Jeffrey Boschman

Graduate Research Assistant, *Artificial Intelligence in Medicine (AIM) Lab*

Areas of Expertise

Deep learning | Python programming | Histopathology | Medical device development | Bioreactors | Pharmaceutical cGMP

Programming Skills

Languages:	Python, R, MATLAB, Bash, LaTeX
Libraries:	PyTorch, Keras, torchvision, Pandas, NumPy, Matplotlib, Seaborn, OpenCV, SciPy, scikit-learn, Pydicom, git
Tools:	Vim, Jupyter, Google Colab, RStudio, Linux/Unix, Docker/Singularity, Slurm, JIRA, Github, Bitbucket

Education

Master of Applied Science (MASc), Biomedical Engineering Sept 2019 - Feb 2022
University of British Columbia *Vancouver, Canada*
- GPA: 4.29/4.33; Switched from course-based Master of Engineering to research-based MASc in May 2020

Bachelor of Applied Science (BASc), Chemical and Biological Engineering Sept 2012 - May 2017
University of British Columbia (UBC) *Vancouver, Canada*
- GPA: 3.85/4.33; Dean's List; With Distinction and Co-operative Education
- Sherman Chen Scholarship in Chemical Engineering; Dorothy and Arthur Holt Scholarship

Research Experience

Graduate Research Assistant May 2020 - Feb 2022
The Artificial Intelligence in Medicine Lab, *UBC* *Vancouver, Canada*
Currently improving deep learning classifier of ovarian cancer histology images to approach the level of expert gynecological pathologists by developing novel feature engineering strategies
- First-authored paper comparing eight color normalization algorithms (using Python or MATLAB) and introducing innovative augmentation approach for consistent diagnostic performance increase on out-of-distribution data
- Developed codebase and machine learning pipeline with a team of 8 for data preparation, statistical analysis, and visualization using PyTorch, NumPy, SciPy, scikit-learn, etc. on a remote Linux server
- Led weekly literature review and book club; organized virtual and in-person lab events for team building
- Placed top-5 at UBC research showcase for video communicating technical project to non-specialist audience
- Supervisor: Dr. Ali Bashashati, PhD

Graduate Student Sept 2019 - April 2020
Engineers in Scrubs program, *UBC* *Vancouver, Canada*
Designed and created medical device prototype with a team of 4 (patent application in process) to decrease the mobility of subcutaneous plaque and facilitate more accurate injections in treating Peyronie's disease
- Iteratively developed needs-based technology by identifying stakeholders, analyzing the market, shadowing surgeries, and conducting patient and clinician interviews
- Supervisors: Roger Tam, PhD and Ryan Flannigan, MD

Research and Development Intern May - Aug 2019
New Beta Innovation Ltd. *Hong Kong SAR*
Achieved 60% increase in volumetric yield of a recombinant *E. coli* fermentation product by optimizing 2L bioreactor conditions

- Ensured purity and confirmed enzymatic activity of product using techniques such as inclusion bodies extraction, SDS-Page, and activity assays

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Work Experience

Graduate Teaching Assistant Sept - Dec 2020
BMEG 557: Statistical Methods for Evaluating Medical Technologies, *UBC* *Vancouver, Canada*
Helped graduate students understand practical statistics by answering questions and marking assignments/exams

- Topics covered: Sampling methods, experimental design, survival analysis, sensitivity vs. specificity, AUC, ROC curves, risk ratio vs. odd ratio, confidence intervals, chi-square tests, etc

Production Technician Oct 2017 - Dec 2018
New Beta Innovation Ltd. *Burnaby, Canada*
Conducted commercial-scale engineering trial runs for optimizing aseptic production and filling of a haemoglobin-based pharmaceutical with a five-day turnaround

- Authored and executed validation documents and protocols (URS, DQ, IQ, OQ, PQ, etc) for equipment on-boarding and cGMP readiness and developed standard operating procedures for multiple production operations
- Led formal risk assessment (FMEA) on equipment installation in Grade A environment as subject matter expert

Fermentation Engineer Intern Jan - Sept 2017
The Biofoundry, *UBC* *Vancouver, Canada*
Managed the operation, maintenance, and coordination of a 2L bioreactor

- Optimized bioreactor for genetically modified bacteria under different aeration conditions

Pilot Plant Chemical Engineering Intern Jan - July 2016
Carbon Engineering Ltd. *Squamish, Canada*
Redesigned fluidized bed pellet reactor by analyzing flaws in previous models, improving ease of use, researching materials, and making equipment modifications

- Constructed two 20 ft tall reactors and conducted tests to quantify pellet growth and attrition by analyzing total suspended solids, pH, and pellet size distribution

Laboratory/Workshop Assistant May - Aug 2015
Department of Chemical and Biological Engineering (CHBE) *Vancouver, Canada*
Built new equipment for undergraduate labs involving thermodynamics and fuel cells and disassembled broken equipment using plasma torch, grinder saw, and oxyacetylene torch

Technician May - Dec 2014
Maxxam Analytics *Burnaby, Canada*
Ensured clients received accurate, timely results by efficiently managing up to 300 samples per day of ~15 analytical procedures while accounting for RUSH samples, making new reagents with back-titration, and training other students

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Technical Projects

Machine Learning Scientist Sept - Oct 2021
RSNA-MICCAI Brain Tumor Radiogenomic Classification Competition*, Kaggle.com* *Remote*
Developed data cleaning and machine learning pipeline for binary classification of 3D DICOM brain MRI scans

- Programmed functions for normalizing, resampling (sagittal/coronal to axial), isolating, and visualizing 3D MRIs
- Created custom PyTorch Dataset, DataLoader, Transform, and Model classes for clean deep learning analysis

Editor-in-Chief May - Current
One Minute Machine Learning, *Medium.com* *Remote*
Currently writing articles summarizing important machine learning papers and topics in simple terms for beginners
- Authored articles on: Inception, VGG, ResNet, multi-instance learning, domain adaptation, recurrent neural networks, regularization (L1, L2, dropout, batch normalization), Transformers, attention, BERT, etc

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Awards

UBC Biomedical Imaging and Artificial Intelligence Fall Research Showcase Top 5	2021
Dean's Award ($150)	2017
Design and Innovation Award ($150)	2017
Sherman Chen Scholarship in Chemical Engineering ($3,920)	2016
Dorothy and Arthur Holt Scholarship ($450)	2016
BIOMOD 1st Place Audience Choice Award	2015
BIOMOD Silver Project Award	2015
Go Global International Learning Programs Award ($1,000)	2015

Publications

Boschman, J., Farahani, H., et al. "The Utility of Color Normalization for AI-Based Diagnosis of Hematoxylin and Eosin-Stained Pathology Images." The Journal of Pathology, Sept. 2021, doi:10.1002/PATH.5797.

Chan, K. Y. T., Zhao, C., Siren, E. M. J., Chan, J. C. Y., **Boschman, J.**, & Kastrup, C. J. (2016). "Adhesion of blood clots can be enhanced when copolymerized with a macromer that is cross-linked by coagulation factor XIIIa". **Biomacromolecules**, 17(6), 2248–2252. http://doi.org/10.1021/acs.biomac.6b00481

Oral Presentations

Boschman, J., (2021, June). "Improving Deep Learning Models for Clinical Epithelial Ovarian Carcinoma Whole Slide Pathology Image Classification Using Color Normalization", *BME-AI Monthly Research Exchange,* Virtual

Boschman, J., Brown, J., Levschuk, A., Werschler, N., (2020, April). "Local Traction to Facilitate Accurate Injection of Xiaflex for Peyronie's Disease", *Engineers in Scrubs 2020,* Vancouver, BC

Fu, D., **Boschman, J.**, Chan, N., Co, I., Fegen, A., Luvalle-Burke, I., Shahali, A. (2015, October). "DNA origami, gold nanoparticle and liposome drug delivery system enabling simultaneous and triggered release", *BIOMOD 2015 Competition*, Boston, MA

Poster Presentations

Boschman, J., (2021, October). "Making Deep Learning Models for Ovarian Cancer Diagnosis More Reliable with Color Normalization", *UBC Biomedical Imaging and Artificial Intelligence Fall Research Showcase 2021*, Video

Boschman, J., Farahani, H., Farnell, D., Jones, S. J. M., Huntsman, D. G., Gilks, C. B., Bashashati, A. (2021, May). "The Utility of Color Normalization for Artificial Intelligence-Based Diagnosis of Hematoxylin and Eosin-Stained Pathology Images", *UBC Pathology Day 2021*, Virtual

Amiri, A., **Boschman, J.**, Yadav, V. G., Scaman, C., Rahim, R. A., Yada, R. Y., Mohamad, R. (2017, July). "Optimal Hemin Stimulation for Maximizing Lactococcus lactis Biomass Production under Respiration Conditions in Batch Cultivation", *2017 BIO World Congress on Industrial Biotechnology*, Montreal, QC

Apduhan, M., **Boschman, J.**, Chan, N., Chin, B., Co, I., Goertsen, D. (2017, March). "Industrial Scale Production of Biocompatible Polyhydroxybutyrate (PHB) Using Apoptosis-regulated Recombinant Escherichia coli", *UBC Applied Science Design Day*, Vancouver, BC

Professional Development

Understanding the Tissue, *Digital Pathology Place,* attendee — October 2021
Data-centric AI: Real World Approaches, *DeepLearning.AI,* attendee — August 2021

Committee Membership and Leadership

Trainee Education Committee Member — April 2021 - Dec 2021
Gynecological Cancer Initiative (GCI) — *Vancouver, Canada*
Helped build and support academic, professional development, and mental health initiatives for GCI trainees
- Conducted research impact assessment to achieve more funding
- Wrote articles to help patients learn more about the basics of cancer in an easy-to-understand way

Event Organizer — May 2020 - Dec 2021
Artificial Intelligence in Medicine Lab — *Vancouver, Canada*
Planned lab events, such as cultural celebrations and summer BBQs, ensuring that everyone felt included
- Led weekly book club by facilitating discussion and choosing appropriate study materials
- Organized the presenters of weekly literature reviews to stay up to date with research

Science Educator — May 2017 - April 2018
Let's Talk Science / The Dept. of Chemical and Biological Engineering, *UBC* — *Vancouver, Canada*
Fostered interest in science by performing various cool experiments and presenting concepts in easy-to-understand ways
- Conducted chemistry experiments for grade 7 students, taught grade 8 students chemical engineering concepts, guided grade 3 student to create science fair project using levers, and did liquid nitrogen ice cream demonstrations

Undergraduate Safety Committee Representative — Sept 2016 - Sept 2017
CHBE/CERC Safety Committee — *Vancouver, Canada*
Corrected 11 extremely dangerous hazards and 178 safety deficiencies by conducting 22 laboratory safety inspections

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Other Voluntary Work

Homeless Shelter Volunteer — Oct 2017 - Feb 2020
Union Gospel Mission — *Vancouver, Canada*

Construction and Farming Volunteer — Feb - May 2019
WWOOF Japan — *Fujinomiya, Ishigaki, and Kasumigaura, Japan*

Recreational Program Volunteer — Oct 2017 - Jan 2019
Burnaby General Hospital - Fellburn Care Center — *Burnaby, Canada*

Undergraduate Research Assistant — Feb - Aug 2015
Kastrup Lab — *Vancouver, Canada*

Hobbies

Calisthenics | Yoga | Cooking with my cast iron pan (Loonardo DiCastironio) | Learning Japanese

References

Ali Bashashati, PhD
Hossein Farahani, PhD
Roger Tam, PhD
Chad Pickel