

CURRICULUM VITAE

Ricky Hu

Email: rhu@qmed.ca | Website: <http://ricky-hu.github.io>

Note: No familial relation to any co-authors in publications

Summary: Medical student with engineering physics background involved in hands-on technical development of artificial intelligence algorithms of medical images, predictive analysis for clinical data, and robotics. End-to-end leader of clinical studies from clinical problem formulation to solution invention to validation analysis. Leading AI education initiatives by creating and instructor AI training programs for medical students and teaching medical imaging physics to undergraduate engineers.

Education

Queen's University (Expected) May 2023

- Doctor of Medicine (In Progress)

The University of British Columbia May 2019

- Master of Applied Science, Biomedical Engineering (GPA: 91%)
Thesis: *Automatic Analysis of the Placenta in Ultrasound* (Thesis Grade: 95%)

The University of British Columbia May 2016

- Bachelor of Applied Science, Engineering Physics (Electrical and Computer Specialization)
- Minor in Honours Mathematics

Indexed Publications

1. Deeba, F., **Hu, R.**, Lessoway, V., Terry J., Pugash, D., Hutcheon, J. A., Mayer, C., Rohling R., (2021) A Quantitative Ultrasound Approach for Detecting Placenta-Mediated Diseases. IEEE International Ultrasonics Symposium (IUS). ePub ahead of print.
2. Deeba, F., Schneider, C., **Hu, R.**, Lessoway, V., Terry, J., Pugash, D., Hutcheon, J. A., Mayer, C., Rohling R. (2021) Ultrasonic Attenuation Coefficient Estimate of Placenta is correlated to MRI Proton-Density-Fat Fraction: A Preliminary Ex Vivo Study. IEEE International Ultrasonics Symposium (IUS). ePub ahead of print.
3. Hu, Z.*, **Hu, R.***, Yan, R., Mayer, C., Rohling, R., Singla, R. (2021). Automatic placenta abnormality detection using convolutional neural networks on ultrasound texture. Paediatric and Perinatal Imaging at the International Conference on Medical Image Computer and Computer Assisted Intervention, 147-156.

***Equal contribution and joint first author (no familial relationship)**

4. Deeba, F., **Hu, R.**, Lessoway, V., Terry, J., Pugash, D., Hutcheon, D., Mayer, C., Rohling, R. (2021). Project SWAVE 2.0: A multimodal placental imaging study. *Placenta*, 112, E17-E18.
5. Fan, K., **Hu, R.**, Singla, R. (2020). Introductory machine learning for medical students: A pilot. *Medical Education*, 54(11), 1042-1043.
6. **Hu, R.**, Singla, R., Deeba, F. & Rohling, R. N. (2019). Acoustic shadow detection: study and statistics of B-Mode and radiofrequency data. *Ultrasound in Medicine & Biology*, 45(8), 2248-2257.
7. **Hu, R.**, Singla, R., Yan, R., Mayer, C., & Rohling, R. N. (2019). Automated placenta segmentation with a convolutional neural network weighted by acoustic shadow detection. *IEEE Engineering in Medicine and Biology Society (EMBC)*, 6718-6723.

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8. Deeba, F., **Hu, R.**, Terry, J., Pugash, D., Hutcheon, J. A., Mayer, C., Salcudean, S., & Rohling, R. (2019). A spatially weighted regularization method for attenuation coefficient estimation. IEEE International Ultrasonics Symposium (IUS), 2023-2026.
9. Jayatilaka, H., Murray, K., Guillén-Torres, M. Á., Caverley, M., **Hu, R.**, Jaeger, N. A. F., Chrostowski, L., & Shekhar, S. (2015). Wavelength tuning and stabilization of microring filters using silicon in-resonator photoconductive heaters. Optics Express, 23(19), 25084-25097.
10. Ma, M., Murray, K., Ye, M., Lin, S., Wang, Y., Lu, Z., Yun, H., **Hu, R.**, Jaeger, N. A. F., & Chrostowski, L. (2016). Silicon photonic polarization receiver with automated stabilization for arbitrary input polarizations. CLEO: Science and Innovations, 4-8.

Non-Indexed Conference Oral and Poster Presentations

- **Hu, Z*, Hu, R***, Singla, R., Yan, R., Rohling, R. N., and Mayer, C. (2021) Automated AI-based risk stratification of placental disease from ultrasound imaging with a convolutional neural network system. UBC Radiology Research Day, Poster and Oral Presentation.
 - * **Equal contribution and joint first author (no familial relationship)**
 - *Winner of Canada Diagnostic Centre's best poster award*
- Crête, S., Campbell, N., **Hu, R.**, Peoples, J., Yan, M., Olding, T., Tyryshkin, K., Simpson, A., and Ynoe de Moraes, F. (2021) Time-dependent machine learning prediction model to estimate survival time of brain metastases with MRI radiomics. European Society for Radiotherapy and Oncology Congress.
- **Hu, R.**, Chen, I., Beaulieu, K., Zhang, Y., Reyngold, M., Simpson A. (2020) An artificial intelligence model to predict survival of liver metastases patients. Queen's Medical Student Research Showcase, Oral Presentation.
 - *Winner of Dr. Albert Clark award for excellence in medical student research*
- **Hu, R.**, Mathur, P., El-Hariri, H., Wyss, J., Danaei, P., Parhar, H., Prisman, E., Anderson, D. W. (2018) A low-cost variable frequency vibration device to assist speech generation for laryngectomy patients. UBC Department of Surgery Research Day, Oral Presentation.
 - *Winner of top plenary award at the UBC Department of Surgery Research Day*

Selected Extracurricular Activities

Co-Founder and Lead Instructor

Kingston, ON

Artificial Intelligence for Medical Students Workshop

Jan 2019 – Present

- Created AI workshop (running 4 times, is ongoing) having 300+ medical students registered and 60+ live attendees, taught AI concepts and custom medical AI programming examples.
- Created and maintained website to deliver content and recordings (<http://ubcaimed.github.io>)

Senior Scout Leader

Richmond, BC

3rd Richmond Scout Troop

Sep 2010 - Present

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- Trained 300+ scouts aged 5-20 in outdoor survival, leadership, and communication from leading 150+ workshops, 30+ camping trips, and fundraising \$40,000+ for youth programs.
- Earned 7 national awards for service, promoted to head leader of advanced skills.

Water Rescue Head Instructor and Sailing Instructor

Vancouver, BC

Scouts Canada

Jun 2010 - Present

- Led team of 6 rescuers (head since 2017) to pilot watercraft and recover sailors in distress, overseeing safety of 150+ sailors and designing protocols for complex storm conditions.

Other Extracurricular Activities

- Senior Executive, Innovation in Medicine Interest Group (Sept 2019 – Present)
- Hackathon Competitor, NW Hacks and Hatching Health (March 2016 – March 2019)
- Startup Co-Venturer, Entrepreneurship@UBC Startup Accelerator (Sept 2018 – May 2019)
- Executive, UBC Biomedical Engineering Graduate Association (Sept 2017 – May 2019)
- Webmaster, UBC Engineering Undergraduate Society (Sept 2013 – May 2015)

Academic Honours and Awards

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| • Canada Diagnostic Centre's Poster Contest Best Poster Award | 2021 |
| • Queen's University Basmajian Research Scholar | 2021 |
| • Queen's School of Medicine Dr. Albert Clark Award for Excellence in Medical Student Research | 2020 |
| • UBC Chung Surgery Research Day Top Plenary Talk Award | 2018 |
| • UBC Biomedical Engineering Symposium Best Poster Award | 2018 |
| • UBC Faculty of Applied Science Graduate Student Award | 2018 |
| • UBC School of Biomedical Engineering Graduate Student Initiative Award | 2018 |
| • Sun Rise Rotary Club Scholarship | 2012 |
| • UBC President's Entrance Scholarship | 2011 |

Non-Academic Honours and Awards

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| • Scouts Canada Certificate of Commendation | 2017, 2018, 2019 |
| • Duke of Edinburgh's Award – Gold Level | 2017 |
| • Scouts Canada Bar to Good Service | 2017 |
| • Scouts Canada Medal of Good Service | 2013 |
| • Scouts Canada Medal of the Maple | 2013 |
| • Queen's Venturer Award | 2010 |

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Work Experience

Electrical and Computer Engineering, UBC

Vancouver, BC

Medical Imaging Physics Teaching Assistant

Sep 2018 – Dec 2018

- Instructed medical imaging tutorials and graded assignments/exams in topics of X-ray, CT, MRI, and ultrasound imaging physics for electrical engineering undergraduate students.

Robotics and Control Laboratory, UBC

Vancouver, BC

Graduate Research Assistant

Aug 2017 – Aug 2019

- Designed and led 2 clinical studies on humans to develop algorithms to computer tissue properties for automatic detection of disease, resulting in 2 first author publications.

MDA Systems Ltd.

Richmond, BC

Software Engineer

Aug 2016 – April 2017

- Developed algorithms and system integration software for image processing, geodetic mapping, and earth ellipsoid modelling from satellite ephemeris and optical imagery data.

Pacific Institute of Mathematical Sciences

Vancouver, BC

Data Science Engineer

May 2016 – Aug 2016

- Programmed 15 prototypes of data analytics software using a fully remote python kernel on a web browser, such as an image recognition interface from a user-input image.

Photonics Research Group, UBC

Vancouver, BC

Research Assistant

May 2015 – Sep 2015

- Designed and implemented a microcontroller photocurrent stabilization system to maximize signal power output of a photonic chip, co-authored in two publications for contributions.

Spot Solutions Ltd.

Vancouver, BC

Software Development Intern

May 2014 – Dec 2014

- Programmed C# applications in an Agile environment to monitor real time sensors by processing data to a database through SQL procedures and a C# (.NET) framework.

NORAM Engineering and Constructors

Vancouver, BC

Research Engineering Intern

Jan 2013 – Apr 2013

- Planned, executed, and analyzed chemical yield experiments, utilizing MATLAB signal processing algorithms to filter chemical reactor thermoconductivity data.

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Technical Skills

Programming and Software:

C, C++, MATLAB, Python, Jupyter, Bash, SolidWorks, Lumerical, Git

Electrical and Mechanical:

Digital logic, signal processing, Fourier spectral analysis, circuit simulation, information theory, CNC and manual machining, rapid prototyping (3D printing, laser cutting, waterjet)

Mathematics & Physics:

Machine learning, computer vision, statistical modelling, differential error analysis, linear programming, partial differential analysis, statistical mechanics, optics, electrodynamics

Recent Technical Projects

More past projects can be seen online <http://ricky-hu.github.io/projects>

Project	Supervisor(s)	Contribution
AI Prediction of Renal Function from Ultrasound (1 conference presentation)	Dr. Timothy Murray Dr. Robert Rohling Dr. Christopher Ngan	Formulated and programmed algorithm to compute quantitative texture features from ultrasound and programmed AI classification model
AI Survival Prediction of Liver Metastases Patients from CT Radiomics (1 conference award)	Dr. Amber Simpson Dr. Marsha Reyngold Dr. Paul Romesser	Programmed AI prediction algorithm, mathematically characterized tumors in liver CT with radiation oncologists
AI Prediction of Placental Disease from Fetal Ultrasound (1 publication)	Dr. Robert Rohling, Dr. Chantal Mayer	Programmed AI image analysis algorithm, led and designed clinical study
Elastography Analysis of Placental Tissue (5 publications)	Dr. Denise Pugash, Dr. Robert Rohling, Dr. Chantal Mayer Dr. Jefferson Terry	Assisted in running ultrasound scans and building elastography vibration apparatus
Acoustic Shadow Detection from Ultrasound Physics (1 publication)	Dr. Robert Rohling	Develop math from ultrasound physics, programmed detection algorithm, led and designed clinical study
Low-Cost Voice-Assist Device for Laryngectomy Patients (2 conference awards)	Dr. Donald Anderson, Dr. Harman Parhar	Designed electronics, designed and 3D-printed mechanical model, developed vibrational math model
Automated Placenta Segmentation from Ultrasound (1 publication)	Dr. Robert Rohling, Dr. Chantal Mayer	Programmed neural network to extract fetal anatomy from scans, led and designed clinical study

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Photonic Resonance Controller (1 conference award)	Dr. Lukas Chrostowski	Designed, programmed, and fabricated laser resonance stabilizer circuit
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