representations from deep learning to visualize and predict protein sets. *Current Protocols*.
- C Dallago, K Schütze, M Heinzinger, T Olenyi, M Littmann, **AX Lu**, KK Yang, S Min, S Yoon, B Rost. Streamlining value of protein embeddings through bio_embeddings. *NeurIPS 2020 Workshop on Learning Meaningful Representations of Life (LMRL)*.
- **AX Lu**, H Zhang, M Ghassemi, AM Moses. Self-supervised contrastive learning of protein representations by mutual information maximization. *Machine Learning for Computational Biology (MLCB) 2020*.
- **AX Lu**, AX Lu, AM Moses. Evolution Is All You Need: Phylogenetic Augmentation for Contrastive Learning. *Machine Learning for Computational Biology (MLCB) 2020*.
- H Zhang*, **AX Lu***, M Abdalla, M McDermott, M Ghassemi. Hurtful Words: Quantifying Biases in Clinical Contextual Word Embeddings. *Spotlight, ACM Conference on Health, Inference, and Learning (CHIL) 2020*. *Equal Contribution.
- AX Lu, **AX Lu**, W Schormann, M Ghassemi, DW Andrews, AM Moses. The Cells Out of Sample (COOS) dataset and benchmarks for measuring out-of-sample generalization of image classifiers. *Neural Information Processing Systems (NeurIPS) 2019*.
- M Abdalla, H Zhang, **AX Lu**, I Chen, M Ghassemi. Quantifying Fairness in a Multi-Group Setting and its Impact in the Clinical Setting. *NeurIPS 2019 Workshop on Fair ML for Health*.
- AM Moses, AX Lu, **AX Lu**, M Ghassemi. Transfer Learning vs. Batch Effects: what can we expect from neural networks in computational biology? *Machine Learning for Computational Biology (MLCB) 2019*.
- AX Lu, **AX Lu**, AM Moses. Paired Cell Inpainting: A Multiple-Instance Extension of Self-Supervised Learning for Bioimage Analysis. *ICML 2019 Workshop on Self-Supervised Learning*.
- J Ban, M Tadrous, **AX Lu**, EA Cicinelli, SM Cadarette. Diffusion of indirect comparison meta-analytic methods to study drugs: a systematic review and co-authorship network analysis. *BMJ Open*.

AWARDS

- **Paula Hawthorn Fellowship**: UC Berkeley Computing, Data Science and Society departmental fellowship.
- **NSERC Postgraduate Scholarships – Doctoral program (PGS D) Award**: Federal doctoral scholarship tenurable abroad, selected in the Committee for Computing Sciences.
- **NSERC Canada Graduate Scholarships – Doctoral (CGS D) Award**: Federal doctoral scholarship tenurable only at a Canadian institution, selected in the Committee for Computing Sciences [DECLINED].
- **Alexander Graham Bell Canada Graduate Scholarships – Master’s (CGS M) Award**: Federal research scholarship for high-calibre Master’s research students.
- **NSERC Michael Smith Foreign Supplement**: Supports high-calibre Canadian graduate students in pursuing research abroad.
- **EPFL Scholarship of Excellence in Research**: Sponsors students for research internship at EPFL.
- **President’s Scholarship of Distinction, Arebi Family Science Scholarship**: University of Waterloo.
- **Royal Conservatory of Music (RCM)**: ARCT Performer’s Diploma in Piano.

SERVICE AND ACTIVITIES

- **Reviewing & Program Committee**: Machine Learning for Health (2020, 2021); Machine Learning for Computational Biology (2021); NeurIPS Workshop on AI for Science (2021); NeurIPS Workshop on Distribution Shifts (2021).
- **Research to the People, Core Team (formerly SVAI)**: Non-profit connecting patients of rare genomic diseases to the medical/AI research community and industry partners through collaborative research initiatives.
- **Tosamaganga Hospital**: Supported operations at a rural Tanzanian hospital.
- **Residence Don**: Organized events, responded to crises, and established rapport with diverse students. Leader for the Velocity Residence, a spin-off program of the Velocity start-up incubator.